Environmental Assessment

Clear Creek Fuels Reduction and Ecosystem Enhancement Project

United States Department of Agriculture

Forest Service

Intermountain Region

Humboldt-Toiyabe National Forest
Carson Ranger District
Carson City and Douglas Counties, Nevada

December 29, 2008

A Healthy Forest Restoration Act Project

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CHAPTER 1
PURPOSE AND NEED

INTRODUCTION

The Healthy Forest Restoration Act of 2003 (HFRA) was signed into law on December 3, 2003. The purpose of the HFRA is in part to: (A) reduce wildfire risk to communities, municipal water supplies, and other at-risk Federal land through a collaborative process of planning, prioritizing, and implementing hazardous fuel reduction projects; (B) enhance efforts to protect watersheds and address threats to forest and rangeland health, including catastrophic wildfire, across the landscape and; (C) protect, restore, and enhance forest ecosystem components, promoting the recovery of threatened and endangered species to improve biological diversity and enhance productivity and carbon sequestration (HR 1904).

The Clear Creek Fuels Reduction and Ecosystem Enhancement analysis was completed under HFRA (USDA DOI 2004). This project is an authorized hazardous fuels reduction project in accordance with the HFRA because:

- The project is located on Federal lands within a wildland urban interface (WUI) area of an at-risk community.
- The project is being conducted under sections 103 and 104 of the HFRA

The project area is located on the Carson Ranger District of the Humboldt-Toiyabe National Forest, and is adjacent to two at-risk communities: Carson City and Clear Creek, Nevada. The community wildfire protection plans contain the following recommendations for US Forest Service lands:

- Clear Creek Community Wildfire Protection Plan: this plan recommends the Forest Service participate in planning and implementation of landscape-scale fuelbreaks in the Clear Creek community.
- Carson City Community Wildfire Protection Plan: this plan recommends pursuing funding for and implementing planned and scheduled fuelbreaks and fuel reduction treatments for the Carson City community.

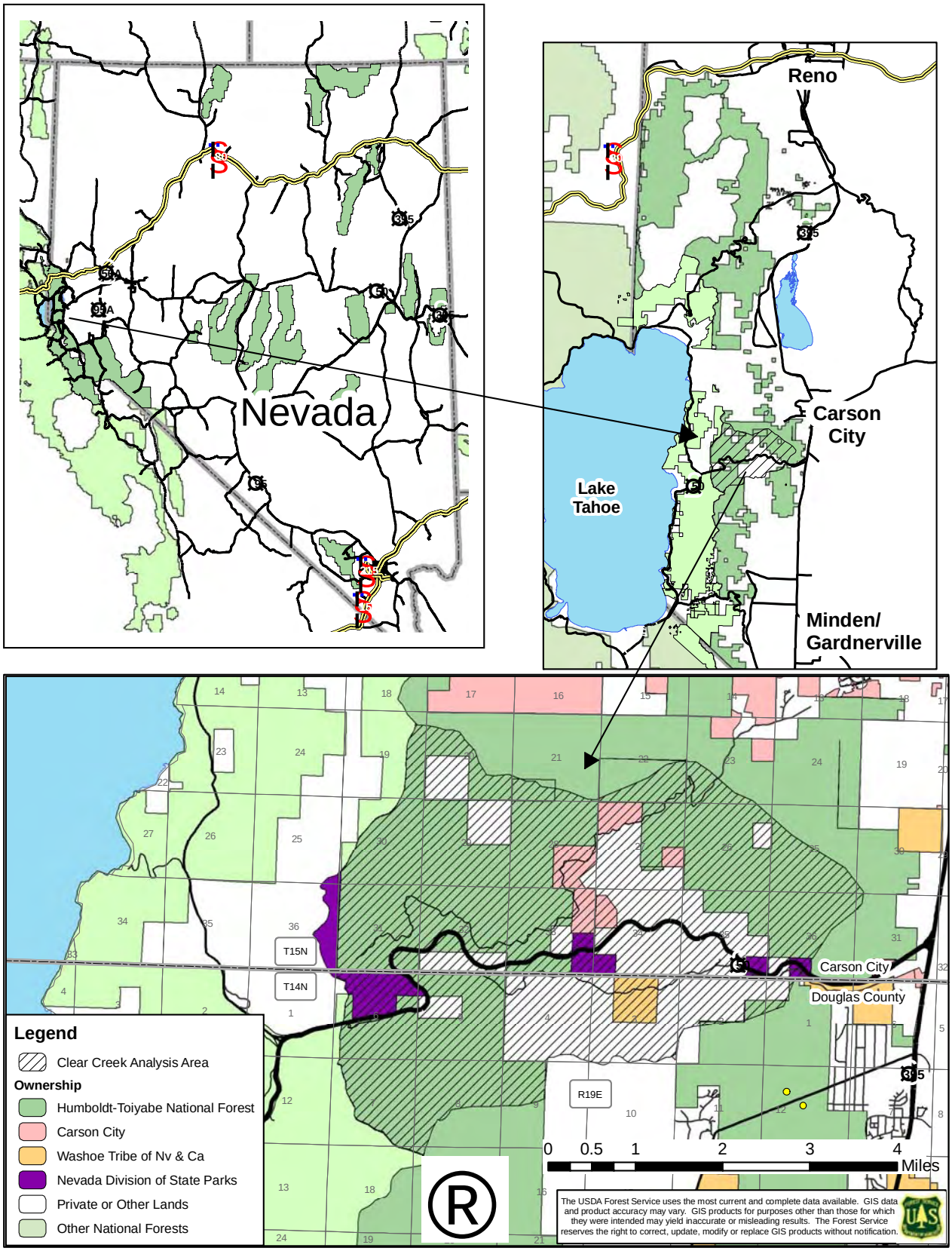
The analysis area for this project encompasses approximately 12,190 acres of land; table 1-1 describes the acreage by land ownership.

Table 1-1 Land ownership within the analysis area

Ownership	**Acreage**
Humboldt-Toiyabe National Forest, Carson Ranger District	7,230
Carson City	404
Nevada Division of State Parks or State of Nevada	410
Washoe Tribe of Nevada and California	170
Private or Other Lands	3,976
TOTAL	**12,190**

The project is located within the Carson River/Buckbrush Well, Carson Valley, and Carson River/Stewart Hydrologic Unit Code (HUC) six watersheds. The elevation of the analysis area ranges from 5,400 to 8,600 feet. The legal description for the analysis area is Township 14 North, Range 19 East, sections 1, 2, 5, 6, 7, 8 and 9 and Township 15 North, Range 19 East, sections 19, 20, 21, 22, 23, 25, 26, 27, 28, 29, 30, 31, 32, 33, 35 and 36. Figure 1-1 is a vicinity map of the project area.

Figure 1-1 Vicinity Map



PURPOSE AND NEED

The purpose and need for this project includes:

- Reduce wildland fire risk to the Clear Creek, Carson City, and Kings Canyon communities and to reduce fuel loading and ladder fuels in forested and shrub areas adjacent to the wildland urban interface west of Carson City. Currently dense vegetative conditions with high fuel loading and excessive ladder fuels create a high risk of uncharacteristic catastrophic wildland fires.
- Reduce dense vegetation to increase vigor, health and growth rates in the forested ecosystem. Competition from high tree densities has reduced stand vigor, thus increasing the possibility that insects, disease, or wildfire would kill the forested stands, including late and older successional trees. Improving the health of the forested ecosystem would reduce the long-term risk of loss and protect this ecosystem component while enhancing productivity.
- Improve aspen stands that are declining from encroaching conifer trees that shade out and replace sun-loving aspen. By removing the encroaching conifers and some older decadent aspen, shading would be reduced, allowing the aspen stand to expand. This action would restore an ecosystem component that has diminished in size and vigor. This would improve habitat for a variety of wildlife species, including migratory birds and mule deer.
- Improve the quantity and quality of mule deer forage and deer winter range. The need for improved forage for mule deer and other wildlife. In some areas, bitterbrush and sagebrush is old and decadent, providing poor forage for mule deer. Removal of some shrubs would encourage sprouting, providing improved forage.
- Provide defensible areas for firefighters to control and/or suppress future wildland fires.

This action responds to the goals and objectives outlined in the Toiyabe National Forest Land and Resource Management Plan (USDA 1986), as amended by the Sierra Nevada Forest Plan Amendment Record of Decision (USDA 2004), and helps move the project area towards desired conditions described in those plans.

MANAGEMENT DIRECTION AND GUIDANCE

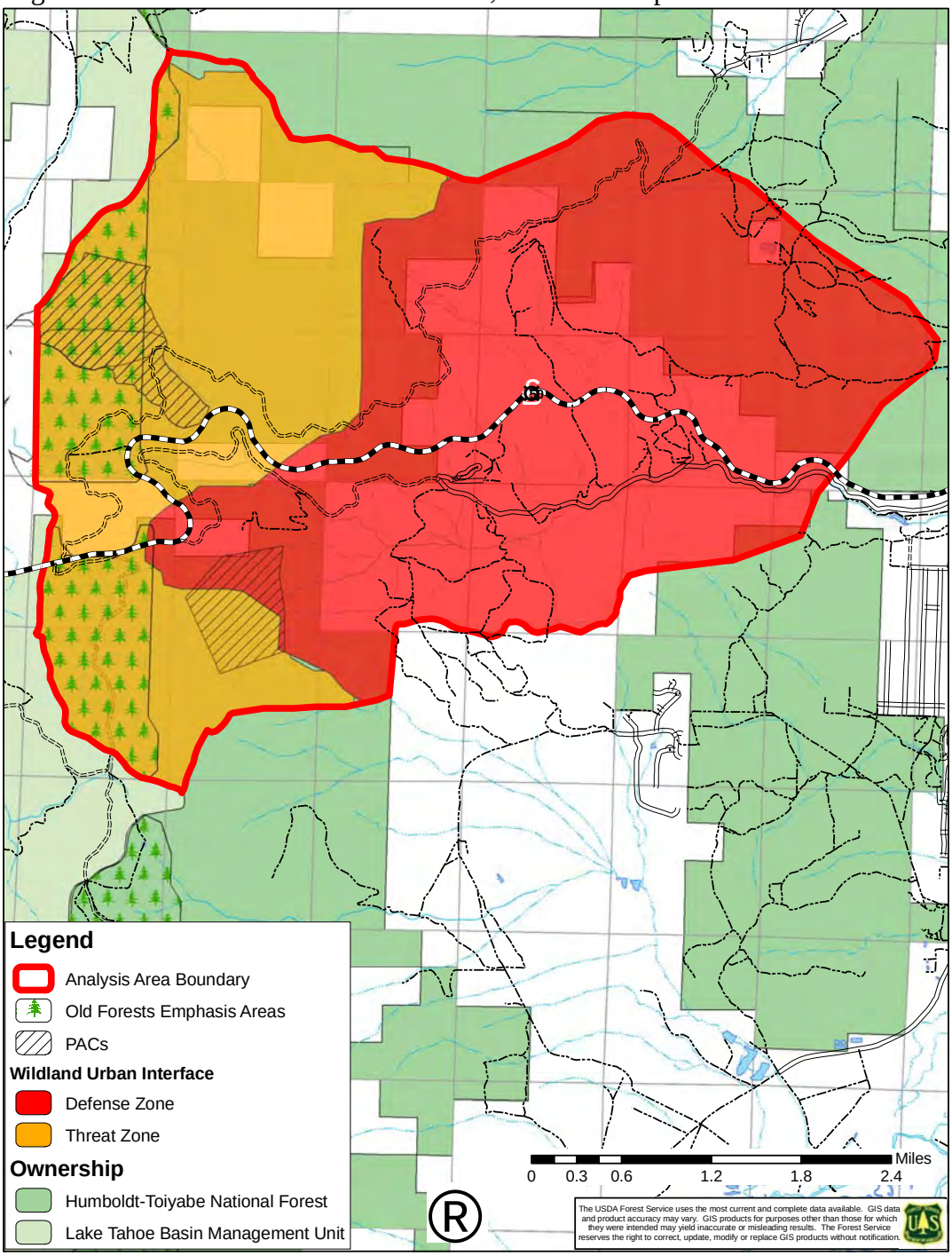
The Clear Creek Fuels Reduction Project is proposed at this time to respond to goals and objectives of the National Fire Plan (USDA DOI 2000) and the Toiyabe National Forest Land and Resource Management Plan (USDA 1986), as amended by the Sierra Nevada Forest Plan Amendment Record of Decision (USDA 2004).

The analysis area is located within Management Area #2 – Carson Front, as identified in the Toiyabe National Forest Land and Resource Management Plan (1986). Key resource values in the Carson Front are watershed, wildlife, visuals, and dispersed recreation. Management emphases in the Carson Front includes: protect key resource values and property from wildfire and management to provide a diversity of recreational opportunities. Vegetation management will be conducted to enhance soil, water, wildlife,

and aesthetic values, and to minimize the potential for catastrophic wildfires, and insect and disease infestations.

Desired conditions, management intent and management objectives from the Sierra Nevada Forest Plan Amendment (SNFPA) Record of Decision (January 2004) are described below and have been incorporated into the Proposed Action. Figure 1-2 depicts the Northern goshawk and California spotted owl protected activity centers (PACs), old forest emphasis areas and the WUI zones.

Figure 1-2. WUI defense and threat zones, old forest emphasis areas and PACs.



Wildland urban interface defense zone, extends roughly ¼ mile out from communities:

Desired Conditions

- Stands are fairly open and dominated primarily by larger, fire tolerant trees.
- Surface and ladder fuel conditions are such that crown fire ignition is highly unlikely.
- The openness and discontinuity of crown fuels, both horizontally and vertically, result in very low probability of sustained crown fire.

Management Intent

- Protect communities from wildfire and prevent the loss of life and property.
- WUI defense zones have highest priority for treatments.
- The highest density and intensity of treatments are located with the WUI.

Management Objectives

- Create defensible space near communities, and provide a safe and effective area for suppressing fire.
- Design economically efficient treatments to reduce hazardous fuels.

Wildland urban interface threat zones, buffers the defense zone, described as:

Desired Conditions

Under high fire weather conditions, wildland fire behavior in treated areas is characterized as:

- Flame lengths at the head of the fire are less than 4 feet.
- The rate of spread at the head of the fire is reduced to at least 50 percent of pre-treatment levels.
- Hazards to firefighters are reduced by managing snag levels in locations likely to be used for control of prescribed fires and fire suppression consistent with safe practices guidelines.
- Production rates for fire line construction are doubled from pre-treatment levels.
- Tree densities are reduced to a level consistent with the site's ability to sustain forest health during drought conditions.

Management Intent

- Fuels treatments in the threat zone provide a buffer between developed areas and wildlands.
- Fuels treatments protect human communities from wildland fires as well as minimize the spread of fires that might originate in urban areas.
- The highest density and intensity of treatments are located within the WUI.

Management Objectives

- Establish and maintain a pattern of area treatments that is effective in modifying wildfire behavior.
- Design economically efficient treatments to reduce hazardous fuels.

California spotted owl and Northern goshawk protected activity centers (PAC)

Desired Conditions

- At least two tree canopy layers are present.
- Dominant and co-dominant trees average at least 24 inches diameter at breast height (dbh).
- Area within PAC has at least 60 to 70 percent canopy cover.
- Existence of some very large snags (greater than 45 inches dbh).
- Snag and down woody material levels that are higher than average.

Management Intent

- Maintain PACs to provide habitat conditions that support successful reproduction of California spotted owls and Northern goshawks.

Management Objectives

- Avoid vegetation and fuels management activities within PACs to the greatest extent feasible.
- Reduce hazardous fuels in PACs in defense zones when they create an unacceptable fire threat to communities.
- Where PACs cannot be avoided in the treatments, ensure effective treatment of surface, ladder, and crown fuels with treated area.
- If nesting or foraging habitat in PACs is mechanically treated, mitigate by adding acreage to the PAC equivalent to the treated acreage wherever possible.
- Add adjacent acres of comparable quality wherever possible.

Old Forest Emphasis Areas

Desired Conditions

- Forest structure and function generally resemble pre-settlement conditions.
- Stands composed of roughly even-aged vegetation groups, varying in size, species composition, and structure. Individual vegetation groups range from less the .5 acres to more than 5 acres in size.
- Tree sizes range from seedlings to very large diameter trees.
- Multi-tiered canopies, particularly in older forests, provide vertical heterogeneity.
- Dead trees, both standing and fallen, meet habitat needs of old-forest associated species.

- Where possible, areas treated to reduce fuel levels also provide for the successful establishment of early seral stage vegetation.

Management Intent

- Focus management activities on the short-term goal of reducing the adverse effects of wildfire.
- Maintain or develop old forest habitat in areas:
    - Containing the best remaining large blocks or landscape concentrations of old forest and/or
    - That provide old forest functions.
- Establish and maintain a pattern of area treatments that is effective in:
    - Modifying fire behavior.
    - Culturing stand structure and composition to generally resemble pre-settlement conditions.
    - Reducing susceptibility to insect/pathogen drought-related tree mortality.

Management Objectives

- Establish and maintain a pattern of area treatments that is effective in modifying wildfire behavior.
- Maintain and/or establish appropriate species composition and size classes.
- Reduce the risk of insect/pathogen drought-related mortality by managing stand density levels.
- Design economically efficient treatments to reduce hazardous fuels.

General Forest

Desired Conditions - the desired conditions are the same as Old Forest Emphasis Areas.

Management Intent

- Actively manage to maintain and enhance a variety of vegetative conditions.
- Strategically place fuels treatments to modify wildfire behavior.
- Reduce hazardous fuels in key areas to lessen the threat of high severity fire.

Management Objectives

- Establish and maintain a pattern of area treatments that is effective in modifying wildfire behavior.
- Reduce the risk of insect/pathogen drought-related mortality by managing stand density levels.
- Design economically efficient treatments to reduce hazardous fuels.

Desired conditions for aquatic, riparian and meadow ecosystems: providing habitat for native fish, amphibian and aquatic invertebrate populations; remnant plant and animal populations in aquatic communities are maintained and restored; and streams in

meadows, lower elevation grasslands, and hardwood ecosystems have vegetation and channel bank conditions that approach historic potential and water quality meets State stream standards.

Desired conditions for riparian conservation areas: riparian conservation objectives along streams and around waterbodies will be established as land allocations to: i) preserve, enhance, and restore habitat for riparian- and aquatic-dependent species; ii) ensure that water quality is maintained or restored; iii) enhance habitat conservation for species associated with the transition zone between upslope and riparian areas; and iv) provide greater connectivity within the watershed. Riparian conservation areas are delineated and managed consistent with riparian conservation objectives.

Desired conditions for noxious weeds include: the Forest Service will work cooperatively with State and local agencies to prevent the introduction and establishment of noxious weed infestations and to control existing infestations. The Forest Service will conduct noxious weed inventories and risk assessments as part of project planning; and the management direction for an integrated weed management approach includes the following priorities: i) prevent the introduction of new invaders; ii) conduct early treatment of new infestations; and iii) contain and control established infestations.

In June 2004 the Clear Creek/Kings Canyon Landscape Analysis and Strategy was completed (Tetra Tech 2004). This analysis identified recommendations for vegetation, fuels, recreation, scenery management, wildlife habitats, watershed, roads, cultural resources, law enforcement, and data needs. This analysis also identified most of the analysis area as a high or moderately high fire hazard based on fuel models and slope classes. Vegetation and fuels recommendations from this analysis for defense zones include:

- Treating fuels adjacent to homes and proposed development.
- Reducing hazardous fuels using mechanical treatment in pockets of dense sagebrush in the Kings Canyon area.
- Cooperating with the Clear Creek homeowners in the implementation of vegetation/fuels treatments, and
- Designing fuel treatments cooperatively with the Nevada Division of Forestry, Carson City Fire Department, East Fork Fire Protection District, and Douglas County.

Vegetation and fuels recommendations in threat zones include:

- Applying strategically placed landscape area treatments (SPLATs) to effectively modify wildland fire behavior and interrupt fire spread across the landscape.
- Mechanical thinning and prescribed fire should be considered in SPLATs.
- Using prescribed fires as follow-up fuel reduction treatments after stand structure modification.
- Using mechanical treatments and prescribed fires to maintain the existing fuelbreak in the southwest portion of the Clear Creek area.

- Using mechanical treatments and/or prescribed fire for fuel reduction treatments in Old Forest Emphasis areas and Riparian Conservation Areas within the SPLATs.
- Considering the use of grazing animals to reduce fuels in cheatgrass-dominated areas.

In 2008, 15 partners representing local, Federal, State, County, and Tribal agencies completed a multi-jurisdictional comprehensive strategy to reduce the risk of large and destructive wildfires in the Carson Range. This strategy, called the Carson Range Multi-Jurisdictional Fuel Reduction and Wildfire Prevention Strategy had three outcomes; 1) Propose projects that create "community defensible space"; 2) Comprehensively display all proposed fuel reduction treatments, and 3) Facilitate communication and cooperation among those responsible for plan implementation. Collaboration between the U.S. Forest Service, Nevada Division of Forestry, Nevada Division of State Lands, Nevada Division of State Parks, Nevada Fire Safe Council, Carson City Park and Recreation Open Space Division, Carson City Fire Department, Washoe County Nevada, Douglas County Nevada, Washoe Tribe of Nevada and California, Sierra Fire Protection District, City of Reno Fire Department, Truckee Meadows Fire Department, Whittel Forest University of Nevada Reno, and East Fork Fire Protection District occurred in development of this plan (USDA 2008). The Clear Creek area was identified as a priority hazardous fuels reduction project in this document. Hazardous fuels reduction treatments have been identified on lands within the analysis area owned or administered by U.S. Forest Service, Nevada State Parks (administered by Nevada Division of Forestry), private lands (through the Nevada Fire Safe Council), Carson City, and Washoe Tribe of Nevada and California. These fuels reduction projects located on various jurisdictions were designed to compliment and enhance each other and achieve the most desirable result of reducing the risk of a wildland fire.

THE PROPOSED ACTION

The Forest Service proposes to reduce fuel loading on approximately 3,500 acres within the Clear Creek analysis area, including:

- Prescribed burning on up to 2,000 acres. This includes both underburning and pile burning of project generated materials.
- On approximately 2,000 acres, trees will be thinned from below. On approximately 1,300 acres trees up to 30" dbh will be thinned and on approximately 700 acres, trees up to 14" dbh will be thinned.
- Aspen enhancement will occur on approximately 250 acres, removing conifers up to 30" dbh from within and up to 100 feet distance from the edge of existing aspen stands.
- On approximately 750 acres, shrubs and small trees will be treated with mechanical equipment, such as brush masticators or by hand, cutting, piling, and burning or removing biomass.

- Approximately 800 acres will include cheatgrass and invasive weed reduction, utilizing hand pulling, utilization by domestic sheep or goats and seeding with native grasses.
- No new permanent road construction is proposed.
- Approximately ½ mile of temporary road is proposed; this would be obliterated and seeded after treatment activities are completed.
- Maintenance of treated areas including mastication, hand cutting, prescribed burning, animal treatments, seeding, and removal of insect infested trees.

Implementation treatments are planned to begin in 2009. Maintenance may begin within three years of initial treatment.

PUBLIC INVOLVEMENT AND COLLABORATION

The Forest Service used multiple methods to develop the proposed action and determine the major issues that would affect the decision on this project. The Forest Service involved members of the public, interested private groups, and State and local agencies, including:

Collaboration with the Nevada Division of Forestry, Washoe Tribe and Nevada, Clear Creek Watershed Council, Nevada Fire Safe Council and the Clear Creek Fire Safe Chapter.

Publication of a Notice of Proposed Action and Opportunity to Comment in the Reno Gazette Journal on August 12, 2008.

Listing of the project in the Schedule of Proposed Actions (SOPA), published quarterly by the Humboldt-Toiyabe National Forest, in 2006, 2007 and 2008.

Holding a public meeting in Carson City, Nevada to discuss the proposed projects on July 23, 2008.

Mailing of the Notice of Proposed Action/Opportunity to Comment to 72 interested individuals and adjacent landowners on June 30, 2008.

COMMENTS RECEIVED DURING SCOPING

A Forest Service interdisciplinary (ID) team identified issues to be addressed in developing alternatives for this area based on input received from the ID team, adjacent landowners, interested members of the public, collaboration meetings with Nevada Division of Forestry, Nevada Fire Safe Council, Washoe Tribe of Nevada and California, Clear Creek Fire Safe Chapter, and Clear Creek Watershed Council. During scoping the following comments and concerns were received from members of the public:

- For noxious weed control, thoroughly clean equipment before entering the forest, much weed contamination occurs from a stray one or two seeds.
- A hydrology study pre and post for Clear Creek would be very interesting.
- I think the result would be a much stronger and resilient ecosystem.

- The Clear Creek Fuels Reduction and Ecosystem Enhancement Project sounds like a good plan.
- Kings Canyon Road needs to be improved, including blading, rock removal and brush clearing.

ISSUES

The following are issues raised by the Forest Service interdisciplinary team analyzing this project and members of the public; these issues are analyzed in detail in Chapter 3.

- Fire and fuels – thinning and brush reductions could reduce fuel loadings.
- Wildlife habitat – project activities could impact wildlife in the short term, in the long term wildlife habitat could be improved. Maintenance of old forest conditions.
- Heritage resources – project activities could affect heritage resources.
- Vegetation – thinning could improve conifer stand vigor and enhance and expand aspen stands.
- Water/Soils - project activities could have a short term impact on water and soil quality.
- Visuals – project could protect visual resources over the long term.

DECISION NEEDED

The decision needed from the Humboldt-Toiyabe National Forest, Carson Ranger District Ranger, the responsible official, is whether to implement this project to meet the management direction as stated in the Forest Plan and reduce hazardous fuels in the Clear Creek project area.

CHAPTER 2
PROPOSED ACTION

INTRODUCTION

This chapter describes the alternatives developed by the interdisciplinary team in response to the issues identified. The team followed the alternative analysis procedure found under Section 104 of the HFRA.

THE PROPOSED ACTION

The proposed action is designed to reduce forest fuel loading in the Clear Creek project area by treating fuels in the three fuel layers: crown or canopy fuels, ladder fuels and surface fuels. Crown and ladder fuels would be reduced by commercial and non-commercial tree thinning and underburning. Surface fuels would be reduced through hand thinning and burning or removal, mastication and/or underburning and animal treatments. Properly functioning aspen stands can act as natural firebreaks, enhancing and expanding existing aspen stands will improve and expand these fuelbreaks.

Up to 4,200 acres could be treated. Some areas would receive more than one type of treatment, such as the same acre being thinned and underburned. Figure 2-1 depicts the proposed action where tree and shrub thinning and aspen enhancement would occur. Figure 2-2 depicts the proposed action where prescribed burning would occur.

Thinning on Forested Areas. On approximately 2,000 acres, trees would be thinned from below, favoring fir species for removal. On approximately 1,300 acres, thinning of trees less than 30" dbh would occur and on up to 700 acres thinning of trees less than 14" dbh would occur. In areas where trees less than 30" dbh are thinned, approximately 23% (300 acres) would utilize a ground based logging system and 77% (1,000 acres) would utilize a helicopter logging system. Skid trails would be constructed for ground based treatment areas. This treatment would involve thinning from below by generally removing smaller trees that are most susceptible to wildfire and leaving the dominant tallest trees that are less susceptible to fire. Residual overstory trees would be irregularly spaced across the landscape and small groups of typically three to six closely spaced overstory trees would be left to retain structural diversity. Insect infested trees would be removed. Whole tree yarding would be utilized in most areas to remove the tops and limbs of trees generally greater than 8" dbh. Trees would be thinned to lower densities, 60 square feet of basal area per acre, along roads and Forest Service boundaries for a distance of 100 to 200 feet, dependent on road location or boundary location, slope, topography and vegetation. Away from roads and Forest Service boundaries, trees would be thinned to 80 to 100 square feet of basal area per acre. Where high quality wildlife habitat exists, small pockets of trees would remain. These pockets would be located where the fuels and forest conditions are such that the risk to crown fire in the surrounding area is lower and tree vigor is fairly high. Trees would be thinned to 100 square feet of basal area per acre for a distance of 200 feet around the untreated pockets.

On approximately 700 acres, trees less than 14" dbh would be thinned. This treatment would occur in areas of smaller diameter trees and within some Northern goshawk and

California spotted owls protected activity centers. Hand thinning, mastication and areas prescribed fire would be utilized to treat these areas.

Mastication equipment would be utilized where access and slope allow and hand crews would be utilized in steeper, more inaccessible areas. Slash resulting from this activity would be a) shredded in the masticated areas; b) lopped and scattered in areas proposed for underburning; c) piled and burned in areas where underburning is not feasible, but pile burning is; and d) lopped and scattered and left on site in inaccessible areas where prescribed burning is not feasible.

Generally, trees in the suppressed and intermediate crown classes would be removed, though some tress in the co-dominant crown class would be removed, primarily in the 60 to 80 residual basal area areas. The majority of trees targeted for removal would be the smaller diameter trees that are competing with mature overstory trees or with more vigorous trees in the same canopy layers. The average size of trees that would be harvested, based on stand examination data and FVS, is estimated at 13" dbh. Generally, trees would be whole-tree yarded, so the tops and limbs would be removed, as well as the tree bole. Depending on market conditions, on the steeper or more inaccessible areas, trees less than 8" dbh may be felled, lopped and scattered or underburned. Canopy cover would be reduced by an average of 10 percent throughout the forested area and quadratic mean diameters would be increased by an average of 18". An average of 400 trees per acre would be removed; this includes removal of as many as 1,300 mostly small diameter trees less than one foot tall per acre in some underburned areas to as few as 20 trees per acre. Stand density index would be an average of 123, which is 27 percent of the maximum. Approximately 3,000 CCF (1,700 MBF) of volume would be removed.

Generally, the largest and most vigorous trees would be retained to achieve the target basal area. The exception to this would be in areas successfully infested with bark beetles. Trees approaching the upper diameter limit of 30" dbh would be harvested only where needed to reduce competition for sunlight and nutrients and maintain more vigorous and larger trees growing in proximity.

Maintenance would be required in the treated areas to maintain more open conditions. Without maintenance conifer and brush regeneration would eventually put the stand at a risk from insect, disease, high severity wildland fire and competition related mortality. Maintenance may include mastication, piling and burning, additional thinning, or underburning.

Excessive Down Fuel Accumulation. In accessible areas, existing large dead, down trees would be masticated, piled and burned or removed. This treatment would occur on approximately 100 acres.

Aspen Enhancement. On approximately 250 acres, aspen stands would be enhanced by removing conifers and expanded by removal of conifers a tree and half length from the edge of the aspen stand, up to a maximum of 100 feet. Generally, conifers less than 30" dbh would be removed. Underburning would occur in aspen stands if conifer removal does not stimulate aspen regeneration, no pile burning would occur within aspen stands. Approximately 135 acres would be treated utilizing a helicopter logging system and 115 acres would be treated utilizing a ground-based (tractor) logging system.

Shrub Treatments. This would involve thinning of shrubs and small sized trees up to 14"dbh on up to 750 acres. Mechanical treatments would include mastication to shred and masticate shrubs and small trees with equipment. Hand treatments would include cutting of some shrubs and noncommerical trees up to 14" dbh and piling and burning or removal or underburning. Shrubs would be treated in a mosaic pattern and residual densites would be 30% to 80% depending on the location. Residual trees would have brush removed around them for a distance of approximately ten to twenty feet. Areas adjacent to the Forest Service boundary that have or are planned for development would generally have more intense treatments and interior areas would generally have less intense treatments.

Prescribed Burning. This treatment would include both underburning and pile burning and would occur in aspen, conifer and shrub areas on up to 2,000 acres. Pile burning would occur in areas where shrub or non-commercial trees are hand thinned and piled and not removed. Underburning would occur where location, slope and vegetation densities are such that objectives would be met. Burning would only occur under desirable weather conditions. These safe weather conditions would be analyzed and documented in an approved burn plan, which would be completed prior to any prescribed burning activities.

Animal Treatments to Reduce Cheatgrass and Invasive Species. In areas where these species may dominate the site various methods would be utilized to reduce densities. These methods would include hand pulling, utilization by domestic sheep or goats and seeding with native grasses. Monitoring would identify locations where treatments would occur and may occur within any of the lower elevation shrub areas.

Biomass Removal. Slash brought to the landing, primarily limbs and tops of trees, and non-commercial timber, could be utilized for biomass. Some areas where shrubs and small trees are cut by hand crews that are accessible to roads may be removed as biomass. Some of the biomass utilization opportunities in this area include Christmas trees, fuel for cogeneration plants, biofuels production, landscaping materials and furniture.

Roads and Landings. Existing roads would be utilized; no new permanent roads would be constructed. A temporary road, up to ½ mile in length may be needed to access some of the area. The proposed action includes road maintenance on approximately five miles of road, including portions of the Genoa Peak, Kings Canyon and Spooner Roads. This maintenance would include removal of any downed trees, brushing out road sides, blading road beds, including ditches where needed, cleaning culverts, constructing water bars and hazard tree felling.

Maintenance. Maintenance would include additional repeated treatments to remove ladder and surface fuels and maintain the project area. Maintenance may include brush and small tree mastication, hand cutting, piling and burning or removal of small trees and brush and underburning. Maintenance may occur within three years of initial treatment.

Figure 2-1. Proposed action – prescribed burning.

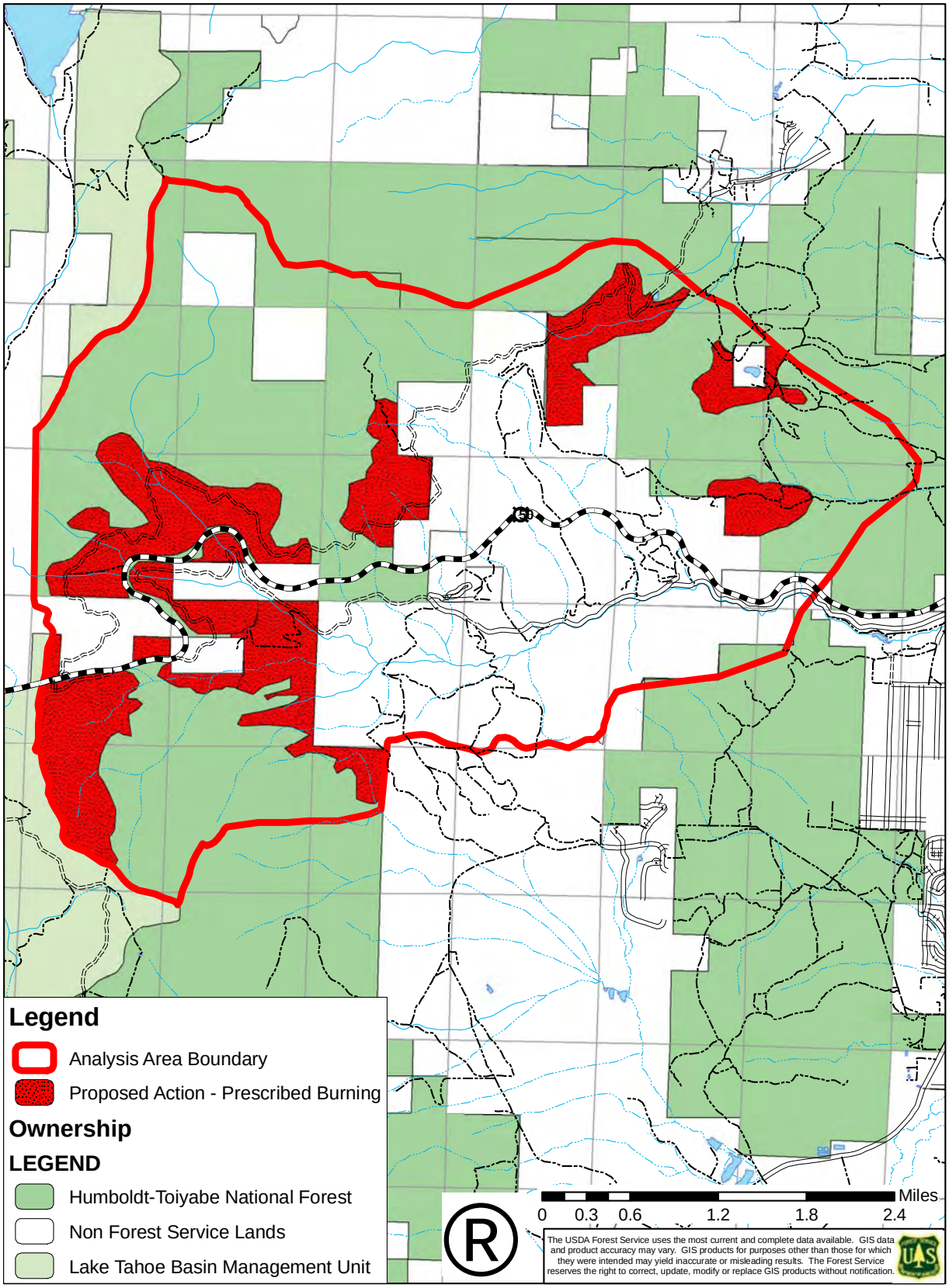
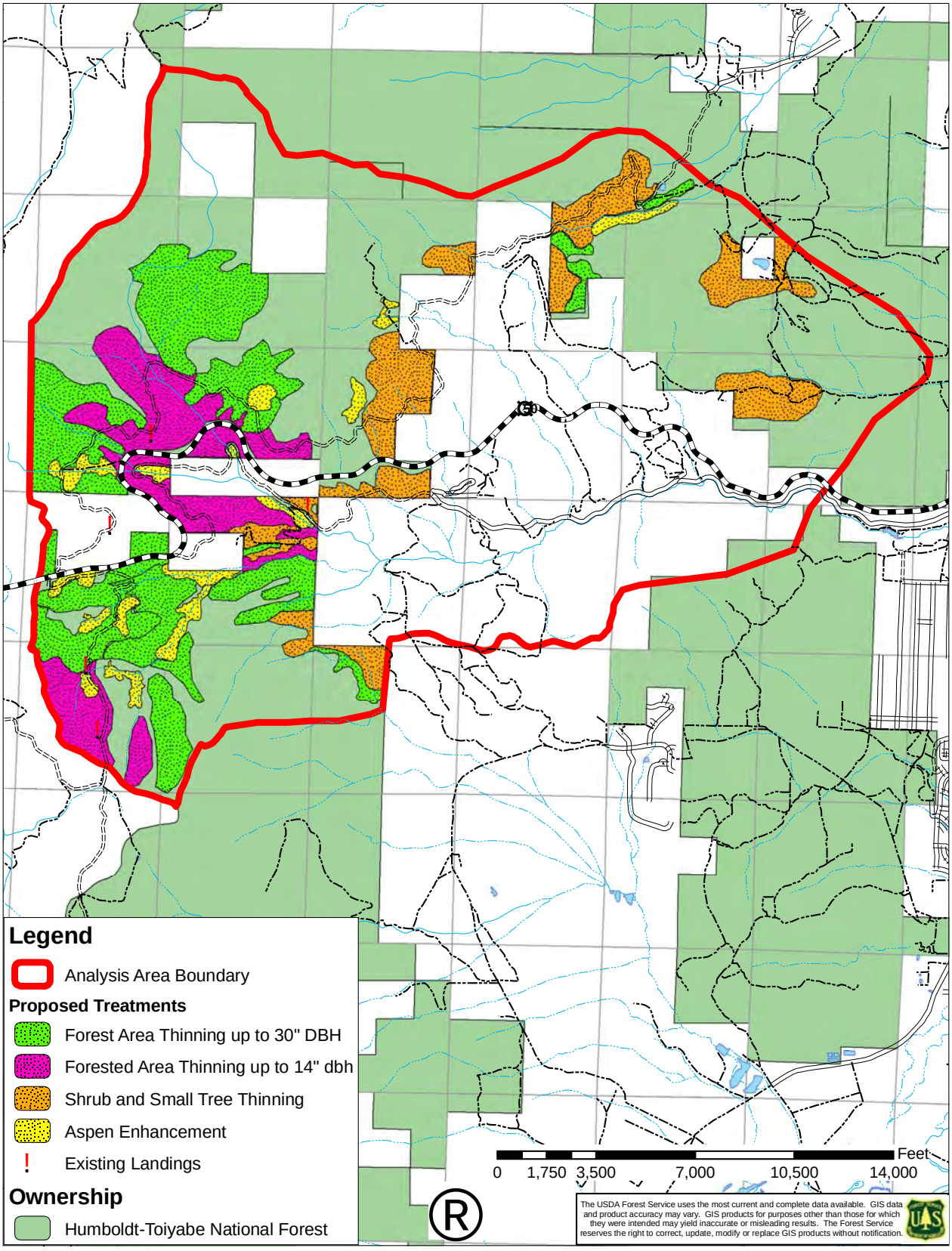


Figure 2-2. Proposed action – tree and shrub thinning and aspen enhancement



DESIGN FEATURES

Fire/Fuels

- All Federal, State and local regulations pertaining to prescribed burning would be followed. A Region 4 approved burn plan would be completed and followed.
- A news release would be distributed to media contacts and the general public contacted prior to the burning season to notify the local community of the prescribed burning.

Archeology

- Six archeological sites have been mitigated by documentation with site records and submitted to the Nevada State Historic Preservation Office. All other archeological sites would be flagged and avoided during project implementation.
- Trees would be directionally felled away from identified archeological sites.
- No slash piles would occur in identified archeological sites, any slash within site boundaries would be removed by hand.
- Temporary roads and skid trails would avoid archeological sites.

Wildlife/Sensitive Plants

- Around raptor nest sites in aspen stands, trees would not be removed for ¼ acre around the nest site.
- Where available, three of the largest snags per acre would be retained.
- Large woody debris would be retained, at least 3 pieces per acre, greater than 12" dbh or the largest available.
- On approximately 450 conifer acres within protected activity centers (PACs) no treatment activities would occur to protect nesting habitat for spotted owls and Northern goshawks.
- On approximately 150 acres, within PACs, no trees greater than 14" dbh would be removed improve and protect habitat for spotted owls and Northern goshawks.
- In aspen stands, harvest activities would not occur in April to July during migratory bird breeding season.
- Washoe tall rockcress plant populations will be flagged and avoided.

Soils/Hydrology

- Rehabilitation of skid trails may include ripping, seeding and waterbar construction.
- Temporary roads will be obliterated.
- Native seed mix will be used during project rehabilitation efforts.

- Multiple pass skid trails will be located a minimum of 100 feet apart except where they converge at landings.
- Generally, ground based equipment will operate on slopes less than 35% (30% on decomposed granite soils), except for pitches of 150 feet or less. However, ground based operations may occur on slopes up to 50%; these will be designed on a unit by unit basis only after soil stability, soil rock content and the location of the steep slope in relation to the remaining portions of the treatment unit have been determined to be appropriate by the Forest Service.
- No trees will be removed where they provide stream bank stability.
- Equipment exclusion zone within 50 feet of a seasonal stream and 100 feet of perennial streams, except for equipment crossing areas.
- Ground based equipment will stay on established stream crossings.
- Where feasible, require whole tree yarding, with limbs and tops attached, to minimize underburning intensity.
- Pile burning will be minimized in riparian conservation areas.

Air Quality

- Prescribed fires are subject to permitting by the Nevada Division of Environmental Protection (NDEP). For each prescribed fire, the Forest Service will have contingency plans identified to reduce smoke emissions. Contingency plans shall be implemented when the NDEP determines that acceptance limits of smoke are exceeded, and/or the Forest Service anticipated that the prescription for a prescribed fire will be exceeded.
- When mechanical fuels treatment operations occur, dirt roads will be monitored for air quality compliance with the standards sect forth by the NDEP.

Noxious Weeds

- Equipment will be cleaned and inspected prior to moving onto National Forest System lands. Equipment will be washed prior to entering National Forest System lands to remove any soil and debris that may harbor noxious weed seeds.
- If road surface material is needed to repair roads, sources will be inspected and determined to be weed free.
- When seeding is required, seed will be tested as weed free.
- Known occurrences of noxious weeds will be managed.

Vegetation

- Skid trails will be designated on ground based skidding units. Skid trails will be located so damage to the residual stand is minimized.
- Retain all trees greater than 30” dbh, except where removal is necessary for operational safety or for roads or landings.

Recreation

- Project activities would not interfere with Aramark special use snowmobile permit operations.

MONITORING

This project will use an adaptive management approach, where the treatments are implemented, monitored and adapted. Monitoring will determine if the desired conditions are being met. Adjustments to project prescriptions based on monitoring within the general scope of the proposed action analyzed in this document would not need a new decision. Any adjustments outside the scope of the proposed action would likely require a new decision. Monitoring actions would include those discussed in Table 2-1.

Table 2-1 Monitoring Actions

Action	Method	Timing	Responsibility
Evaluate the effectiveness of tree and fuels treatments in meeting resource objectives	Field exams and photo points	Pre and post project activities	Silviculturist, Fuels Specialist, Wildlife Biologist
Evaluate burning conditions, fuel consumption and fire effectiveness	Fuels treatment inventory	Pre, during and post burn	Fuels Specialist and Burn Boss
Effectiveness of weed treatments and seeding	Field exams and photo points	Pre and post activity	Fuels Specialist, Invasive Weed Specialist, Botanist
Effectiveness of aspen enhancement areas	Photo points and field exams	Pre and post activity	Silviculturist
Effectiveness of aspen treatments on migratory bird populations	Bird point count surveys	Pre and post activity	Wildlife Biologist
Ensure archeological sites are not impacted	Field exams	Pre, during and post activity	Archeologist, Sale Prep Forester
Ensure contracts are correctly implemented.	Inspections	During and post activities	Contracting Officer, COR, Sale Administrator

COMPARISON OF EXISTING CONDITION AND PROPOSED ACTION

Under HFRA, no alternatives other than the proposed action is required if the project is in the WUI and 1 ½ miles of an at-risk community, as is the case with this project. The comparison table below, Table 2-2 compares the proposed action and the existing conditions for the project purpose or issue.

Table 2-2: Comparison of existing condition and proposed action

Purpose or Issue	Existing Condition	Proposed Action
Reduce fuel loading and ladder fuels in forested and shrub areas adjacent to the wildland urban interface.	Most of the analysis is in a condition class 2 or 3, where fire regimes/vegetation patterns have a moderate to high departure from the historical fire regime (refer to fire/fuels environmental consequences). The average canopy base height is 2 to 23 feet from the ground to the tree canopy.	Treated areas will be in condition class 1, where fire regimes/vegetation patterns have a minimal departure from the historical fire regime. The average canopy base height is 19 to 50 feet from the ground to the tree canopy.
Reduce dense vegetation in order to increase vigor, health and growth rates in the forested ecosystem.	Current stands have basal areas ranging from 60 to 134 square feet per acre and stand density indexes ranging from 146 to 312. Insect-related mortality is increasing. Dense ladder fuels exist in the understory.	Treated areas will have densities ranging from 60 to 100 square feet of basal area per acre, with some small patches of trees interspersed. Stand density indexes will range from 76 to 140. Dense ladder fuels will be reduced.
Enhance and expand existing aspen stands.	Aspen stands converting to conifer stands due to conifer encroachment.	Aspen stands with several age classes and abundant regeneration, at least 3,000 stems per acre. Minimal to no conifer encroachment.
Improve the quantity and quality of mule deer forage and deer winter range.	Shrub vegetation in the area is in a decadent, overgrown condition and provides less than desirable nutritional value for mule deer.	Removal of decadent, overgrown brush will allow for re-sprouting of new, more nutritious vegetation.
Help firefighters control and/or suppress potential wildland fires.	High fuel loads exist throughout the project area, decreasing the potential to control and/or suppress a wildland fire.	In treated areas, the reduced risk of a crown fire will improve the potential to control and suppress wildland fire.

Issue #1: Fire/Fuels	In most of the analysis area, the threat of a crown fire is moderate to severe.	In treated areas, the threat of a crown fire will be reduced to low to moderate.
Issue # 2 - Wildlife Habitat	Various wildlife species and habitats exist within the analysis area. Existing human use, insect infestations, past management activities including fire suppression have substantially altered the habitat effectiveness. There is currently a high probability of major habitat disturbance from an uncharacteristic wildland fire.	Unit design and mitigation measures are designed to minimize impacts from project activities. Some short term disturbance during project activities. Long term benefits due to improved habitat conditions in aspen stands for species dependent on aspen and reduced risk of an uncharacteristic wildland fire.
Issue #3 – Heritage Resources	There is currently a substantial risk to destruction from an uncharacteristic wildland fire	The risk of an uncharacteristic wildland fire will be reduced, thereby reducing the risk to heritage resources. Sites will be flagged and avoided during project activities.
Issue #4 - Visuals	Dense stands with a high risk to wildland fire which will degrade visuals	Thinned stands with reduced risk to a stand-replacing wildland fire.
Issue #5 – Water/Soils	A severe wildland fire could result in significant impacts to water and soil quality.	The use of ground based equipment for thinning, construction of skid trails, and the use of prescribed fire could have short term effects on water and soil quality.
Issue #6 - Vegetation	Dense stands at moderate to severe risk of a stand replacing fire	Densities reduced to 60 to 100 square feet of basal area per acre. Low to moderate risk of stand replacing fire.

CHAPTER 3
ENVIRONMENTAL CONSEQUENCES

ANALYSIS QUALIFICATION

This chapter provides a summary of the key environmental effects of the alternatives as described in the specialist reports prepared for this project. The analysis and conclusion about the potential effects are synopsized and cited in the respective resource sections. The Resource Specialist Reports, which disclose the full analysis of the direct, indirect, and cumulative effects, are incorporated by reference and are available in the project file, located at the Carson Ranger District office.

The consequences of implementing the proposed action are summarized in terms of changes in the affected environment from the current situation. This project is not adjacent to, nor would it have any effect on existing Wilderness areas, Forest Plan designated roadless areas, or Research Natural Areas.

Each resource area discloses the direct, indirect, a cumulative effects for that resource area. The National Environmental Policy Act defines these as:

Direct – effects which are caused by the action and occur at the same time and place.

Indirect – effects which are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable.

Cumulative – impacts that result from the incremental impact of the action, when added to other past, present, and reasonably foreseeable future actions, regardless of what agency or person undertakes such other actions.

The past, present and reasonably foreseeable future actions include:

- Comstock logging in the late 1800's.
- Spooner Timber Salvage Sale in 1996.
- Old Clear Creek Road Fuels Reduction Project in 2006. Mastication of brush and small trees on 46 acres.
- West Carson Fuels Reduction Project in 2008. Removal of fine fuels, primarily cheatgrass, in eastern most portion of the project area.
- Personal use Christmas tree sales, 2006 – 2008, expected to continue in future years, primarily in the Spooner summit area.
- Private land development including new homes and golf courses.
- Recreational use – primarily hiking, horseback riding, mountain biking, OHV use, cross-county skiing and snowmobile use.
- Construction, existence and maintenance of US Highway 50.
- Hazardous fuels reduction projects completed and planned on Nevada State Parks lands in section 6.

- Hazardous fuels reduction projects completed and planned on Washoe Tribe of Nevada and California lands in section 3.
- Hazardous fuels reduction projects completed and planned on private lands.

Because this project is being prepared under the HFRA, and is within the WUI, the no-action alternative was not developed. However, an understanding of what would occur should no-action be taken is important in gaining an understanding of the effects of the proposed action. The Fire/Fuels section of this chapter gives details on what is expected over time without treatment.

FIRE/FUELS

Existing Condition

This project is being conducted under the HFRA within the WUI of an at-risk community. An at-risk community is defined as an area (USDA DOI 2004):

A) Comprised of:

- An interface community as defined in the notice entitled "Wildland Urban Interface Communities Within the Vicinity of Federal Lands That Are at High Risk From Wildfire" issued by the Secretary of Agriculture and the Secretary of the Interior in accordance with title IV of the Department of the Interior and Related Agencies Appropriations Act, 2001 (114 Stat. 1009) (66 Fed. Reg. 753 January 4, 2001); or
- A group of homes and other structures with basic infrastructure and services (such as utilities and collectively maintained transportation routes) within or adjacent to Federal land;

B) In which conditions are conducive to a large-scale wildland fire disturbance event; and

C) For which a significant threat to human life or property exists as a result of a wildland fire disturbance event.

The term wildland urban interface (WUI) means (USDA DOI 2004):

A) An area within or adjacent to an at-risk community that is identified in recommendations to the Secretary in a community wildfire protection plan; or

B) In the case of any area for which a community wildfire protection plan is not in effect:

(i) An area extending ½ mile from the boundary of an at-risk community.

(ii) An area within 1 ½ miles of the boundary of an at-risk community, including any land that:

(I) has a sustained steep slope that creates the potential for wildfire behavior endangering the at-risk community;

(II) has a geographic feature that aids in creating an effective fire break, such as a road or ridge top; or

(III) is in condition class 3, as documented by the Secretary in the project-specific environmental analysis; and

(iii) An area that is adjacent to an evacuation route for an at-risk community that the Secretary determines, in cooperation with the at-risk community, requires hazardous fuel reduction to provide safer evacuation from the at-risk community.

Graham el al. (2004) indicates that fires are usually placed into three broad classes: ground fires, surface fires and crown fires. Ground fires consist of principally duff and burn slowly for days to months. Surface fires depend on the availability and condition of surface fuels. Low vegetation, woody and litter contribute to the initiation and spread of surface fires. Burning and fuel conditions of surface fuels are highly influenced by the presence and density of overstory tree canopies. Fine fuel moisture content, surface air temperature, and shading of surface fuels contribute to increasing the spread rate of surface fires in open stands compared to surface fires burning in dense stands. When surface fires frequently burn, they tend to minimize surface and ladder fuel accumulations, which in turn decrease the likelihood that crown fires will develop. The key characteristics of forest structure for the initiation and spread of crown fires are canopy base height, canopy bulk density and canopy continuity. Crown fires remove much or the entire tree canopy in a particular area, essentially resetting the successional and growth processes of stands and forests. Crown fires also have the largest immediate and long-term ecological effects and the greatest potential to threaten human settlements near wildland areas (Graham et al. 2004). Canopy and ladder fuels are modified by forest thinning operations that target crown classes stand basal area and canopy bulk density. Surface fuels can be modified by prescribed fire and treatments that remove and reduce fuel such as piling and burning or mastication. (Peterson et al. 2005).

Elevation, slope angle, aspect, and physiographic position influence how a fire behaves (Agee 1993). In general, as elevation increases both precipitation and humidity increases and temperature decreases, and these factors influence a fire's behavior as it burns up or down slopes. Fuels occurring on south-facing aspects tend to be drier and dry faster than fuels occurring on northerly aspects. Fire spread rates double for every 30 percent increase in slope angles up to 60 percent and double for every 15 percent increase thereafter (Chandler et al. 1991).

The historic fire regime is an important reference point to assess changes in vegetative patterns and the associated risks of uncharacteristic fire. A fire regime refers to an integration of disturbance attributes including type, frequency, intensity, duration, and extent. Natural fire regimes have been altered by management activities including fire exclusion and timber harvesting. Potential global climate change may further impact fire regimes, which range from non-lethal to stand-replacing levels. The five natural fire regimes are classified based on average number of year between fires (fire frequency) combined with the severity (amount of replacement) for the fir on the dominant overstory vegetation (Hann et al. 2003).

Fire Regime I – 0 to 35 year frequency and low (surface fires most common) to mixed severity (less than 75% of the dominant overstory vegetation replaced).

Fire Regime II - 0 to 35 year frequency and high (stand replacement) severity (greater than 75% of the dominant overstory vegetation replaced).

Fire Regime III - 35 to 100+ year frequency and mixed severity (less than 75% of the dominant overstory vegetation replaced).

Fire Regime IV - 35 to 100+ year frequency and high (stand replacement) severity (greater than 75% of the dominant overstory vegetation replaced).

Fire Regime V - 200+ year frequency and high (stand replacement) severity.

The Fire Regime-Condition Class (FRCC) (table 3-1) is used to describe the degree of departure from the historic fire regimes that results from alterations of key ecosystem components such as composition, structural stage, stand age, and canopy closure (Hann et al. 2003).

Table 3-1. Fire Regime Condition Class descriptions

Condition Class	Description
Condition Class 1	Fire regimes in this condition class are near or within the natural (historical) ranges. Vegetation composition and structure are intact. The risk of losing key ecosystem components for the occurrence of fire is relatively low. Fire frequencies have departed from historical frequencies (either increased or decreased) by no more than one return interval. Where appropriate, these areas can be maintained through fire use or prescribed fire.
Condition Class 2	Fire regimes and vegetation attributes have been moderately altered from their historical range. The risk of losing key ecosystem components has increased to moderate. Fire frequencies have departed by either increasing or decreasing from historical frequencies by one or more return interval resulting in moderate changes to one or more of the following: fire size, frequency, intensity, severity, or landscape patterns. Where appropriate, these areas may need moderate levels of restoration treatments such as fire use, prescribed fire and hand or mechanical treatments to be restored to their historical FRCC.
Condition Class 3	Fire regimes and vegetation attributes have been significantly altered from their historical range. The risk of losing key ecosystem components is high. Fire frequencies have departed from historical frequencies by multiple return intervals resulting in dramatic changes to one or more of the following: fire size, frequency, intensity, severity, or landscape patterns. Vegetation condition, structure, and diversity have been significantly altered. To restore the historical fire regime these lands may require high levels of restoration treatments such as hand or mechanical treatments before prescribed fire can be utilized.

Surface fuels are described by the 13 fire behavior fuel models (FM) (Anderson 1982). They are divided into four groups – grass, shrub, timber, and slash. They describe fuel conditions on the surface only in timber and do not describe live ladder fuels. The fuel models in the surveyed areas, determined through the FFE of FVS, include:

FM 2 is a shrub model that is comprised of open shrub land and pine stands that cover one-third to two-thirds of the area; such stands may include clumps of fuels that generate higher fire intensities and may produce fire brands.

FM 5 is a shrub model that is comprised of low shrub fields within timber stands. Fire is generally carried in the surface fuels that are made up of litter cast by the understory. Fires are generally not very intense because surface fuel loads are light.

FM 10 is a timber model that contains greater quantities of 3-inch or larger limb-wood resulting from over-maturity or natural events that create a large load of dead material on the forest floor. Fires burn in the surface fuels with greater fire intensity than other timber litter models. Crowning, spotting, and torching of individual trees are more frequent and may lead to potential fire control difficulties.

FM 12 is a slash model, though natural down, dead material may also contribute. Rapidly spreading fires with high intensities capable of generating firebrands can occur. When fire starts, it is generally sustained until a fuel break or change in fuels is encountered.

FM 13 is a slash model, though natural down, dead material may also contribute. Fire is generally carried across the area by a continuous layer of slash (or down, dead material).

Table 3-2 summarizes the current fuel models in the areas where stand examination data was collected.

Table 3-2. Fuel Models within the surveyed areas

Fuel Model	% of stand examination area
2	18%
5	9%
10	45%
12	18%
13	10%

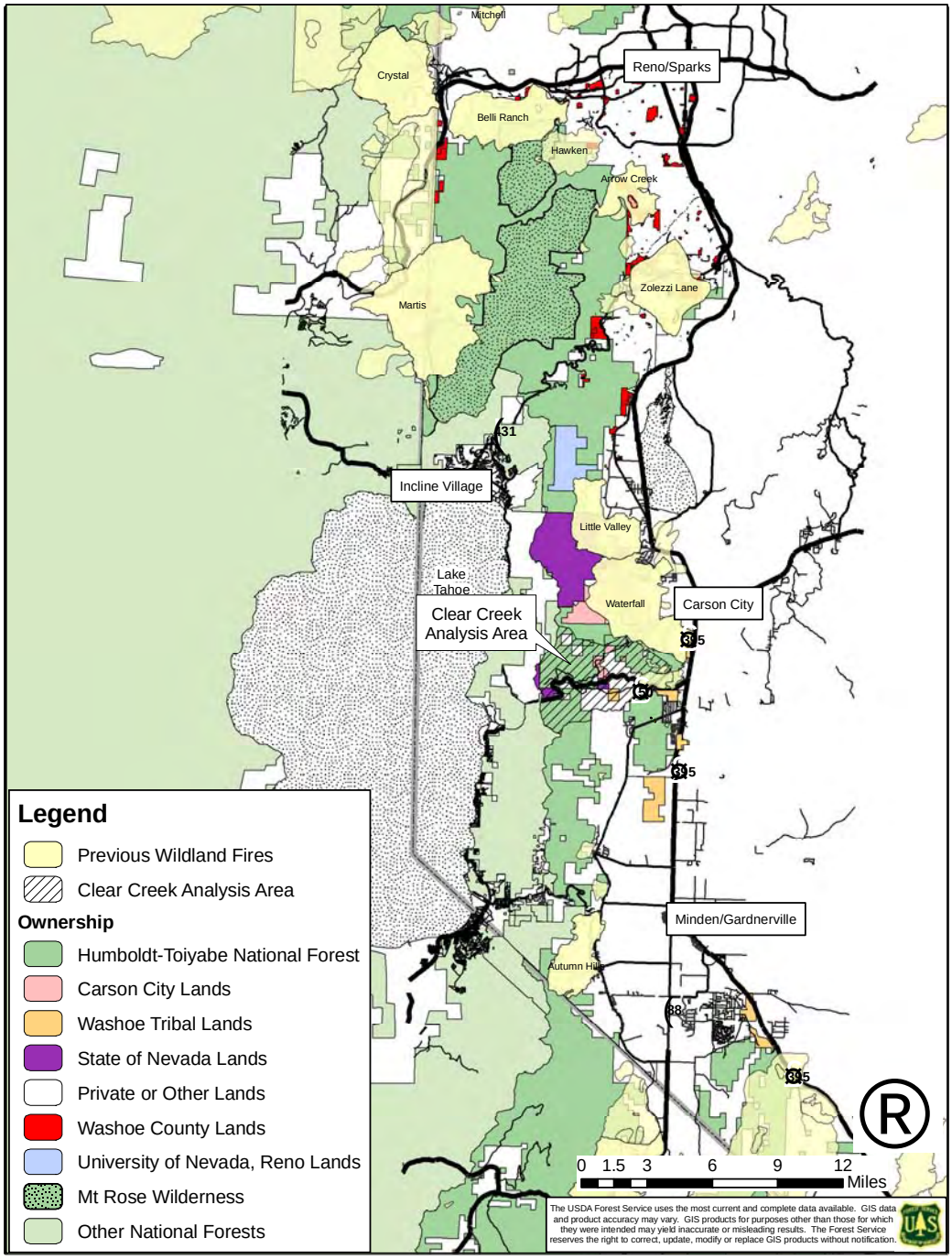
Fireline production rates for initial attack line construction by a Type 1 20-person hand crew in Fuel Models 2, 5, 10, 12 and 13 are 24, 6, 6, 7, and 5 chains per hour, respectively (NWCG 2004). Surface fuel loading and ladder fuels have a direct effect on amount of fireline that can be constructed in a given time and the rate of construction can vary.

Climate strongly influences the forest in several ways, ranging from direct effects of temperature, precipitation, and increased atmospheric concentrations of carbon dioxide on tree growth and water use, to altered fire regimes and changes in the range and severity of pest outbreaks (Malmsheimer et al. 2008). According to Malmsheimer et al. (2008) global mean surface air temperature is expected to increase over the next century. Taylor and Beaty (2005) documented that from 1650 to 1850 wet conditions were characteristic of years without fires and fire years were associated with drought. Drought intensity also influenced fire extent and the most widespread fires occurred in the driest years.

The largest fire that burned within the analysis area since the early 1900's is the Highway 50 fire, which burned 600 acres in 2003 and was human caused. Other fires within the analysis area include the human-caused 80 acre Voltaire fire in 2003 and a 70 acre fire in 1992. Other smaller,

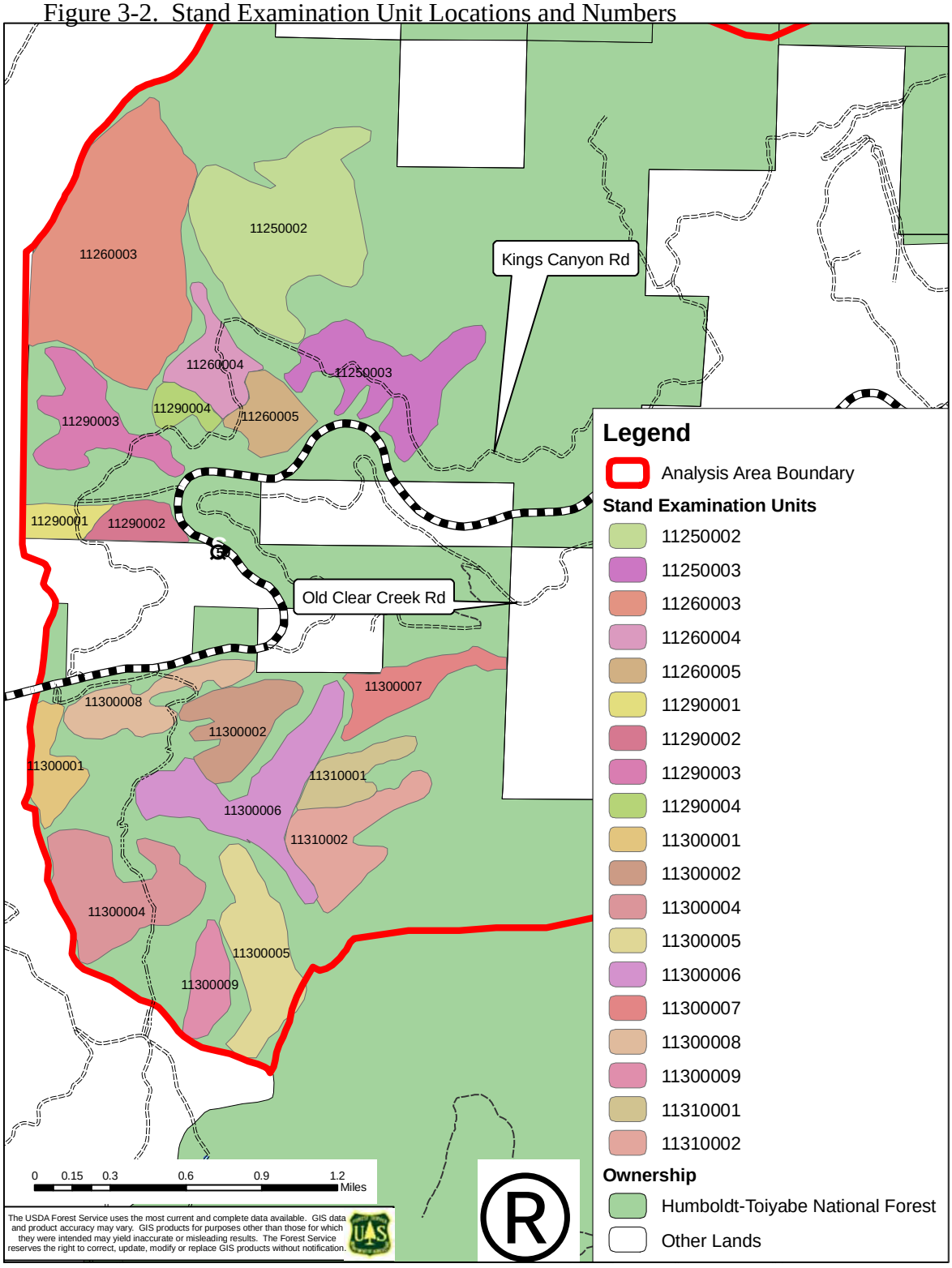
lightening caused fires have also occurred throughout the analysis area. While most of the fire starts are lightning-caused, the three largest in the area were human caused. These included the Waterfall fire in 2005 which consumed 8,700 acres and multiple structures; the Little Valley fire in 1981 which consumed 5,100 acres and; the Autumn Hills fire in 1996 which consumed 3,800 acres and multiple structures. Figure 3-1 displays previous wildland fires on the Humboldt-Toiyabe National Forest around the analysis area.

Figure 3-1. Previous wildland fires on the Humboldt-Toiyabe National Forest.



In 2005, stand examination was completed on 1,699 acres to collect fuels, vegetation, surface and topographic data. Figure 3-2 depicts the stand examination locations and unit numbers.

Figure 3-2. Stand Examination Unit Locations and Numbers



The forested areas are currently at a moderate to severe risk from a crown fire. Table 3-3 indicates the current fuels conditions within the areas surveyed by stand examination.

Table 3-3. Current fuels conditions within surveyed areas.

Stand #	Flame Length	Torching Index	Crowning Index	Crown Fire Hazard	% Motality	*Crown Fire Type*	Total Tons Per Acre of Down Fuels
125.02	7.3	24.7	53.6	Moderate	39	*Surface*	30.4
125.03	7.6	29.4	58.9	Moderate	36	*Surface*	6.5
126.03	11.6	0.0	25.6	Severe	98	*Passive*	61.7
126.04	7.2	0.0	36.5	Severe	96	*Passive*	13.5
126.05	13.7	2.7	54.8	High	93	*Passive*	97.2
129.01	13.2	2.2	45.9	High	95	*Passive*	95.1
129.02	6.7	0.0	44.7	High	94	*Passive*	18.0
129.03	7.0	0.0	32.1	Severe	96	*Passive*	21.7
129.04	7.4	0.0	27.2	Severe	98	*Passive*	0.3
130.01	6.9	0.0	30.5	Severe	97	*Passive*	36.1
130.02	7.0	32.7	40.5	Moderate	25	*Surface*	22.1
130.04	8.6	14.0	42.2	High	94	*Passive*	37.5
130.05	7.6	0.0	30.3	Severe	97	*Passive*	18.5
130.06	8.9	0.0	46.8	High	94	*Passive*	37.3
130.07	8.7	0.0	20.5	Severe	99	*Passive*	40.3
130.08	7.3	0.0	35.5	Severe	96	*Passive*	32.9
130.09	8.3	0.0	35.1	Severe	96	*Passive*	14.9
131.01	7.5	30.0	47.6	Moderate	56	*Surface*	2.8
131.02	8.6	0.0	41.2	High	96	*Passive*	34.8

The spatial arrangement of vegetation influences the growth of large fires. Patches of vegetation that burn relatively slower of less severely than surrounding patches can reduce fire intensity, severity, or spread rate, or may force the fire to move around them by flanking, which locally delays the forward progress of the fire. Photo 3-1 is a photograph from the analysis area, indicating some of the dense stand conditions that currently exist.

Photo 3-1 – Current stand conditions

Cheatgrass is an aggressive, non-native, invasive winter annual grass that was first introduced into the United States in the mid 1800's and now occurs in all states. Cheatgrass is a poor quality forage for wildlife and has the potential to completely alter the ecosystem it invades and alter fire regimes. Cheatgrass-dominated sites result in reduced forage on critical winter rangeland for mule deer and

other game animals (Ypsilantis 2003). Cheatgrass turns from green to purple as it matures and eventually dries out to a wheat color, becoming extremely flammable. Cheatgrass also matures and dries out weeks before native vegetation, potentially lengthening the fire season. The roots of cheatgrass are less extensive than the roots of typical native shrubland plants, providing a weak anchor for the soil and promoting erosion. (USDA 2008a).

Cheatgrass has been identified as the C3 species most positively responsive to increased CO2 and thus capable of benefiting from global atmospheric trends (Ypsilantis 2003).

Environmental Consequences

Direct and Indirect Effects

With no treatment, fuels will continue to accumulate. Dead fuels will continue to accumulate on the ground and as standing dead. Ladder fuels will continue to increase and already closed canopies will become denser. The stand density index indicates that as the number of trees increases within a stand, shade intolerant species would die out. As this takes place surface fuel loading would increase. The shade tolerant species, white fir and incense cedar, are less fire resistant than the shade intolerant pines. This would cause an increase in the probability of mortality for the stand when a wild fire occurs. These stands would also experience greater mortality under less severe fire conditions. In the event of a wildfire occurring under current conditions in the project area, the potential for a fire to move off the forest and into the communities as a crown fire will increase. No other natural or man-made barriers exist with the exception of U.S. highway 50. Increasing dead fuels, ladder fuels and closed canopies increase the potential for crown fire.

Mechanical treatments would remove three inch diameter and larger surface, ladder and crown fuels and reduce the crown fire hazard. Table 3-4 depicts the flame length, crown fire hazard, canopy base height and canopy bulk density before and after treatment (thinned to basal areas ranging from 65 to 102 square feet per acre). This data was determined from stand examination data and the fire and fuels extension (FFE) of the forest vegetation simulator (FVS). The data is within the project file at the Carson District office. In some stands, flame length may exhibit a minor increase temporarily after thinning because a reduction in canopy closure may cause an increase in mid-flame windspeed (Reinhardt and Cookston 2003).

Table 3-4. Fuel conditions before and after treatment, thinned to basal areas ranging from 65 to 102 square feet per acre. Stands highlighted in pink indicate areas within PACs that will receive no treatment. Stands highlighted in yellow indicate areas that will have trees up to 14" DBH thinned. Stands with no highlighting indicate areas that will have trees up to 30" DBH thinned.

Stand #	Estimated Current Flame Length	*Estimated Flame Length After Treatment*	Estimated Current Torching Index	Estimated Torching Index After Treatment	Estimated Current Crowning Index	Estimated Crowning Index After Treatment	Estimated Current Crown Fire Hazard	*Estimated Crown Fire Hazard After Treatment*	Estimated Current Canopy Base Height	*Estimated Canopy Base Height After Treatment*	Estimated Current Canopy Bulk Density	*Estimated Canopy Bulk Density After Treatment*
1125.02	7.3	*7.8*	24.7	*46.8*	53.6	*57.1*	Moderate	*Low*	16	*29*	0.028	*0.026*
1125.03	7.6	*8.9*	29.4	*49.4*	58.9	*85.5*	Moderate	*Low*	21	*48*	0.025	*0.015*
1126.03	11.6	*11.6*	0.0	*0.0*	25.6	*25.6*	Severe	*Severe*	4	*4*	0.071	*0.071*
1126.04	7.2	*8.2*	0.0	*22.3*	36.5	*45.8*	Severe	*Moderate*	5	*18*	0.048	*0.035*
1126.05	13.7	*12.7*	2.7	*25.0*	54.8	*68.2*	High	*Moderate*	17	*35*	0.028	*0.021*
1129.01	13.2	*12.2*	2.2	*44.1*	45.9	*83.6*	High	*Low*	14	*50*	0.036	*0.016*
1129.02	6.7	*6.9*	0.0	*40.2*	44.7	*69.6*	High	*Low*	2	*29*	0.037	*0.02*
1129.03	7.0	*5.8*	0.0	*62.8*	32.1	*59.7*	Severe	*Low*	4	*27*	0.056	*0.024*
1129.04	7.4	*9.7*	0.0	*29.0*	27.2	*56.5*	Severe	*Moderate*	6	*29*	0.064	*0.026*
1130.01	6.9	*6.5*	0.0	*43.0*	30.5	*41.8*	Severe	*Low*	2	*29*	0.063	*0.041*
1130.02	7.0	*7.4*	32.7	*49.4*	40.5	*58.4*	Moderate	*Low*	23	*32*	0.042	*0.025*
1130.04	8.6	*7.9*	14.0	*28.0*	42.2	*47.0*	High	*Moderate*	13	*23*	0.04	*0.035*
1130.05	7.6	*6.4*	0.0	*37.9*	30.3	*43.0*	Severe	*Moderate*	2	*19*	0.059	*0.038*
1130.06	8.9	*9.8*	0.0	*23.2*	46.8	*57.5*	High	*Moderate*	4	*22*	0.034	*0.026*
1130.07	8.7	*7.5*	0.0	*48.0*	20.5	*63.0*	Severe	*Low*	4	*38*	0.095	*0.023*
1130.08	7.3	*6.9*	0.0	*40.8*	35.5	*67.8*	Severe	*Low*	2	*29*	0.051	*0.021*
1130.09	8.3	*6.6*	0.0	*19.6*	35.1	*56.7*	Severe	*Moderate*	4	*13*	0.048	*0.026*
1131.01	7.5	*7.5*	30.0	*30.0*	47.6	*47.6*	Moderate	*Moderate*	22	*22*	0.034	*0.034*
1131.02	8.6	*9.4*	0.0	*23.9*	41.2	*53.2*	High	*Moderate*	5	*26*	0.041	*0.029*

Mechanized treatment will also change the arrangement of fuels by crushing shrubs and small trees, further reducing ladder fuels that can cause scorch and torching in prescribed burns and wildfire. Mastication of brush fields would reduce fuel bed bulk depth, thereby reducing flame height; the fire behavior would be similar to a light slash model. Thinning would remove ladder fuels resulting in a change in fire behavior, from a crown fire to a surface fire.

Reductions in fuel loading and stand density, changes in species composition, and rising of the canopy base height would produce changes in the behavior and effects of wild fire. Mortality would be reduced due to changes in species composition, reducing the canopy bulk density and the raising of the crown base height. Species remaining would tend to be the more fire resistant dominant pines. The reduction in fuel loading and raising of the crown base height would reduce torching and the probability that a fire would move into the crowns.

Underburning and pile burning would reduce surface fuel loading; burning will kill brush, and kill small conifers and hardwoods temporarily reducing fire behavior. Some preparatory hand treatment of trees less than 14" dbh may be required to reduce the ladder fuels prior to the implementation of a burn.

Annual grasses reproduce by seed; therefore, invasive annual grasses can be suppressed when targeted consumption limits the production of viable seed. Seed heads of invasive grasses must be consumed while they are still green and unviable, therefore timing of consumption is important and must occur in the early spring months. Early Intense flash consumption (consumption for a short period of time) of these introduced grasses by domestic animals will remove biomass, decrease plant density and suppress flowering. Cheatgrass may require a second or third grazing in the spring because it can re-grow and produce new seed heads three to four weeks after the first defoliation. Domestic animals will readily consume cheatgrass, medusahead and intermediate wheatgrass when it is green. Cheatgrass populations crash when cheatgrass plants do not produce viable seed for two or more successive years, leaving only

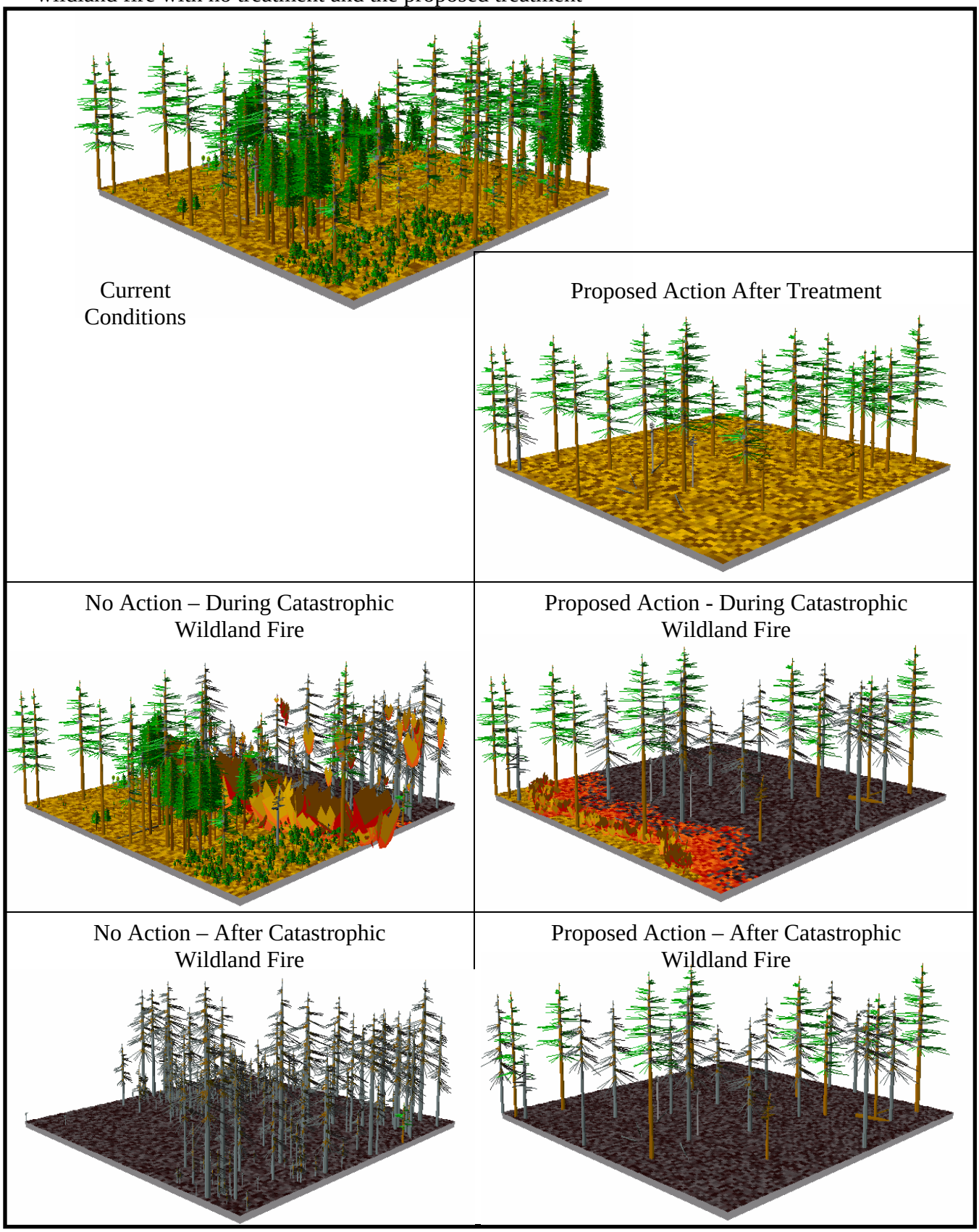
scattered, thin populations. Domestic sheep and goats are especially effective because their consumption and movements can be closely controlled and they get a full bite of the grass more easily (Launchbaugh et al. 2006).

Shrub species and hardwoods will re-sprout within one growing season but would have a lesser flame length for five to 10 years until plants reach full size and produce a significant amount of dead branches.

Fireline intensity, as measured by flame length, directly affects suppression tactics and capabilities. Fires with less than 4-foot flame lengths can be attacked directly with hand or engine crews. As intensity increases, changes in tactics and equipment are needed to slow or stop the spread of fire.

A typical stand within the analysis is visually represented in figure 3-3. This stand was modeled using the forest vegetation simulator (FVS) and SVS and the FFE. Stand examination data, collected in 2005, was used to provide the statistics for FVS FFE, and SVS.

Figure 3-3. Visual depiction of a timbered stand with proposed treatments and a simulated wildland fire with no treatment and the proposed treatment



Cumulative Effects

Fuels reduction has occurred on forest land within the project area and surrounding area. Fuels reduction work has occurred in connection with the Clear Creek Chapter of the Nevada Fire Safe Council. A prescribed fire reduces canopy base height and crown bulk density. Under more moderate weather conditions this treatment would reduce fire severity in the short term, 5-10 years, in these stands. In the long term, more than 10 years, these single treatments would have little effect, as ground fuels accumulate and fuel ladders are re-established.

Additionally the past, present and reasonably foreseeable future actions include:

Spooner Timber Salvage Sale, 1996

Old Clear Creek Road Fuels Reduction Project, 2006

West Carson Fuels Reduction Project, 2008

Personal use Christmas tree sales, 2006 – 2007, expected to continue in future years

Private land development including new homes, golf courses, etc.

Clear Creek/Kings EA

This project would connect these areas and produce a more strategic landscape-wide fuel treatment.

VEGETATION

Existing Condition

Historically fire played a critical role in the development and maintenance of the forest structure in the analysis area. In the 1860's most of the analysis area was intensively logged to provide timber and firewood for the Comstock mining boom in Virginia City. Historical photographs document a landscape devoid of most to all trees. Photo 3-2 is an 1876 photograph of Spooner Summit, which is located within the analysis area, indicating a landscape mostly devoid of trees. Some remnant red fir, Jeffrey pine and western white pine were retained during the Comstock logging and still exist today in isolated pockets. These 300 to 400 year old trees primarily occur along ridgelines at the upper-most elevations. The Sierra Nevada Framework (USDA 2004) identifies approximately 1400 acres of old forest emphasis area within the analysis area, primarily in the higher elevations.

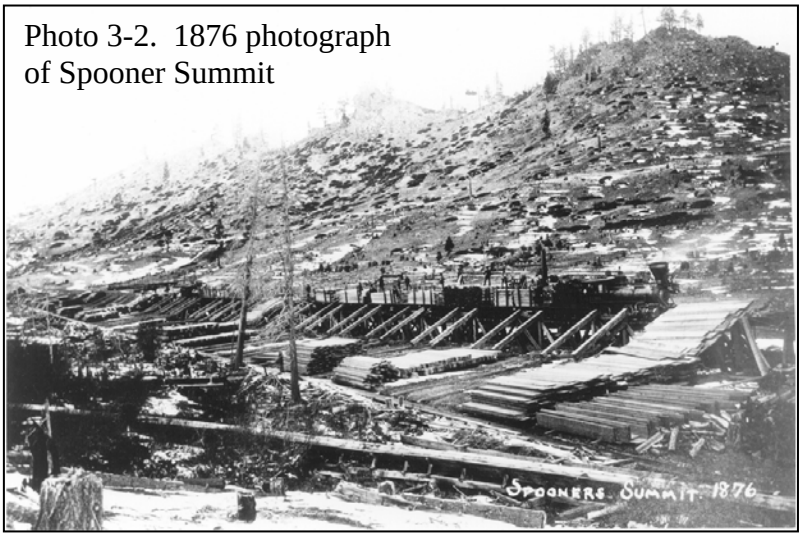


Photo 3-2. 1876 photograph of Spooner Summit

The present forest developed under conditions unique to the last 150 years, which strongly influenced its structure and species composition. Early influences of grazing, abundant precipitation and suppression of wildfires played a strong role in shaping the vegetation that

exists today. The current vegetation reflects the natural regeneration that followed the Comstock-era logging boom and consists of forest stands that are approximately 120 years old.

Conifer stands, with interspaced shrub fields, are the predominant vegetation in the mid to higher elevations within the analysis area, transitioning to shrubfields with scattered conifer in the lower elevations. On National Forest System lands within the analysis area 50 percent of the cover is comprised of shrub vegetation, 45 percent is conifer cover, 2 percent is herbaceous cover, 2 percent is hardwood species (aspen), and 1 percent is barren or urban.

Within the conifer cover, approximately 51 percent is comprised of mixed conifer/fir, 29 percent is comprised of Jeffrey or eastside pine, 18 percent is comprised of red or white fir, and the remaining 2 percent is comprised of lodgepole pine, subalpine conifers, incense-cedar, western white/sugar pine or willow.

Within the shrub cover, approximately 35 percent is comprised of bitterbrush-sagebrush, 32 percent is comprised of greenleaf manzanita, 29 percent is comprised of sagebrush, 1 percent is comprised of pinemat manzanita, 1 percent is comprised of bitterbrush and the remaining 2 percent is comprised of snowbrush, riparian mixed shrub, or mixed shrub.

Table 3-5 displays the current vegetation data for the stands identified in figure 3-2. This data was calculated using the Forest Vegetation Simulator.

Table 3-5. Current vegetation data

Stand #	Basal Area Per Acre	Canopy Closure (%)	Trees Per Acre	Stand Density Index (SDI)	% Max SDI Before	Acres	QMD Before
125.02	94	30	74	146	32%	237	15.2
125.03	118	37	51	163	36%	123	20.6
126.03	107	38	366	222	49%	328	7.3
126.04	117	42	416	245	54%	55	7.2
126.05	87	30	354	186	41%	46	6.7
129.01	74	30	333	162	36%	26	6.4
129.02	101	50	1326	273	61%	31	3.7
129.03	101	36	130	172	38%	81	11.9
129.04	121	46	256	228	51%	21	9.3
130.01	102	46	1641	287	64%	43	3.4
130.02	109	35	87	169	38%	71	15.1
130.04	70	25	751	182	40%	123	4.1
130.05	100	35	596	231	51%	101	5.5
130.06	90	34	636	215	48%	130	5.1
130.07	134	47	840	312	69%	56	5.4
130.08	126	49	961	306	68%	63	4.9
130.09	77	30	286	162	36%	38	7.0
131.01	96	33	185	178	40%	42	9.7
131.02	63	25	382	146	32%	84	5.5

In table 3-5, basal area is the cross-sectional area of a single stem, including the bark, measured at 4.5 feet above the ground. The Quadratic mean diameter (QMD) is the diameter of average basal area per tree. The stand density index (SDI) is a relative measure of stand density, as stand density increases so does insect and disease impacts and fire hazard. Some key relative densities include 25 percent of the maximum SDI which is when crown closure and the on set of competition begins; 35 percent of the maximum SDI which is when the stand is at the lower limit

of full site occupancy and 60 percent of the maximum SDI, which is the lower limit of self-thinning.

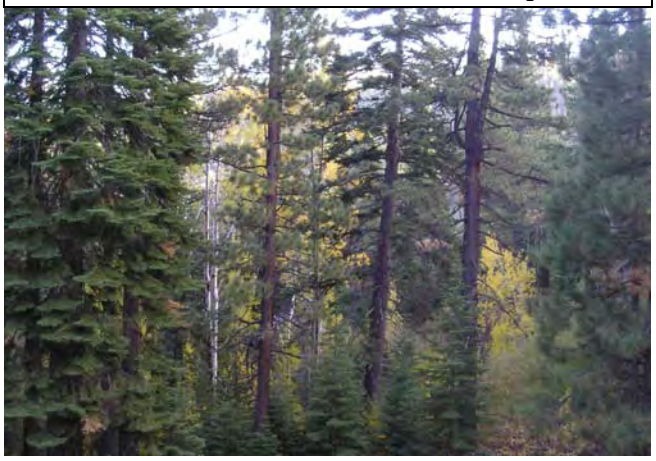
Aspen is an important species that is deteriorating throughout the Western United States. Comparisons of data from historical records indicate that the areas occupied by aspen have declined by 60 to 90 percent or more since European settlements (Lachowski et al. 1996). Aspen are short-lived, clonal species that require large amounts of sunlight (shade-intolerant) and moisture to regenerate. Aspen rarely reproduces from seed; they regenerate primarily through suckering (cloning). As an aspen seedling matures, it develops a shallow, widespread root system. Under optimal conditions, usually after a disturbance such as cutting, flood or fire, many shoots, called suckers, rise out of the root system of existing trees, these root suckers are genetic clones of the existing trees.

Healthy aspen stands contribute to the long-term land health and are an important component of ecosystem functioning (material cycling, succession, habitat, etc.). Many wildlife species utilize aspen stands to some degree and some species depend on them. Mule deer frequently browse in aspen stands, taking advantage of the higher quantities of shrubs, forbs and grasses that tend to occur in the more mesic environments associated with aspen. Northern goshawks also frequently rely on mature aspen stands for nesting. Many of the goshawk's prey species including woodpeckers, grouse, and a several rodents are typically abundant in aspen making them suitable foraging habitat as well. A variety of migratory birds rely on the abundance of snags and cavities found in aspen for protective cover and nesting.

Aspen stands may contribute to fire protection by acting as living firebreaks from the more flammable conifer stands. Aspen stands are also an integral component to the total scenic setting in a viewshed and contribute to the recreational experience of many forest users.

Western aspen exist in primarily three different types; 1) stable, 2) successional to conifers and 3) decadent and falling apart. Stable aspen replaces itself and has a ring of young regeneration around the edge and numerous sized aspen stems in the interior, the stems are of various ages that resulted from pulses of regeneration. Decadent aspen stands are generally of a single age and are very open; mature trees are not being replaced as they die because successful regeneration is lacking (Bartos 2001). The aspen in the analysis area primarily fall in the successional to conifers type of aspen; this is primarily due to fire suppression. Photo 3-3 is an aspen stand with encroaching conifer located within the analysis area. Conifers are out-competing aspen and reducing aspen size and vigor and reducing the diversity of suitable wildlife habitat. Generally, when conifers replace aspen there is a potential for a decrease in water yields. This loss of water means that it is not available to produce undergrowth vegetation, recharge soil profiles, or increase stream flow (Bartos 2001).

Photo 3-3. Conifer encroachment in aspen



In the past, sheep and cattle grazed heavily within the analysis area. Extensive Basque carvings within the project area indicate repeated use by sheepherders during the early to mid 1900's. There are currently two existing grazing allotments within the analysis area, the Clear Creek cattle and horse allotment and the Kings Canyon sheep and goat allotment. These allotments are currently vacant; Clear Creek was last grazed in 1990 with 18 cow/calf pairs and Kings Canyon was last grazed in 1977 with 1,000 sheep.

Environmental Consequences

Direct and Indirect Effects

Conifer Areas. Without treatment, the risk of a stand replacing wildfire is currently moderate to severe and the likely outcome over some or all of the analysis area. Based on FVS simulations, located in the project file at the Carson Ranger District, it is estimated that 25 to 99 percent tree mortality would occur during a wildland fire, with an average mortality of 84 percent. If this were to occur many forested stands would be replaced by shrub-fields of manzanita and ceanothus, especially in the lower to mid-elevations. This has occurred to the North of the project area within the Little Valley fire burned area. Without the occurrence of a wildland fire, the stand would still be at risk to bark beetle and density related mortality. Stand density indexes, which range from 32 to 68 percent of the maximum, indicate the stands range from near to lower limit of full site occupancy to the lower limit of self thinning, which indicates density related mortality. Stocking levels would remain high and stand vigor would continue to decline. Increases in overall stand diameters would continue to be minimal, due to over-stocked conditions and minimal stand growth. Conversion of stands to more shade-tolerant species such as white and red fir would continue.

Tree thinning areas. On up to 1,300 acres, trees up to 30" DBH would be thinned from below. In these areas trees would be thinned to 60, 80 or 100 square feet of basal area per acre, depending on their location. Thinning to 60 square feet per acre would occur within 100 to 200 feet of Forest Service system roads and boundaries. Residual trees with moderate to heavy dwarf mistletoe infection along system roads and the Forest Service boundaries would be pruned to remove mistletoe "witches' brooms". Witches' brooms affect stand structure and tree flammability by lowering crown base heights and increasing the amount of flammable resin (Hoffman et al. 2007). Away from roads and Forest Service boundaries, trees would be thinned to 80 to 100 square feet of basal area per acre. Where high quality wildlife habitat exists, small pockets of trees would remain and basal areas would remain higher to maintain cover for wildlife. These pockets would be located where the fuels and forest conditions are such that the risk to crown fire in the surrounding area is lower and tree vigor is fairly high. Trees would be thinned to 100 square feet of basal area per acre for a distance of 200 feet around the untreated pockets. In the remaining areas, trees would be thinned to 80 square feet of basal area.

Long-term sustainability of treated timber stands and resiliency to natural disturbances would improve and stand structures would be restored to be more representative of historic conditions. Tree stocking levels and fuel loading would be consistent with pre-settlement fire regimes. Natural disturbance regimes for forest insects, diseases, and fire in treated stands would be restored for approximately 20 to 30 years following treatment. Treated stands would benefit from the proposed vegetation and fuels reduction treatments for approximately 20 to 30 years before stocking levels and fuels would increase to undesirable levels once again. Reducing tree stocking levels would help to restore more historic stand conditions by reducing tree stocking levels, adjusting tree species composition and maintaining the largest trees. Thinning from

below would increase the average size of trees in treated stands following harvest; the majority of the large trees would be maintained in the treated areas. Large trees would become more abundant in the future due to decreased mortality of existing trees and in-growth from younger trees. Thinning from below (also called low thinning) mimics mortality caused by inter-tree competition or surface fires and concentrates site growth potential on the dominant trees (Graham et al. 1999). Susceptibility to forest insects and diseases would be restored to endemic levels associated with historic stand conditions. The treated areas will have a reduced risk of bark beetle related mortality. McGregor et al. (1987) reported that based on a five-year study, thinning to 80 to 100 square feet of basal area per acre reduced mountain pine beetle (*a bark beetle)* related tree losses. In treated areas, stand densities indexes would be reduced to 21 to 38 percent of the maximum, which indicates no crown closure and no competition. In some areas, stand densities will remain higher due to the large number of trees greater than 30" DBH. A low to moderate risk of a crown fire would exist. Trees species composition would change to reflect more historic conditions; red and white fir species would be reduced and pine species such as Jeffrey, western white, sugar and ponderosa would be increased. Within this treatment area, approximately 440 acres of old forest emphasis area exist. Where treatments occur, desired conditions (pages 1-7 and 1-8) would be realized.

On up to 700 acres, trees up to 14" DBH would be thinned. This treatment is located in areas that are more inaccessible, where smaller diameter trees are located and within some portions of PACs. Residual stand densities would range from 65 to 100 square feet of basal area per acre. Reducing tree stocking levels would help to restore more historic stand conditions by reducing tree stocking levels, adjusting tree species composition and maintaining the largest trees. Stand density indexes would be reduced to 30 to 48 percent of the maximum, which indicates some areas will still have crown closure from trees greater than 14" DBH and other stands will have full site occupancy. There will be a moderate risk of a crown fire. Trees species composition would change to reflect more historic conditions; red and white fir species would be reduced and pine species such as Jeffrey, western white, sugar and ponderosa would be increased. Within this treatment area, approximately 300 acres of old forest emphasis area exist. Due to the low thinning densities, desired conditions (pages 1-7 and 1-8) for old forest emphasis areas may not be met. Table 3-6 displays the estimated basal area, canopy closure, trees per acre and stand density indexes before and after treatment. This table gives an approximation of results. All figures are determined for an estimated basal area. As basal areas will vary within units from 60 to 100 square feet per acre, the resulting canopy closure, trees per acre and stand density indexes will also vary. In table 3-6, stands highlighted in pink indicate areas within PACs that will receive no treatment. Stands highlighted in yellow indicate areas that will have trees up to 14" DBH thinned. Stands with no highlighting indicate areas that will have trees up to 30" DBH thinned.

Table 3-6. Estimated basal area, canopy closure, trees per acre, SDI and percent maximum SDI before and after treatment.

Stand #	FVS Estimated Current Basal Area	*FVS Estimated Basal Area After Treatment*	FVS Estimated Current Canopy Closure (%)	FVS Estimated Canopy Closure After Treatment (%)	FVS Estimated Current Trees Per Acre	FVS Estimated Trees Per Acre After Treatment	FVS Estimated Current Stand Density Index	FVS Estimated Current % Maximum SDI	FVS Estimated Stand Density Index After Treatment	FVS Estimated % Maximum SDI After Treatment
1125.02	94	*80*	30	*26*	74	*55*	146	32%	*121*	*27%*
1125.03	118	*80*	37	*26*	51	*24*	163	36%	*103*	*23%*
1126.03	107	*107*	38	*38*	366	*366*	222	49%	*222*	*49%*
1126.04	117	*102*	42	*37*	416	*102*	245	54%	*215*	*48%*
1126.05	87	*84*	30	*30*	354	*120*	186	41%	*181*	*40%*
1129.01	74	*73*	30	*25*	333	*17*	162	36%	*109*	*24%*
1129.02	101	*70*	50	*23*	1326	*27*	273	61%	*96*	*21%*
1129.03	101	*78*	36	*26*	130	*35*	172	38%	*105*	*23%*
1129.04	121	*72*	46	*27*	256	*32*	228	51%	*103*	*23%*
1130.01	102	*72*	46	*27*	1641	*213*	287	64%	*172*	*38%*
1130.02	109	*80*	35	*26*	87	*25*	169	38%	*103*	*23%*
1130.04	70	*70*	25	*24*	751	*165*	182	40%	*138*	*31%*
1130.05	100	*80*	35	*24*	596	*33*	231	51%	*109*	*24%*
1130.06	90	*77*	34	*25*	636	*25*	215	48%	*101*	*22%*
1130.07	134	*78*	47	*27*	840	*32*	312	69%	*114*	*25%*
1130.08	126	*80*	49	*26*	961	*434*	306	68%	*101*	*22%*
1130.09	77	*65*	30	*25*	286	*238*	162	36%	*137*	*30%*
1131.01	96	*96*	33	*33*	185	*185*	178	40%	*178*	*40%*
1131.02	63	*63*	25	*25*	382	*382*	146	32%	*146*	*32%*

California spotted owl and Northern goshawk PACs areas. Approximately 650 acres of the conifer stands within the analysis area are within California spotted owl and Northern goshawk PACs. Most of the PACs will receive no treatment, of the 650 acres in PACs; 420 acres will not be treated. Within PACs approximately 20 acres of aspen will be enhanced, 60 acres of trees up to 30" DBH will be thinned and 150 acres of trees up to 14" DBH will be thinned. The treatment areas are located near Forest Service boundaries or Forest System roads. Approximately 300 acres of old forest reserves are located within the PACs. Desired conditions (pages 1-7 and 1-8) within these areas for old forest emphasis areas may not be met. In un-treated areas, the risk of a stand replacing wildfire would remain at moderate to severe. Without the occurrence of a wildland fire, the stand will remain at risk to bark beetle and density related mortality. Stand density indexes would remain at 32 to 49 percent of the maximum, which indicate the stands range from near to lower limit of full site occupancy to the lower limit of self thinning, which indicates density related mortality. Stocking levels would remain high and stand vigor would continue to decline. Increases in overall stand diameters would continue to be minimal, due to over-stocked conditions and minimal stand growth. Conversion of stands to more shade-tolerant species such as white and red fir would continue, however habitat for species such as the Northern goshawk and California spotted owl would be maintained.

Aspen enhancement areas. Without treatment aspen stands would continue to decline in vigor and size and may eventually be replaced by conifer stands. Aspen are a disturbance species; without a major disturbance, such as fire or mechanical treatments, aspen suckering will not occur and the aspen stand will eventually die out. Aspen cannot regenerate in the shade produced by an established forest stand. For this reason, it can be replaced by shade-tolerant conifers, such as white fir, that become established under the shelter provided by the mature aspen stand. Other conifer species, such as Jeffrey pine, also become established. If conifers continue to encroach upon the aspen community and aspen clones cannot sucker due to insufficient sunlight the existing clones will eventually die out and the stand will be replaced by

a conifer community. Once an aspen stand is allowed to die due to lack of disturbance, establishment of new aspen from naturally occurring seed sources is extremely limited

If a wildland fire were to occur aspen stands may be enhanced by the removal of invading conifer trees. However, with the high densities of conifers within many of the stands, wildland fires may burn at such high intensities that the shallow aspen root structures may be destroyed and the stand lost. Aspen stands would continue to be encroached upon by conifers and without a disturbance; the aspen stands would eventually be lost, removing this ecologically important component.

Treatments proposed include removal of conifers up to 30" DBH from within and around the stand. An aspen suckering response is expected to occur within and around the aspen stand, allowing the aspen stand to expand and flourish. Competition for sunlight from conifers can be minimized by the elimination of the majority of the encroaching conifers from within and adjacent to the aspen stand. Removal of conifers around the aspen stand for distance of approximately 1 ½ times the existing aspen height is optimal for aspen sprouting (Shepperd et al. 2006). Removal of conifers from within the stand would provide sunlight and nutrients to allow the aspen to successfully regenerate. Removal of conifers from the edge of the aspen stand would only occur where it is expected the aspen could expand. If aspen suckering with at least 3,000 aspen suckers per acre does not occur within three to fours years after conifer removal, underburning may be required to stimulate an aspen suckering response. Soil compaction will be minimized by helicopter logging systems, using mechanized harvesting equipment, or pre-approving skid trail layout. Use of mechanical harvesting by a tracked feller-buncher, which can harvest a tree, and carry it directly back out over the same track without turning, will create very little soil disturbance and minimize soil compaction (Sheppard et al. 2006). Reducing or removing conifer species would help to restore more historic aspen stand conditions by removal of competing conifers. Aspen is a disturbance-dependant species; therefore maintenance would be needed to allow for continued existence of healthy aspen stands. Maintenance would depend on the residual conifer reproduction and invasion and would include either periodic underburning or hand removal of conifer regeneration.

Shrub and small trees thinning areas. Without treatment, the shrubs densities would remain high, with a tall, continuous, interlocking shrub canopy layer with little to no sprouting. Reduced desirable forage for wildlife species would continue; wildlife species prefer the younger, more succulent sprouts and stems. The fire risk would continue to be high due to the tall, continuous, interlocking shrub canopy layer, which can carry a surface fire into the crowns of trees. These dense shrub fields can also carry a fire in between stands of timber and also into residential areas. In some shrub areas, small diameter stands of trees exist within the shrub fields; these trees are generally small, dense and have low heights to live crown. These trees would remain at a high risk of mortality due to a wildland fire and maintain little to no growth due to inter-tree and shrub competition.

Treatments proposed include removal of 30 to 80 percent of the shrubs; severity would depend on soils, location and wildlife concerns. Some smaller diameter trees, less than 14" dbh would also be removed. The residual trees would have brush removed around them for a distance of approximately ten to twenty feet. With the reduced brush densities, the residual brush would become more vigorous, sprouting younger, more tender sprouts. These sprouts would provide more desirable forage for wildlife species. Due to the reduced densities, smaller shrub heights and no continuous fuel layer, the flame lengths and fire severity would be reduced. Thinning of

the small diameter trees and release from the shrubs would eventually increase residual tree diameters and resistance to fire by eventually increasing the height to the live crown. This treatment would be effective for approximately five to ten years before shrub levels would begin to increase to undesirable levels. Maintenance every three to five years would need to occur to maintain the shrub areas. Maintenance may include mastication, piling and burning, seeding, or underburning. Maintenance may also include the use of animal based (sheep and/or goats) treatments to consume invasive/noxious weeds, including cheatgrass, within the analysis area.

Cumulative Effects

There are approximately 7,230 acres of National Forest system lands within the analysis area. Approximately 3,000 acres or 41 percent of the area will receive vegetation treatments through this proposal. Past and proposed treatments on private lands include hazardous fuels reduction projects around homes and developments, generally in cooperation with the Nevada Fire Council and the Clear Creek Fire Safe Chapter. Treatments on State of Nevada lands include tree thinning and brush removal in section 6. Treatments on Washoe Tribe of Nevada and California lands include tree thinning and brush removal in section 3. Treatments on public lands include the Spooner Timber Salvage Sale in 1996, the Old Clear Creek Road Hazardous Fuels Reduction Project in 2006, the West Carson Habitat Improvement Project in 2008 and personal use Christmas tree removal. These treatments on private, State, Tribal and public lands would generally reduce the risk of wildland fires and move the watershed toward more historical conditions.

AIR QUALITY

The existing sources of particulate emissions within and/or near the Clear Creek analysis area include smoke from neighboring prescribed fire projects, residential wood stoves, and vehicular exhaust and dust.

Existing Condition

All of the project area falls within Douglas County and Carson City. These counties air quality are monitored and enforced by the Nevada Division of Environmental Protection (NDEP).

Environmental Consequences

Direct/Indirect Effects

Air Quality will be affected primarily by prescribed fire operations such as pile burning and/or understory burning following pretreatments of an area. Prescribed fires are subject to permitting by the Nevada Division of Environmental Protection (NDEP). For each prescribed fire, the Forest Service will have contingency plans identified to reduce smoke emissions. Contingency plans shall be implemented when the Nevada Division of Environmental Protection determines that acceptable limits of smoke are exceeded, and/or the Forest Service anticipates that the prescription for a prescribed fire will be exceeded. Given these conditions, it is unlikely that health risks from air quality would occur. However, smoke generated from prescribed burning cannot be prevented and would likely be an annoyance to some individuals in local neighborhoods as well as to travelers through the area. The Carson Ranger District will work with other National Forests and Ranger Districts, the Bureau of Land Management, the Nevada Division of Environmental Protection, local fire departments, and the Nevada Division of Forestry to ensure that multiple prescribed burns would not exceed air quality standards. When mechanical fuels treatment operations take place dirt roads will be monitored for air quality compliance with the standards set forth by Nevada Division of Environmental Protection.

In the absence of hazardous fuels reduction treatments, a high severity wildland fire is likely. This would cause short term adverse air quality impacts from smoke emissions. The 3,100 acre Angora fire in 2007 on the Lake Tahoe Basin Management Unit released an estimated 141,000 ton(e)s of green house gasses and the decay of the trees killed by the fire could bring the total emissions to 518,00 ton(e)s. This is equivalent to the green house gas emissions generated annually by 105,500 cars (Malmsheimer et al. 2008).

Cumulative Effects

With the application of design features, there are no foreseen cumulative effects to air quality under the proposed action.

HERITAGE RESOURCES

Existing Condition

Prehistoric use of the Carson Range's eastern slope by Native American populations appears to be minimal. Findings include a number of isolated projectile points that suggest the eastern slope served primarily as a hunting ground. Large artifact scatters have been found on the floor of the valley, indicating some degree of residential stability nearby. This is supported by anthropological fieldwork that has shown that, historically, the Washoe lived in single-family residences on the floor of the valley during the winter. The proposed project area lies within the traditional homelands of the Washoe Tribe of Nevada and California. With the Comstock mining boom of 1859, vast amounts of timber were needed to support the burgeoning Euro-American population in western Nevada. Lumber was used for mine frames, buildings, and fuel, among other things. Historic documentation shows that the Carson Front was among the first places to be logged. Archaeological survey, to date, has found Comstock-era sawmill or habitation sites. Numerous roadways, water flumes, and evidence for other water conveyance pipelines have been found. There are also several water ditches and flumes, originally constructed during the Comstock-era or shortly thereafter. Many of these sites have the potential to provide information relevant to early Euro-American history including land use patterns, logging technology, and domestic life. Not all of the abovementioned sites are considered eligible for nomination to the National Register of Historic Places (NRHP). Those resources within the project area that are eligible for inclusion on the NRHP will be managed in compliance with 36 CFR Part 800 of the National Historic reservation Act.

The Washoe Tribe was notified of the proposed project via letter and telephone and discussed in a meeting. The tribe did not express any concerns about the project. The tribe was involved in the planning for this project as members of the "Carson Range Multi-Jurisdictional Fuel Reduction and Wildfire Prevention Strategy". This project was planned and approved in concert with this group which included members of the Washoe Tribe.

Environmental Consequences

Direct and Indirect Effects

The proposed action has the potential to affect 46 historic and prehistoric sites. Twenty one sites have been identified within or adjacent to proposed ground disturbing activities. Design criteria have been developed to protect the known sites from potential adverse impacts of implementing the proposed action.

Many of the sites in the project areas were old tree carvings on aspen trees. During project analysis, site inventories were completed and documentation was submitted to the State Historic

Preservation Office. Documentation was the required mitigation from the State. Over time these sites are and will continue to be lost as trees rot, die and fall over. Six known historic sites will be impacted by proposed burning activities.

All other sites will be flagged and avoided. If previously unknown sites are encountered during activities, operations will stop and the district archaeologist will be contacted. An adverse direct effect from burning will be the potential loss of several aspen stands that have historic Basque carvings of aspen. This impact was considered and consultation with Nevada State Historic Preservation Office provided mitigation measures to properly deal with the loss of these unique and temporary resources. Potential indirect effects may stem from increased recreation in the area and increased visibility of cultural resources and this may increase the potential for looting and vandalism to cultural resources.

Without treatments, the risk of a high severity stand replacing fire is high; this would allow the continued exposure of important archaeological resources to damage or destruction by catastrophic wildland fires and may constitute an adverse effect on these resources. Some of the aspen carvings are currently being adversely impacted by aspen disease, causing the bark to discolor and slip and the tree to die, this would most likely continue with or without treatment.

Cumulative Effects

No cumulative effects are anticipated, as impacts to six known sites will be mitigated and all other sites will be avoided.

WILDLIFE/SENSITIVE PLANTS

Existing Condition

The Clear Creek Fuels Reduction and Ecosystem Enhancement area lies west of Carson City between Eagle Valley and Lake Tahoe between 4,600 feet and 7,000 feet elevation. Major habitat types within the project area include sagebrush communities at the lower elevations transitioning to mixed conifer and pockets of aspen at the upper elevations. Montane brush communities are comprised primarily of sagebrush and bitterbrush, with some currant, tobacco brush, manzanita and desert peach. Forested communities along Clear Creek include a mix of Jeffrey and ponderosa pine, with some white and red fir and lodgepole pine. Most stands are fairly open, early to mid-seral condition with an average canopy cover of 30 to 40 percent. Pockets of mid to late-seral Jeffrey pine mixed with white fir occur near the upper ends of both Clear Creek and Kings Canyon Road where canopy cover ranges between 50 and 70 percent. These stands are relatively steep slopes (15- 20%), adjacent to drainages, and contain large diameter trees and multiple canopy layers. Rolling topography and gentler slopes (between 10 and 20 percent) are found in the lower elevations of the project area. Most of the Clear Creek fuels reduction and aspen enhancement project lies within the upper Clear Creek watershed. There are some units in the North Kings Canyon and Voltaire Canyon watersheds, and a small area that flows into Jacks Valley. These drainages are tributary to the Carson River. Clear Creek and Kings Canyon Creek flow as perennial streams, while Voltaire Canyon Creek and the unnamed Jack's Valley stream flow seasonally. Riparian vegetation is in most places confined to the immediate stream channel and includes some aspen, willow, alder and wild rose and appears to upland vegetation from most of the streams transitions to brush or conifer and other non-aquatic vegetation. Generally, soils in the Clear Creek watershed area are composed of metavolcanic soils.

Federally Listed Threatened or Endangered Species

Informal consultation to date includes a written request to the US Fish and Wildlife Service (USFWS), as required in 50 CFR 402.12(c), for a list of threatened, endangered, and proposed species known or likely to occur in the analysis area. According to the letter received from USFWS on December 2, 2008, no threatened, endangered or proposed species occur within the project area. This letter, file number 2009-SL-0054, is located in the project file at the Carson District office.

Forest Sensitive Species

A biological evaluation was prepared for the project record to evaluate the impacts of project activities to Forest Service sensitive species (on file in the project record). The combination of forested, shrub and riparian communities provides potential habitat for the following wildlife species listed as sensitive in region four: Northern goshawk, California spotted owl, flammulated owl, white-headed woodpecker, mountain quail, upswept, slender, and dainty moonwort. There are historic sightings of Northern goshawk and California spotted owl within the analysis area. Based on these sightings, two protected activity centers (PACs) were delineated for Northern goshawks and one for spotted owls. Although Northern goshawks and California spotted owls have not been detected during recent surveys, the PACs are still managed for the presence of these sensitive species. Refer to the biological evaluation for more detailed discussion on Northern goshawks and California spotted owls.

Management Indicator Species

Management indicator species (MIS) are identified in the Toiyabe National Forest Land and Resource Management Plan as representing a group of species having similar habitat requirements. MIS are not federally listed as threatened, endangered, or Forest Sensitive, but have the potential to be affected by project activities. A review was conducted to determine: 1) if the project is within the range of any MIS, 2) if habitat 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 analyzed below.

The following MIS were selected for analysis for the Clear Creek Fuels Reduction and Ecosystem Enhancement project due to the presence of suitable habitat for these species that may be impacted by the project: mule deer, American marten, yellow warbler, yellow-rumped warbler, hairy woodpecker, Williamson's sapsucker, northern goshawk*, and macroinvertebrates.

The following species were not selected for further analysis due to absence of habitat or because the project will not directly or indirectly affect the habitat: Palmer's chipmunk, sagegrouse*, Lahontan cutthroat trout, and Paiute cutthroat trout.

Mule Deer – Most of the lower elevations of the project area are considered critical winter range for mule deer with some transitional range occuring in the higher elevations of the project. Range for mule deer is generally considered "critical" when habitat components meet or exceed the biological requirements necessary to sustain a viable population of mule deer. For example, critical winter range is typically found at lower elevations where brush stands remain snow free and readily accessible for browsing and cover. Transitional ranges provide mule deer with necessary cover and forage to allow movement between winter and summer habitats. Important forage and cover species for mule deer in both winter and transitional ranges include bitterbrush,

** These species are also listed as sensitive in Region 4 and are discussed in the Biological Evaluation.*

sagebrush, mountain mahogany, and aspen. The bitterbrush and sagebrush communities located in the lower elevations of the project area near Voltaire Canyon Road provide suitable winter habitat for mule deer. The area south of Clear Creek Road and east to Jacks Valley Wildlife Management Area (adjacent to the project area) is a traditional wintering area where hundreds of deer congregate each year. The mixed conifer stands found at the upper elevations of Kings Canyon and Clear Creek Road, provide thermal and protective cover for mule deer transitioning from summer to winter range.

The project area is occupied primarily by Carson River Interstate herd (NDOW 2007, Cox 2008). This herd has endured substantial declines over the last decade largely due to loss of habitat from urban development, wildfires, and increased recreation (NDOW 2007). Currently, the Carson River deer herd is continuing to decline although population levels for the herd have fluctuated over the years (CDFG 2008, Cox 2007). For example, population estimates in 1956 were recorded at approximately 11,000 animals and peaked in 1959 at 21,500 (Fowler and Hinz 1981). This herd has decreased significantly in the last two decades, from an estimated 4,700 animals in 1978 to about 1000 in 2006 (NDOW 2007). A current population estimate for this Interstate herd is approximately 900 animals (Cox 2008). Over the last 30 years, urban development in Carson Valley, along with the increase in traffic on Highway 395 and Highway 88, have led to a loss of critical winter range and a subsequent decline in the Carson River deer herd (NDOW 2007). The highways have fragmented migratory routes and led to numerous deer being hit by vehicles.

American Marten - In California, marten occur in the northern Sierra Nevada at elevations of 3,400 feet to 10,400 feet, averaging 6,600 feet (USDA 2001). Preferred habitat for denning and resting 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 (Freel 1991). These areas are generally in close proximity to both dense riparian corridors (used as travelways), and include an interspersion of small (<1 acre) openings with good ground cover (Ibid). Marten use rest sites daily and therefore availability of these sites in suitable habitat is critical to their well being (Martin and Barrett 1991). Marten prey items vary seasonally, feeding primarily on ground squirrels and chipmunks during spring through fall and squirrels, mice, and snowshoe hares in the winter (Zielinski et al. 1983). Martens will also occasionally feed on birds, insects (primarily yellow jackets), amphibians, nuts, fruit, and occasionally carrion (Ibid). Alterations to marten habitat are their greatest threat and may even promote local extinctions (Lacy and Clark 1993). Suitable habitat for American marten exists within the upper portions of the Clear Creek drainage, north of Kings Canyon Road. Furbearer surveys, using sooted track plates and baited camera stations were conducted in several locations within the project area during the summer of 2008. Survey sites were randomly selected in the upper elevations of the project area following methods described in Zielinski et al. (1995**)**. No detections of martens were recorded.

Yellow Warbler – Yellow warblers breed in the Sierra Nevada and are uncommon to common summer residents on the Toiyabe National Forest (Finch 1991). Yellow warblers are closely tied to riparian habitat that contains willow, alder, and elderberry components. Although yellow warblers can be found in mixed conifer habitat, they are usually migrants (not breeders) associated with riparian areas found at the edge of conifer stands and or conifer stands that contain substantial amounts of brush (Zeiner et al. 1990). Wetlands, dominated by brushy draws, tend to have the highest occurrences of breeding yellow warblers (Schroeder 1982). According

to USGS Breeding Bird Survey information, population trends of yellow warblers in the Sierra Nevada have decreased slightly between 1980 and 2007 but have been on a a steady increase in the State of Nevada (Sauer et al. 2008). Habitat destruction and brown-headed cowbird parasitism are the biggest threats to yellow warblers (Erlich et al. 1988). Portions of the Clear Creek drainage contain abundant riparian vegetation suitable for yellow warblers such as willow, alder and bitter cherry. However, the Clear Creek drainage, as it occurs in the project area, is canopied by dense conifer forest for most of its length, and therefore provides only marginal habitat for yellow warblers.

Yellow-Rumped Warbler - The yellow-rumped warbler is considered to be highly adapatable and can be found in a variety of habitats including coniferous forest, mixed woodlands, deciduous forest, pine plantations, bogs, forest edges, and openings (Sibley 2000). Yellow-rumped warblers are primarily insectivores but also depend on berries in the winter. The Audubon race of yellow-rumped warbler breeds from southern British Columbia through the mountains and coastal coniferous forests of including the Sierra Nevada (Cornell 2008). According to USGS Breeding Bird Survey information, population trends of yellow-rumped warblers in the Sierra Nevada have been stable between 1980 and 2007 (Sauer et al. 2008). Within the Clear Creek project area, yellow-rumped warblers would likely be found in the upper elevations where mixed conifers are present.

Hairy Woodpecker - Hairy woodpeckers are associated with deciduous and coniferous woodlands found throughout North America (Ryser 1985, Erlich et al. 1988). In the Sierra Nevada, hairy woodpeckers nest in low to moderate canopy closure (< 70%) containing trees with a minimum dbh of 25 cm and minimum height of 4.6 meters (Sousa 1987). The hairy woodpecker requires cavities for nesting and foraging and feeds primarily on wood boring insects and insect larvae. Hairy woodpeckers are considered opportunistic foragers and will feed from a variety of substrates including snags and downed logs (Sousa 1987). The USGS Breeding Bird Survey reports population trends of hairy woodpeckers in the Sierra Nevada have been stable from 1980 to 2007 (Sauer et al. 2008). Threats to hairy woodpeckers include loss of habitat from activities such as logging that remove large diameter trees and snags (Siegel and DeSante 1999). Potential habitat for hairy woodpeckers occurs primarily in the upper reaches of Clear Creek drainage with some habitat potential in the upper elevations of conifer stands near Clear Creek Road.

Williamson's Sapsucker - Williamson's sapsuckers are found along the entire length of the Sierra Nevada and are considered a year-round resident on the Toiyabe National Forest (Finch 1991). This sapsucker breeds at middle to high elevations, generally from 4,900–10,500 feet in montane mixed deciduous-coniferous forest with quaking aspen as an important nesting substrate (Finch 1991). Availability of dead trees or live trees with heartwood rot is a critical component of breeding habitat (Finch 1991). Williamson's Sapsucker nests are located in fairly large snags (1 – 2.5 ft in diameter) (GBBO 2005). If large snags are preserved, the species appears to be fairly tolerant of habitat disturbances and may even respond to forest fires with population increases, if additional large snags are created in the process and at least some live trees remain for forage (Ibid). In the Sierra Nevada, population trends were reported as slightly increasing between 1980 and 2007 (Sauer et al. 2008). Patches of aspen located along Clear Creek and upland conifer stands with large diameter snags likely provide some habitat for the species.

Macroinvertebrates - Freshwater benthic Macroinvertebrates or more simply "benthos"are animals without backbones that are larger than ½ milimeter (the size of a pencil dot). These

animals live on rocks, logs, sediment, debris, and aquatic plants during some period in their life. The benthos include crustaceans such as crayfish, clams and snails, aquatic worms and the immature forms of aquatic insects such as stonefly and mayfly nymphs. Macroinvertebrates are an important part of the food chain, especially for fish. Many feed on algae and bacteria, which are on the lower end of the food chain. Some shred and eat leaves and other organic matter that enters the water. Because of their abundance and position as "middleman" in the aquatic food chain, Macroinvertebrates play a critical role in the natural flow of energy and nutrients. As Macroinvertebrates die, they decay, leaving behind nutrients that are reused by aquatic plants and other animals in the food chain. Macroinvertebrates are likely present in the Clear Creek drainage and its tributaries.

Other Species Considered

Washoe tall rockcress - Washoe tall rockcress (*Arabis rectissima var. simulans*) is a rare plant species which is endemic to the north half of the Carson Range in Douglas and Washoe counties. Washoe tall rockcress is proposed for listing as a sensitive species in Region 4 and is ranked as "1" (most vulnerable) by the Nevada Natural Heritage Program (Morefield 2001). Currently this plant is only known to occur in eight locations, totaling 29 acres of Federal, county, state, and private lands (Morefield 2002). Many of the known populations occur within or adjacent to high-use recreation or other disturbance areas. Washoe tall rockcress occurs on relatively flat dry, sandy soils between 6,000 and 7,500 feet elevation. Populations have been found in thinly-littered openings among mid- to late-seral stands of Jeffrey pine and white fir (Ibid). Some preference for inhabitating mildly disturbed sites such as old picnic and camping areas and recovering road banks has also been observed. However, plants which occur in these disturbed locations appear to often be hybridized with *Arabis holboelli* (Morefield 2002).

A plant survey conducted in 2002 (for a separate project) located a single population of Washoe tall rockcress (totaling 5 plants) approximately 0.2 miles south of Old Clear Creek Road (JBR et al. 2002). This population is outside of any of the proposed treatment areas. In addition to this population, approximately 133 acres of potential habitat were identified for Washoe tall rockcress within the boundaries of the Clear Creek fuels project area (Ibid). A plant survey was conducted for this project in 2006 and found no additional populations of Washoe tall rockcress within the project area. The greatest threats to Washoe tall rockcress are recreational development and use, road construction, fire suppression activities, timber harvest and off-road vehicle use (Morefield 2001).

Neotropical Migratory Birds - The migratory songbirds found in North America include roughly 350 species, of which about 250 are known as "neotropical migrants". Migratory birds spend their winters in the tropics of southern Mexico, Central and South America, and the West Indies. Migratory songbirds can be found in virtually every habitat on the continent, and usually half or more of the breeding birds in any sampled area are migratory (Robinson 1997).

A variety of migratory and resident birds occur within the project area. Aspen-riparian habitat found throughout the project area is considered the "highest priority" habitat for Neotropical Migratory birds (NTMB) in the 1999 Draft Avian Conservation Plan for the Sierra Nevada Bioregion (Siegel and DeSante 1999). Aspen habitat supports an extremely rich and abundant avian community that includes several species of conservation concern, such as warbling vireo and red-breasted sapsucker (Gardali et al. 2000, Rich et al. 2004).

Other habitats in the project area, including late successional forest, are also ranked as high priority and support species such as brown creeper and golden-crowned kinglet.

A priority Species table including trend information calculated from the Breeding Bird Survey (BBS) is located in Table 1.

Table 3-7 display species associated with major habitat types in the project area and current trend information (from 1966 to 2007) for the Sierra Nevada Region from the USGS Breeding Bird Survey (Sauer et al. 2008). Significant declines or increases were determined based on number species per route over time (BBS Trend Classification System).

Table 3-7. Species associated with major habitat types in the project area and current trend information from the USGS breeding bird survey.

Species- Common Name	Riparian/Aspen	Late Successional Forest	BBS Trend
Belted Kingfisher	X		slightly declining
Red-breasted sapsucker	X	X	slightly increasing
Tree swallow	X		increasing significantly
Northern rough-winged swallow	X		slightly increasing
House wren	X		slightly decreasing
Swainson's thrush	X	X	stable
American robin	X	X	decreasing significantly
Orange-crowned warbler	X		slightly decreasing
Nashville warbler		X	decreasing significantly
Wilson's warbler	X		decreasing significantly
Chipping sparrow		X	decreasing significantly
Song sparrow	X		slightly increasing
Lincoln's sparrow	X		slightly decreasing
White-crowned sparrow			slightly decreasing
Lazuli bunting	X		slightly increasing
Bank swallow	X		no information
Black-headed grosbeak	X		slightly decreasing
Common yellowthroat	X		no information
Swainson's hawk	X		no information
Tricolored blackbird	X		no information
Warbling vireo	X		slightly decreasing
Yellow breasted chat	X		slightly decreasing
White-headed woodpecker		X	increasing significantly
Pileated woodpecker		X	slightly decreasing
Red-breasted nuthatch		X	slightly decreasing
Pygmy nuthatch		X	slightly decreasing
Brown creeper		X	slightly decreasing
Winter wren	X	X	decreasing significantly
Hermit warbler		X	slightly decreasing
Purple finch		X	decreasing significantly
Cassin's finch		X	decreasing significantly
Evening grosbeak		X	slightly decreasing

The two largest threats to NTMB are habitat fragmentation on breeding grounds and deforestation of wintering habitat (Finch 1991). Compared to other birds, migratory species are the most negatively affected by fragmentation, and are usually absent from small or highly isolated forests (SERC 2003).

Environmental Consequences

Under the proposed action, disturbance to existing vegetation and an increase in human activity will likely result in some minor impacts to wildlife. However, in the long term, the improvements to aspen stands and brush communities will benefit a variety of wildlife species. Furthermore, the proposed action would reduce the risk of a severe, stand replacing fire, protecting habitat conditions for plants and wildlife in the project area.

Federally Listed Threatened or Endangered Species

There are no Federally listed threatened, endangered, or proposed species within the project area.

Forest Sensitive Species

Historical occurrences of both goshawks and spotted owls have been recorded within the project area. However, surveys conducted in the area since 1993 have resulted in no detections of these species. Suitable habitat is also present for flammulated owls, white-headed woodpeckers, mountain quail, dainty moonwort, upswept moonwort, and slender moonwort although their occurrence within the project area is unknown. Implementation of the proposed project may impact the above listed species by disturbing breeding and foraging activities and/or disturbing habitat. However these impacts are expected to be minor, will only impact individuals, and will not lead to a trend toward Federal listing (See Biological Evaluation).

Management Indicator Species

Mule Deer - Under the proposed action, direct effects to mule deer include displacement of deer during project activities. The effects of disturbance to mule deer may be greater during the winter months when deer are often relying on energy reserves for survival. If disturbance levels are consistently high, deer may permanently avoid these areas and subsequently, productivity of the herd may be reduced. However, under the proposed action, the majority of the project activities will occur outside of the winter months (to avoid resource damage) and therefore will minimize the impact to mule deer from disturbance. Project activities occurring during the late spring and summer months may impact deer transitioning from winter to summer range or deer seeking cover in aspen and conifer stands. However, suitable habitat for mule deer surrounds the project area and will provide easily accessible refuge for mule deer during project operations. Furthermore, because the project area is not occurring in critical fawning habitat, deer occupying the project area will primarily be adults who are mobile and able to disperse to adjacent undisturbed suitable habitat during project operations.

Indirect effects to mule deer summer and transition range include the reduction in tree cover both in conifer and aspen stands proposed in the upper elevations of the project area. Mule deer rely on conifer and aspen stands, particularly on summer and transitional ranges, to provide thermal and security cover (Carson and Peak 1987). Mule deer tend to prefer conifer stands in early to mid-seral stages due to the relative abundance of understory vegetation typically present in the younger stands. Deciduous forests, such as cottonwood or aspen, provide overhead shade and open under stories to allow passage of cool breezes during summer. Mule deer also rely on aspen communities for food, cover, hiding, fawning, fawn rearing, and protection from severe weather, making it a popular habitat type for them three seasons of the year. Under the proposed

action, conifer would be completely removed from approximately 250 acres of aspens stands. In the short term, the reduction in conifer will reduce the overall canopy cover in aspens stands and subsequent thermal protection for mule deer. In the long term, however, the removal of conifers will promote the regeneration of aspen and other understory vegetation thereby improving habitat for mule deer. In conifer stands outside of aspen areas, thinning of conifer will also reduce thermal cover and protection for mule deer. However, the decrease in canopy cover will likely benefit mule deer in the long term, as shrubs and other vegetation are re-established in the understory providing mule deer with quality summer forage.

In the lower portions of the project area, thinning of bitterbrush and sagebrush stands will occur in areas considered critical winter range for mule deer. Brush stands will be thinned between 30 and 80 % with more intensive treatments occurring in high risk areas (near structures). In areas where structures are not threatened, brush will be treated in a mosaic pattern to allow for adequate cover and forage for mule deer. In the short term, some cover and forage habitat for mule deer will be reduced as tall shrubs are topped and some removed from mastication equipment. However, the stems and roots of most shrubs will be left intact allowing resprouting of existing shrubs and regeneration of new shrubs to occur. In general, younger shrubs provide more nutritious and palatable forage for mule deer. Therefore, any loss of cover will be offset from the benefits of improved forage capability of the new growth. Prescribed burning in the shrub communities will also improve habitat conditions by stimulating seed production of both grasses and shrubs. Mule deer habitat could also be indirectly affected from the increase in cheatgrass following mastication and/or prescribed burning efforts. The conversion of critical winter range to cheatgrass and other noxious weeds is considered a major threat to mule deer populations in the State of Nevada (Wasley 2004). Under the proposed action, areas considered as high risk for cheatgrass invasion will be seeded following mastication and/or prescribed burning operations. Seeding with native vegetation will minimize the risk of noxious weed spread within the project area.

Cumulative Effects

Over the last 30 years, urban development in Carson Valley, along with the increase in traffic on Highway 395 and Highway 88, have led to a loss of critical winter range and a subsequent decline in the Carson River deer herd (NDOW 2007). The highways have fragmented migratory routes and led to numerous deer being hit by vehicles. Large scale fires such as the Cannon Fire in 2002 and the Larson Fire in 2007 burned over 30,000 acres, much of which was important winter range for the Carson River mule deer. The Waterfall Fire, west of Carson City, burned over 5,000 acres of critical deer habitat further reducing the availability of resources for mule deer along the Carson Range. Many burned areas have been replaced by invasive or non-native species such as cheatgrass that out-compete native vegetation and provide little or no forage value for mule deer. In addition to fires, urban development has also diminished habitat for mule deer. For example, a large scale residential development and golf course is scheduled to be developed adjacent to the project area within the next five years and will reduce habitat for mule deer by approximately 2, 000 acres.

The Forest Service, in cooperation with the Nevada Department of Wildlife has recently implemented several deer habitat restoration projects in the Carson City area in order to improve habitat in some of the recently burned areas along the Sierra Front. For example, locally collected sagebrush and bitterbrush seedlings were planted within the boundaries of the Waterfall Fire in 2006. An additional 100 acres was planted in the Voltaire Canyon area east of Carson

City and 200 more acres were planted in Voltaire and C-Hill in the spring of 2008. During the fall of 2008, the Forest Service will be improving approximately 300 acres of critical winter range in the Jack's Valley Wildlife Management area through brush treatments and native plant restoration. The Management Area is located approximately two miles east of the project area.

Based on the above assessment, it is expected that some disturbance to mule deer may occur from implementation of the proposed project. However, the overall disturbance to mule deer is expected to be minor and temporary. Reductions in cover habitat for mule deer will be offset from the benefits of increased forage production and overall improvements to critical habitat. Therefore, the proposed action may affect individual mule deer, but will eventually improve habitat and will not contribute to a downward trend in the population of the Carson River deer herd.

American Marten - The upper portions of Clear Creek drainage contains late-seral stand conditions suitable for marten. Under the proposed action, approximately 2,000 acres of conifer forest will be thinned using ground based and helicopter logging systems. Within this area approximately 1,300 acres will have larger trees removed up to 30" dbh with a target basal area of 60 square feet of basal area along Forest Service roads and 80 to 100 square feet in areas interior from roads. Direct effects from the proposed action include displacement of marten during logging and other project operations. Marten may be inadvertently trampled from heavy equipment and or have den sites impacted from logging operations. However, furbearer surveys conducted in the project area during the summer of 2008 resulted in no detections of marten. Furthermore, the most suitable habitat for marten occurs in the goshawk and spotted owl PACs. These areas, relative to most of the project area, contain more mature conifer with greater structural diversity. Under the proposed action, only 150 acres of an approximately 600 acres of PACs will be treated with small diameter hand thing (less than 14"minor). Because project activity will be minimal in the most suitable habitat for marten, the likelihood of directly affecting the marten will also be minimal.

Indirectly, marten could be affected from a reduction in canopy cover and structural diversity within the project area. Marten typically require habitat features associated with late-seral coniferous forests such as dense canopied (60-100%), multi-storied stands with numerous large diameter snags. Alterations to habitat are considered one of the greatest threats to marten as they rely on late successional forests which have become increasingly rare, particularly along the Eastern Sierra (Lacy and Clark 1993). However, under the proposed action, design features such as maintaining at least three of the largest snags per acre and down woody debris over 12" in diameter will minimize the impacts to marten habitat. As mentioned above, approximately 450 acres of the most suitable habitat for marten will not be treated at all under the proposed action. These stands will maintain a late successional character and continue to provide marten with suitable habitat within the project area. In denser pockets of forested stands outside of the project area, no treatment would occur within the pockets and basal area would be at least 100 square feet per acre for a distance of 200 feet around the untreated pockets. This design feature will allow for habitat corridors between the most suitable habitat (in the PACS) and the smaller pockets of suitable habitat that occur outside of the PAC area.

Cumulative Effects

Across the Ranger District, the primary threat to marten is the loss of late successional habitat. Historic logging during the Comstock area effectively removed many of the large diameter trees in the area which likely reduced available marten habitat in the area. Current Forest Service

forest health and fuels reductions projects typically include focus on the removal of smaller diameter trees to reduce ladder fuels. However, the Forest Service is planning a large fuels reduction project in the Browns and Winter's Creek area which will remove some larger diameter conifers up to 30 inches DBH and will reduce conifer cover from an average of 200 sq. ft. basal area to approximately 80 to 100 sq. ft. basal area. The removal of these trees may impact the marten's ability to forage and den in the area. However, the project will retain three of the largest snags per acre and all trees greater than 30 inches will be preserved (unless it is a hazard tree). Development of both commercial and private residences has increased significantly in the last 10 to 20 years along the Carson Front Range. Such development has likely impacted marten by eliminating habitat and fragmenting the habitat that remains between the urban lots. The development and expansion of local ski resorts resort has also likely had some impact on marten although it is unclear if those impacts are negative or positive. Marten have been reported in high numbers at several ski resorts along the Cascades and Sierra Nevada eating human food (e.g., dumpsters), using resort structures (e.g., chalets, buildings) as rest sites, and are frequently detected under lift lines via their tracks in snow. The Clear Creek Fuels project will reduce cover and other habitat features required by marten in portions of the project area. However, the highest quality habitat for marten will either be treated minimally with small diameter hand thinning or will not be treated at all. Furthermore, treatment of the Clear Creek area will reduce the chance of a catastrophic wildfire eliminating the entire available habitat for marten. Based on the above assessment, it is expected that the proposed action may have minor, short term impacts on habitat for marten, but in the long term will likely improve habitat conditions for this species and will not lead to a downward trend in the population.

Yellow Warbler

Direct and Indirect Effects

Portions of the Clear Creek drainage contain abundant riparian vegetation suitable for yellow warblers such as willow, alder and bitter cherry. However, the Clear Creek drainage, as it occurs in the project area, is canopied by dense conifer forest for most of its length, and therefore provides only marginal breeding habitat for yellow warblers. Yellow warblers found in the project area would likely be migrants foraging during the post breeding cycle. Habitat destruction and brown-headed cowbird parasitism are the biggest threats to yellow warblers. Under the proposed action, direct effects to yellow warblers include flushing birds from nest and foraging sites during project activities, particularly those that involve thinning immediately in the Clear Creek drainage. Disruptions to breeding could lead to mortality of eggs and/or juveniles and allow for the increased risk of nest parasitism. However, thinning in riparian areas will entail primarily removing small diameter conifers and very little riparian vegetation removal. Furthermore, because yellow warblers are typically found in conifer habitats during migration and not breeding, it is unlikely that any impacts to breeding activities would occur. Indirectly, yellow warblers could be affected from the removal of vegetation during thinning operations in the Clear Creek drainage and upland habitats. Yellow warblers require shrubs and small trees of adequate height to provide perching and foraging habitat. Reduction in shrubs could cause yellow warblers to avoid the area during migration. However, under the proposed action the reduction in forested canopy cover will likely result in the increase in shrubs in the drainages and some upland areas.

Cumulative Effects

Across the Ranger District, local, large scale wildfires that have recently occurred have likely reduced habitat for yellow warblers. For example, portions of perennial drainages such as Ash

Canyon and Vicee Canyon, burned at high intensities during the Waterfall fire destroying large acres of riparian vegetation. However, population trends of yellow warblers appear to be increasing in the state of Nevada, indicating suitable habitat conditions are available throughout the state. Based on the above assessment, it is expected that the proposed action may have some minor, temporary impacts to yellow warbler habitat but in the long term may improve habitat for the species. Therefore, the project will not lead to a downward trend in the population.

Yellow-Rumped Warbler

Direct and Indirect Effects

Within the Clear Creek project area, yellow-rumped warblers would likely be found in the upper elevations where mixed conifers are present.

Under the proposed action, direct effects to yellow-rumped warblers include flushing birds from nesting and or foraging areas during project activities. Disruptions to breeding could lead to mortality of eggs and/or juveniles and allow for the increased risk of nest parasitism. Indirectly, removal of vegetation could temporarily cause yellow-rumped warblers to avoid the area for nesting and or foraging. However, under the proposed action dense pockets of vegetation will not be treated and will continue to provide adequate nesting habitat for the warbler. In addition, portions of stands that are treated may respond with an increase in shrubs that will in the long-term improve habitat conditions for yellow-rumped warblers.

Cumulative Effects

Across the Ranger District, local, large scale wildfires that have recently occurred have likely reduced habitat for yellow-rumped warblers. For example, the Waterfall fire burned approximately 1,500 acres of mixed conifer on National Forest Lands. Regionally, other fires such as Martis, Crystal, and Cottonwood have also burned thousands of acres of forested habitat. Population trends of yellow warblers appear to be increasing in the state of Nevada, indicating suitable habitat conditions are available. Reforestation efforts associated with the burned areas will continue to improve habitat conditions for yellow-rumped warblers. Based on the above assessment, it is expected that the proposed action may have minor impacts on yellow-rumped warbler habitat, but will not lead to a downward trend in the population.

Hairy Woodpecker, Williamson's sapsucker

Direct and Indirect Effects

Habitat for hairy woodpeckers and Williamson's sapsucker occurs in several portions of the project area. For example, hairy woodpeckers are often associated with late successional conifer forest which is found in the PAC areas of the project area, as well as several pockets of denser stands outside of the PACS. The approximately 250 acres of aspen stands likely contain some of the best habitat for both species in the project area. Aspen stands typically provide the structural diversity with abundant snags and snags with cavities to support woodpeckers. Under the proposed action, direct effects to these woodpeckers include flushing birds from nesting and or foraging areas during project activities. Disruptions to breeding could lead to mortality of eggs and/or juveniles and allow for the increased risk of nest parasitism. However, under the proposed action, project activities will not occur in aspen stands until after the breeding season for most migratory birds (May through July). Furthermore, snags with obvious cavities will not be removed, decreasing the potential for inadvertent nest destruction. In the most suitable conifer habitats within the project area (PAC areas), only 150 acres will be treated. Within those 150 acres only small diameter trees will be hand thinned. Therefore, the potential for disturbing woodpeckers in the highest quality habitat will be minimal.

Indirectly, Williamson's sapsuckers and hairy woodpeckers could be affected from a reduction in canopy cover and structural diversity within the project area. Both species require conifer and/or deciduous stands that include large diameter snags and some structural diversity within the stand. Loss of these habitat features is considered one of the largest threats to both of these species. However, under the proposed action, design features such as maintaining at least three of the largest snags per acre and down woody debris over 12" in diameter will minimize the impacts to woodpecker habitat. As mentioned above, approximately 450 acres of the most suitable habitat for hairy woodpecker will not be treated at all under the proposed action. These stands will maintain a late successional character and continue to provide hairy woodpeckers and Williamson's sapsucker with suitable habitat within the project area. In denser pockets of forested stands outside of the project area, no treatment would occur within the pockets and basal area would be at least 100 square feet per acre for a distance of 200 feet around the untreated pockets. This design feature will allow for habitat corridors between the most suitable habitat (in the PACS) and the smaller pockets of suitable habitat that occur outside of the PAC area. In aspen stands, conifer removal may, in the short term, impact Williamson's sapsuckers and hairy woodpeckers by reducing suitable foraging and nesting habitat. However, the improvements to aspen stands from removing conifer will in the long term compensate for habitat loss from conifer removal and will eventually benefit both of these species. For example, in a study conducted on the Lassen National Forest, the abundance of hairy woodpeckers significantly increased one and two years following conifer removal in aspens stands (Burnett et al. 2008). Williamson's sapsuckers also showed a slight increase as did a number of other migratory and resident bird species.

Cumulative Effects

Across the Ranger District, local, large scale wildfires that have recently occurred have likely had mixed impacts on hairy woodpeckers and Williamson's sapsuckers. Although thousands of acres of forested lands were burned, these burns provided an abundance of snags, many of which remain adjacent or within patches of live, in-tact stands of conifer and/or aspen. Removal of firewood and hazardous tree projects has likely had some negative impacts on both of these woodpeckers. For example, the Bliss Fuelwood project, located southwest of the project area, treated 124 acres of dead trees in 2003. However, requirements associated with these projects were designed to protect woodpecker habitat by including a diameter limit of 24" and no removal of snags with cavities. Population trends for hairy woodpeckers and Williamson's sapsuckers appear to be stable and/or increasing in the state of Nevada, indicating suitable habitat conditions are available. Reforestation efforts associated with the burned areas will continue to improve habitat conditions for hairy woodpeckers and Williamson's sapsuckers. Based on the above assessment, it is expected that the proposed action may have minor, short term negative impacts to hairy woodpecker and Williamson's sapsucker habitat, but in the long term will likely improve habitat conditions for these species and will not lead to a downward trend in the population.

Macroinvertebrates - Most of the Clear Creek fuels reduction and aspen enhancement project lies within the upper Clear Creek watershed. There are some units in the North Kings Canyon and Voltaire Canyon watersheds, and a small area that flows into Jacks Valley. These drainages are tributary to the Carson River. Clear Creek and Kings Canyon Creek flow as perennial streams, while Voltaire Canyon Creek and the unnamed Jack's Valley stream flow seasonally. Macroinvertebrates are likely present in all of the above water bodies although current populations are not known.

Direct and Indirect Effects

Under the proposed action, the use of ground-based equipment for thinning, construction of skid trails and temporary roads, and prescribed burning may have some impacts on soils and water quality. The direct and indirect effects of these actions can include soil disturbance and erosion, soil compaction, increased runoff, and sediment delivery to stream channels. It is assumed that any activity that may increase erosion, or streambank destabilization, or loss of shading would affect water quality and likely have some negative effects on aquatic insects. However, the risk of impacts to soil and water would be reduced through implementation of Best Management Practices (BMPs), which are described in the Design Features section of Chapter 2. The water and soils measures are designed to minimize soil disturbance and protect stream channels and riparian areas. According to the watershed analysis conducted for this EA, the short term effects to soil and water quality from ground-based thinning and mastication would likely be minimal and the long term water quality and soil quality would be maintained. The watershed assessment also concluded that water and soil quality would be maintained following prescribed burning activities. If no action is taken it is assumed that all or part of this area would burn as a wildfire. High severity wildfires can remove much of the vegetation, along with duff and litter from the forest floor. Wildfires are usually more severe than prescribed fire and, as a result, they are more likely to produce significant effects on soil and water quality and consequently affect macroinvertebrate populations. Any effects to macroinvertebrates from project activities are expected to be minimal and temporary and will be confined to specific, relatively small areas. Therefore, the proposed action will not affect habitat or lead to a downward trend in macroinvertebrate populations.

Washoe Tall Rockcress - A single population of Washoe tall rockcress occurs within the analysis area but is located outside of any proposed treatment areas. An additional 133 acres of suitable habitat was surveyed in 2006 by a Forest Service botany crew and resulted in no detections of Washoe tall rockcress. Direct effects from the proposed action potentially include inadvertent trampling from equipment accessing treatment units. Although Washoe tall rockcress is able to tolerate some level of disturbance, permanent loss of the plant has occurred in areas where disturbance is constant and/or severe (Morefield 2002). However, no populations of Washoe tall rockcress occur in any of the designated treatment units. The nearest treatment unit is located approximately 0.25 miles south of the population. In order to protect the plants from inadvertent trampling of equipment accessing the treatment units, known populations of Washoe tall rockcress will be flagged and avoided.

Direct and Indirect Effects

Indirectly, Washoe tall rockcress can be affected from ground disturbance that occurs near plant locations by promoting hybridization with *Arabis holboellii*. Hybridization has most frequently been observed in areas of light disturbance such as picnic and campsite areas and roadsides. Given the small, relatively isolated populations of Washoe tall rockcress, an increase in hybridization could result in a permanent loss of the genetic integrity of the plant. To minimize the potential of hybridization, direct ground disturbance in known plant locations will not occur and all existing plants locations will be flagged and avoided. Removal of the surrounding vegetation could indirectly affect Washoe tall rockcress by altering canopy cover and reducing over all habitat quality for the plant. However, no vegetation removal is proposed in the vicinity of known populations of Washoe tall rockcress. Other potential indirect effects to Washoe tall rockcress include the invasion of noxious weeds into occupied or potential habitat caused by increased ground disturbance from project activities. To minimize the potential for noxious

weed invasion, Forest standards and mitigations for noxious weed prevention, including washing down of all equipment prior to arriving at the site, will be required.

Cumulative Effects

Within the analysis area, approximately 29 acres of Forest Service, state, county and private lands are occupied by Washoe tall rockcress with the majority occurring partially or wholly on Forest Service lands. An additional 4,700 acres is considered potential habitat (Morefield 2004). Of these known and potential sites, several are subject to some level of existing or proposed human disturbance such as recreational development and use, road construction, timber harvest, and off-highway vehicle use. Sixty-two percent of the total known population occurs in Galena Creek County Park, in Washoe County, approximately 15 miles north of the project area. Picnic, campsites, and other developed areas overlap with a portion of the existing park population. In these areas, Washoe tall rockcress appears to be coexisting with some level of disturbance, although hybridization has been observed. The remainder of the park population occurs in a currently undeveloped area. Future development of this site is unknown. Washoe tall rockcress was also recently detected within the boundaries of the North Washoe fuels project. The size of this population is currently not known. However, locations of Washoe tall Creek rockcress within the North Washoe fuels area will be flagged and avoided during fuels treatment. Several hundred acres of potential habitat for Washoe tall rockcress was consumed in the Waterfall fire. Currently, it is unknown how this species responds to fire. It is assumed that in areas where the fire burned at low intensity, plants may have survived if adequate tree canopy cover was preserved and the structure of the soil remained intact. Reforestation and brush planting efforts in these areas will improve habitat for Washoe tall rockcress in the long term.

Based on the above assessment, impacts to Washoe tall rockcress habitat are expected to be minimal and therefore the proposed action will not lead to a downward trend in the population.

Neotropical Migratory Birds (NTMB)

Direct and Indirect Effects

A variety of migratory and resident birds have the potential to occur within the project area. Direct effects to migratory birds can occur from inadvertent trampling or flushing birds from perches and nest sties. Repeated intrusions during the nesting season may cause birds to minimize or stop singing, decrease defensive behavior at nests, and possibly cause birds to abandon nest sites leading to an overall decline in nesting productivity (Knight and Tempel 1986). Along the Eastern Sierra, the breeding season for many NTMB is generally between March 1 and August 30 depending on species and elevation (Heath and Ballard 1999). Under the proposed action, a limited operating period (LOP) on project activities proposed in aspen stands will occur during the breeding period for most NTMB for those elevations (between 5,500 and 6,500 feet elevation). Birds occurring as this elevation range typically have ended their breeding cycles mid to late July. In areas outside of aspens stands, project operations can occur during the breeding season which may increase the potential for impacts to nesting birds. It is likely however, that most operations will begin later in the summer, even in coniferous areas, as conditions often remain too snowy and/or wet for safe access. Furthermore, some of the best habitat for NTMB occurs within the PACs and dense pockets of conifer and riparian vegetation that occur outside of the PAC. Under the proposed action, these areas will not be treated or will only be minimally treated therefore decreasing the potential for disturbance.

Indirectly, NTMB could be affected from a reduction in canopy cover and structural and floristic diversity within the project area. Large reductions in habitat can fragment habitat and act as

barriers to migratory bird corridors. Habitat fragmentation is considered the major factor for population declines in migratory bird species, particularly when the fragmentation occurs within riparian zones (Hutto 1995). Habitat fragmentation can lead to an increase in predation and nest parasitism from the increase in edge habitat (Joslin and Youmans 1999). As mentioned above, some of the highest quality habitat for NTMB occurs in the PACs and other dense patches of vegetation along riparian corridors that will not be treated. Areas surrounding the denser pockets will be treated at a lesser intensity leaving at least a basal area of 100 square feet per acre for a distance of 200 feet around the untreated pockets. These untreated and less intensely treated areas will reduce the effect of fragmentation and allow birds to access adjacent habitats for foraging and nesting. In addition, design features such as retaining at least three of the largest snags per acre and down woody debris over 12" in diameter will also help maintain the structural integrity of the stands. In aspen stands, reductions in conifer may have some short term impacts on some NTMB, especially those species that are typically more adapted to a conifer habitat types such as dusky flycatcher. However, conifer removal will improve the overall health of the aspen stand by opening up the canopy and allowing new aspen shoots and understory vegetation to grow. The increased floristic diversity following treatment is expected to result in an increase in abundance and diversity of NTMB as well. For example, in a study conducted on the Lassen National Forest, the abundance of several species migratory and resident birds significantly increased one and two years following conifer removal in aspens stands (Burnett et al. 2008). The study also found that the newly opened habitat conditions created through removal of conifer attracted a new suite of species which were typically absent from untreated aspen such as tree swallow, chipping sparrow, and mountain bluebird.

Cumulative Effects

On the Carson Front, recent wildfires have burned over 25,000 acres of trees and shrublands, reducing available nesting and foraging habitat for a number of migratory birds. However, habitat conditions are gradually improving in these burned areas from natural regeneration and Forest Service tree and brush planting efforts. Future Forest Service fuels management, including Old Clear Creek and Clear Creek Fuels projects, will reduce both tree and brush canopy cover in migratory bird habitat. However, effects to birds from these projects are expected to be temporary and offset by the improved habitat conditions that will result over the long term. Based on the above assessment, although some migratory birds may be temporarily displaced, the proposed project will not lead to a downward trend in migratory bird populations.

NOXIOUS/INVASIVE WEEDS

Existing Condition

Forest Service Manual 2081.02 and the Sierra Nevada Forest Plan Amendment (SNFPA), to conduct a noxious weed assessment when any ground disturbing action or activity is proposed to determine the risk of introducing or spreading noxious weeds associated with the proposed action. For projects having moderate to high risk of introducing or spreading noxious weeds, the project decision document must identify noxious weed control measures that must be undertaken during project implementation. Noxious weeds are defined in FSM 2080.5 as "those plant species designated as noxious weeds by the Secretary of Agriculture or by the responsible State official. Noxious weeds generally possess one or more of the following characteristics: aggressive and difficult to manage".

The project area has been surveyed for noxious weeds. A small population of bull thistle (*Cirsium vulgare*) was located in 2005 near the Spooner Picnic area. This population has been treated with hand pulling and herbicides annually since its detection. In 2008, only a few plants were detected and treated with herbicides. Cheatgrass (*Bromus tectorum*) occurs infrequently in the lower elevations with small patches occurring in the understory of brush stands. Cheatgrass is widespread on others parts of the Carson Ranger District where it has established itself as a minor component in many plant communities.

Environmental Consequences
Weed prevention and eradication strategy included in the proposed action consists of the following:

- All off-road equipment would be cleaned to insure it is free of soil, seeds, vegetative matter or other debris before entering National Forest system land if it is known to have most recently operated in an area known to be infested with noxious weeds, or if the last operating location is unknown. The equipment would also be cleaned prior to moving from an infested treatment unit, to a unit that is free of such weeds.
- Any new infestations of noxious weeds that are discovered during implementation will be documented and locations marked. New sites would be treated by hand pulling or lopping.
- Post treatment surveys will be conducted to document any new infestations of noxious weeds. Populations would be grubbed or hand-pulled prior to seed-set. Where appropriate, seeding of weed-treated areas with native grass species would be done to reduce, through competition, further weed establishment or expansion of existing infestations.

Objectives of this weed risk assessment are to evaluate each risk factor, including all the proposed actions, for their potential to introduce and/or expand noxious weeds and other invasive species into the Clear Creek Project area. Factors that influence the spread of weeds include the following:

<u>Presence of weeds in and adjacent to the project area: Low</u>
The project area has been surveyed for noxious weeds. A small population of bull thistle was located in 2005 near the Spooner Picnic area. This population has been treated with hand pulling and herbicides annually since its detection. In 2008, only a few plants were detected. These were also treated with herbicides. Cheatgrass occurs infrequently in the lower elevations with small patches occurring in the understory of brush stands. Cheatgrass is widespread on others parts of the Carson Ranger District where it has established itself as a minor component in many plant communities.

<u>Habitat vulnerability (low risk)</u>
Much of the proposed project includes thinning units that are densely forested either with small trees and large trees. The vegetation in these areas is composed of native species and the degree of shade under these stands is not conducive to invasive weed growth.

Brush stands in the lower portions of the project area may be at slightly more risk of cheatgrass infestation as disturbance from mastication may allow cheatgrass to become established. However, under the proposed action, in areas where invasives may be more prevalent, native vegetation will be seeded following project disturbance to reduce the risk of cheatgrass infestation.

Vectors unrelated to the proposed project (low risk)
Weeds are most commonly vectored along roadways. Under the proposed action no new roads will be constructed which will help minimize the risk of noxious weed spread. Project equipment using existing roads will be required to be cleaned to insure it is free of soil, seeds, vegetative matter or other debris before entering National Forest system land. The equipment would also be cleaned prior to moving from an infested treatment unit, to a unit that is free of such weeds.

Habitat alteration expected as a result of the project - Low-moderate risk
In areas where cheatgrass and other annual grasses currently exist, these weeds may move into nearby disturbed areas that provide enough sunlight for growth. However, in areas where cheatgrass is known to occur, seeding of native vegetation will follow project disturbance and are expected to limit or inhibit, through competition, the expansion of these infestations. In areas where mastication is proposed, mulch layers will minimize the risk of cheatgrass germination. However, if mulch layers are more than 2-3 inches deep, natives may also be inhibited. These sites would likely need to be seeded in the future with native grasses. Risks from equipment introducing weed seeds will be reduced because of the equipment-cleaning requirement.

Increased vectors as a result of project implementation (low risk)
Project induced vectors include primarily vehicles, including heavy equipment, associated with the project. Again, the equipment cleaning requirement will significantly reduce the potential for project related vectors to enter the project area. To the extent that vectored seeds actually result in weed establishment on roadsides and disturbed sites such as landings, these areas will be immediately treated by hand pulling or grubbing. These sites will continue to be monitored for several years post-treatment to assure no new infestations occur.

Design features (low risk)
Measures are included in the proposed action that will reduce the likelihood of weed introduction into the project area (equipment cleaning clause).

- Hand pulling and lopping treatments for any new infestations discovered during implementation.
- Post treatment surveys in the vicinity of known weed infestations and areas of potentially new infestations (i.e. roadways, landings).
- Troublesome areas, such as highly disturbed sites with new weeds establishing will be hand treated and then seeded with native grasses or forbs.

To the degree that measures, such as those noted above, are successfully utilized, the likelihood of invasive species becoming a significant problem in the analysis area is considered low.

The risk factor tally includes: known weeds = low; habitat vulnerability = low; vectors unrelated to project = low; proposed actions = low-moderate; vectors related to project = low; and 6. design features= low risk.

The proposed action provides a low-moderate risk for introducing or enhancing new or existing weed populations. Design features built into the project reduce opportunities for weed spread and expansion. Information gained from monitoring this and other projects is expected to further our knowledge on local weed ecology thus enabling us to better predict how Forest Service management activities influence the introduction and spread of weeds.

WATER/SOILS

Existing Condition

Most of the Clear Creek fuels reduction and aspen enhancement project lies within the upper Clear Creek watershed. There are some units in the North Kings Canyon and Voltaire Canyon watersheds, and a small area that flows into Jacks Valley. These drainages are tributary to the Carson River. Clear Creek and Kings Canyon Creek flow as perennial streams, while Voltaire Canyon Creek and the unnamed Jack's Valley stream flow seasonally.

Stream gage flow data from the U.S. Geologic Survey (USDI 2008) are available for both Clear Creek and Kings Canyon Creek. Average monthly flows in Clear Creek range from a low flow of approximately 2 cfs (cubic feet per second) in August to a high of 9 cfs in April. Average flows at the Kings Canyon gauging stations are less than 2 cfs for each month. The amount and timing of stream flow in Kings Canyon has been affected by stream diversions. The peak flow for both streams occurred during the rain-on-snow event in January 1998 that produced flows of over 250 cfs.

A segment of Clear Creek, downstream of the analysis area, has been included in the State of Nevada 2006 303(d) Impaired Waters List (NDEP 2006). The stream reach listed is from just upstream of HWY 395 to the confluence with the Carson River. Parameters listed include temperature, dissolved oxygen, iron and fecal coliform.

The Nevada Department of Transportation (PBS&J 2003) retained PBS&J, a local consulting firm, to conduct an erosion assessment of the Clear Creek watershed. The final report, the Clear Creek Erosion Assessment, was issued in January 2003. The purpose of the project was to locate and identify erosion and sedimentation areas within the watershed, determine the causes of the erosion and sedimentation, and develop mitigation and restoration alternatives (PBS&J 2003).

This study concluded that sediment loading of the Clear Creek main channel was from both tributary streams, including channels originating from highway culverts, and erosion from streambanks within the main channel. The sources of erosion and sedimentation were rated as high, moderate or low, and mapped. The main channel on National Forest Lands is shown as having low streambank erosion. The reaches of Clear Creek downstream of the National Forest boundary, have moderate to high streambank erosion (PBS&J 2003). The study included an erosion component rating summary (Table 5-1) which indicates that majority of the culverts, headcuts and hillsides, drainage corridors and main channel streambanks were labeled as low erosion. Approximately 14% of the culverts and 8% of the channels were rated as having high erosion (PBS&J 2003).

Soils in the project area are predominantly derived from coarse-grained granite. Soil textures are commonly fine to coarse sand with a low percentage of fine particles. These types of soil have high infiltration rates. Soil erosion on undisturbed soil most commonly occurs during surface runoff events, which are relatively rare in this area (USDA 2004a). Because the soils have high infiltration rates, precipitation tends to infiltrate. However, concentrated runoff from roads has resulted in significant erosion in parts of the Clear Creek watershed. Erosion from Highway 50 was one of the primary factors leading to the Clear Creek assessment.

Environmental Consequences

The use of ground-based equipment for thinning, construction of skid trails and temporary roads, and prescribed burning can have impacts on soils and water quality. The direct and indirect

effects of these actions can include soil disturbance and erosion, soil compaction, increased runoff, and sediment delivery to stream channels. The risk of impacts to soil and water would be reduced through implementation of Best Management Practices (BMPs), which are described in the Design Features section of Chapter 2. The water and soils measures are designed to minimize soil disturbance and protect stream channels and riparian areas.

Table 3-8 below displays the acreage of ground disturbing activities within each of the watersheds. The area of brush mastication was included, although this type of activity has a minimal impact to the soil because the equipment drives over the brush and vegetation that has been masticated and spread on the ground. The acres of helicopter thinning were not included since this activity is not ground disturbing. Skid trail acreage was determined using a factor of 5% skid trails in a ground-based thinning unit. Also, the acreage displayed for prescribed burning is the maximum that could occur; it is likely that the actual acreage burned would be less.

Table 3-8 Acreage of ground disturbing activity by watershed

	Treatment Type and Acres				
Watershed	**Ground-based thinning**	**Skid trails**	**Temporary road**	**Mastication**	**Prescribed burning**
Clear Creek	360	18	1	360	1550
North Kings Canyon	55	3		140	200
Voltaire Canyon	0	0	0	150	150
Jacks Valley unnamed tributary	0	0	0	100	100

Studies have shown that roads and skid trails are generally the main cause of erosion from logging (Megahan 1980). The area impacted from these activities, 19 acres in Clear Creek and three acres in North Kings Canyon, is quite small compared to the overall watershed area. In addition, skid trails would not be constructed within 100 feet of a perennial stream channel, or 50 feet of a seasonally flowing stream. After thinning is completed the skid trails will be rehabilitated using measures such as ripping, seeding and waterbar construction. The temporary road would be obliterated and revegetated. No new landings will be constructed.

The short terms effects to soil and water quality from ground-based thinning and mastication would likely be minimal from implementation of this project and the project design features. It is anticipated that in the long term water quality and soil quality would be maintained.

Direct and indirect effects from prescribed burning on soils and water quality can include loss of ground cover, increased erosion and runoff, increased water temperature and increased sediment delivery to stream channels (USDA 2005). The effects of fire on soil and water depend on fire severity and frequency, and on soil and site properties. Prescribed burns are designed to be low or moderate severity and generally burn in a mosaic pattern so that not all the vegetation is consumed. Riparian areas will be ignited on the outside edge so that the prescribed fire can back into the riparian vegetation towards the stream.

Pile burning, which concentrates heat on a small area, can have a greater effect on soil fertility and soil biota than broadcast burning. Although the severe heating under the piles are damaging to the soil, only a small percentage of the total area may be affected (USDA 2005). Pile burning in riparian areas would be limited, and would not occur at all in aspen stands.

The proposed action indicates that prescribed fire, including both broadcast and pile burning, could occur on up to 2,000 acres, though it is likely that not all of this acreage will be suitable for burning. In addition, this burning would be spread out over a number of years. It is likely that some impacts to soil and water quality would occur from prescribed burning. Implementation of the project design features will lessen these impacts. It is anticipated that in the long term water quality and soil quality would be maintained.

If no action is taken it is assumed that all or part of this area would burn as a wildfire. High severity wildfires can remove much of the vegetation, along with duff and litter from the forest floor. Wildfires are usually more severe than prescribed fire and, as a result, they are more likely to produce significant effects on soil and water quality. Following wildfires, flood peak flows can increase substantially, affecting stream physical conditions, aquatic habitat and human health and safety (USDA 2005). Soil erosion would likely increase, along with streambank erosion from increased flows.

Cumulative Watershed Effects

Cumulative effects are caused by the aggregate of past, present, and reasonably foreseeable future actions. Past, present and future activities and natural disturbances in a watershed can contribute to sediment delivery to streams, resulting in degradation of water quality and aquatic habitat. Cumulative effects were analyzed using the equivalent roaded area (ERA) method developed by the U.S. Forest Service Region 5 (USDA 1990). When utilizing the ERA model, all landscape disturbances are evaluated in comparison to a completely impervious, or roaded, surface. Road surfaces are considered to represent maximum hydrologic disturbance and rainfall-runoff potential.

The present actions assessed in this cumulative watershed effects (CWE) analysis include ground-based timber harvest, prescribed burning, brush mastication, sheep grazing on C-Hill for fuels reduction, and roads and trails, including HWY 50. These components are assigned disturbance coefficients that represent a typical ratio of their hydrologic impact compared to the same roaded area.

Past actions include the 1993 Spooner Salvage timber sale, the Waterfall Fire of 2004, and the subsequent Waterfall Fire firewood sale. The Spooner Salvage sale was primarily helicopter logging in the Clear Creek watershed (USDA 1993). This sale was 15 years ago and has had a long period for vegetation and hydrologic function to recover. The Waterfall Fire burned in the Kings Canyon drainage. Much of the fire was seeded and has shown good vegetative recovery. Some of the fire area was opened for a commercial firewood cutting. The ERA model includes a recovery factor over time. Burned areas typically recover faster than areas of timber harvest. The Plumas National Forest has used a 25 year recovery for timber harvest and five years for wildfire. For this analysis it was assumed that the areas burned and seeded in the Waterfall Fire had recovered.

Future actions in the Clear Creek watershed include residential development on private land downstream of the project area. This is primarily the golf course and homes being constructed in the Clear Creek Tahoe development.

Three subwatersheds, 2,000 to 5,000 acres in size, were delineated for analysis of cumulative watershed effects. This size of a subwatershed is recommended in the Region 5 CWE methodology. The areas delineated are the upper Clear Creek subwatershed, the middle Clear Creek subwatershed, and the north fork of Kings Canyon Creek. These three subwatersheds contain most of the proposed project. Voltaire Canyon and the unnamed tributary to Jacks Valley were not analyzed for cumulative effects. The area of proposed actions in these two subwatersheds is quite small and the impacts would be minimal.

Threshold of Concern. Watershed sensitivity is an estimate of a watershed's natural ability to tolerate land use impacts without increasing the risk of cumulative impacts to unacceptably high levels. Measures used to evaluate watershed sensitivity for individual watersheds included the potential for 1) soil erosion, 2) high intensity and/or long duration precipitation events, including rain-on-snow, 3) landslides and debris flows and 4) channel erosion within alluvial stream channels (USDA 2008b).

Watershed response to elevated levels of ground disturbance may begin to negatively impact downstream channel stability and water quality. To describe the level of disturbance when such impacts may begin to occur, upper estimates of watershed "tolerance" to land use may be established based on basin-specific experience, comparison with similar basins, and modeling of watershed response. These indices of tolerable levels of disturbance are called thresholds of concern (TOC). The tolerance of a watershed is used to determine acceptable levels of disturbance and prescribe mitigation measures to prevent detrimental responses. The TOC does not represent an exact level of disturbance above which cumulative watershed effects will occur. Rather, it serves as a "yellow flag" indicator of increased risk of significant adverse cumulative effects occurring within a watershed.

Thresholds of concern have not been determined for watersheds on the Carson Ranger District. However, National Forests in the Sierra's generally use TOC values that range from 10 to 14 percent of a watershed (USDA 2008b). The results of the analysis are shown in the table 3-9.

Table 3-9. Cumulative watershed effects

Cumulative Watershed Effects			
Watershed	Upper Clear Creek	Middle Clear Creek	North Kings Canyon
Area in acres	4940	3090	2500
ERA as % watershed area	5	3	4

The percent of equivalent roaded acres of disturbance for each of the watersheds is well below the TOC commonly used for watersheds in the Sierra Nevada Mountains. Based on this analysis it can be assumed that the cumulative effects from this project would be minimal. The table with all the values and coefficients used is in the project files.

TRANSPORTATION SYSTEM

Existing Condition

US Highway 50 is situated in the center of the analysis area and provides the main access to the project area. There are also approximately 16 miles of Forest roads within the analysis area. These roads, along with the length in the project area and their status are displayed in table 3-10.

Table 3-10 – Existing Forest Service roads within the analysis area.

Road #	Road Name	Length Within Project Area (miles)	Current Status
41039	Kings Canyon Road	9.3	Open
41710	Voltaire Canyon Road	2.3	Open
	Spooner Road	1.8	Open for Administrative Use
41084 & 41084A		.59	Open
21039		.12	Open
21540		.57	Open
21543		.57	Open
21544		.45	Open
41714 & 41714A		.84	Open

The Genoa Peak Road (road #14N32), is outside of the analysis area and located on the Lake Tahoe Basin Management Unit, will also be utilized in this project.

Environmental Consequences

The Clear Creek Fuels Reduction and Ecosystem Enhancement project makes road management decisions for those roads that would be used by the project. All existing roads would be maintained, all temporary roads will be obliterated to allow for re-vegetation. The result would no net gain in open road densities.

Routes used for removal of logs would include US Highway 50, the western portion of route 41039 (Kings Canyon Road), the southern portion of the Spooner Road and route 14N32. The western portion of the Kings Canyon Road would be utilized from the existing landing in section 31 to US Highway 50 and would sustain approximately 20 days of truck traffic averaging ten trips per day; this would include log trucks and chip vans. The southern portion of the Spooner Road would be utilized from the existing landing in section 7 to the Genoa Peak Road and US Highway 50 and would sustain approximately 20 days of truck traffic averaging ten trips per

day; this would include log trucks and chip vans. The other roads identified in table 3-10 would be utilized for crew vehicles and fire trucks during layout and administration of service contracts and prescribed burning. Average daily traffic volume would increase by about ten to 20 vehicle trips per day during project implementation. This amounts to a less than 1% increase in traffic per day. Safety concerns would be evident when vehicles are entering US highway 50 from either the Genoa Peak Road or the Kings Canyon Road. A Nevada Department of Transportation encroachment permit would be required for any of the logging trucks entering this highway.

Cumulative Effects

Access for timber and firewood harvest and westward expansion began in the 1850's. Users created roads; some declined in condition from non-use and are now non-existent, while others, like the Lincoln Highway, are now US highways. Five landings were constructed in the 1995 Spooner Timber Salvage Sale and portions of the Spooner and Kings Canyon Roads were improved. The landings remained open after the 1995 sale and would be utilized for project activities.

Potential road closures as part of Motor Vehicle Use Map may occur in the future. The project would have no effect on this; the project proposes to use roads identified as open or administrative use or non Forest System roads such as US Highway 50. The proposed action would have no adverse cumulative impacts to the transportation system or open road densities.

RECREATION

Existing Condition

The project area has dense stands of forested and shrub areas including aspen stands that have lost vigor due to encroaching conifer trees. There are scenic views of Carson City and Lake Tahoe within the project area and the project is located near large urban centers.

Recreation uses in the Clear Creek analysis area includes opportunities such as picnicking, hiking, off highway vehicle use, horseback riding, mountain biking, cross country skiing, snowshoeing and snowmobiling.

At the top of Hwy 50, the Spooner Summit trailhead and picnic area provides access to the Tahoe Rim Trail, a National Recreation trail that runs south to Kingsbury Grade for 12 miles. The trail is open for hiking, biking, horseback and dispersed camping. During the winter months the trailhead is used as a staging area under a special use permit for snowmobiling outfitter and guiding operations. Portions of the permitted snowmobile route runs through the project area. The permittee begins staging in early November before snowfall and leaves the area around March or April, depending on the snow year. The trailhead is also used by the public for snowmobiling and non-motorized winter recreation. A contract to refurbish the trailhead and picnic area has been awarded and construction is scheduled to start in the spring of 2009.

The Carson Ranger District recently published a Motor Vehicle Use Map; the roads were analyzed in the Kings-Clear Creek environmental assessment. Motorized recreation is limited in the project area. Kings Canyon road (41039), (21540), (41714), (41714A), (41710C), (41710D) and (21541) are designated routes in the project area and encompass less than 10 miles.

Environmental Consequences

The proposed action would maintain current recreation opportunities. There would be no new trails or roads for motorized or non-motorized recreation. Existing administrative roads would continue to be open for non-motorized activities including hiking, biking and horseback riding. Administrative roads would continue to be closed to motorized vehicles. This decision will reduce the risk of catastrophic fire that could damage or destroy the trailhead facility and the forest character that attract people to this area for the many recreational opportunities. If this project is not implemented there may be risk of a catastrophic wildland fire that could burn down the trailhead and close the Tahoe Rim trail during and after the event. The trail may be less desirable if the forest character were burned down and snowmobile tours may also be less attractive if a catastrophic wildland fire were to occur.

Direct Effects

Direct effects from implementing this project include a temporary closure of the Tahoe Rim trail during felling and burning operations. Smoke from prescribed fire operations may enter the trail and snowmobile area depending on the timing and location of the prescription. The timing and location of project activities would be coordinated with the snowmobile concessionaire to reduce impacts to snowmobile tours. Kings Canyon road (41039), and other forest roads (21540), (41714), (41714A), (41710C), (41710D), (21541) may be temporarily closed during implementation.

Indirect Effects

Indirect effects may include improving over snow vehicle terrain by increasing tree spacing and reducing decadent brush. There may be an opportunity to do interpretation and education about improving forest health during snowmobile tours.

Cumulative Effects

There are no foreseen cumulative effects to recreation under the proposed action.

VISUAL RESOURCES

Existing Condition

The project area is located in the visual backdrop to nearby communities, including Carson City, Jacks Valley, Minden and Gardnerville. The area is also a visual backdrop to vehicle occupants traveling on US Highways 50 or 395 and hikers on the Tahoe Rim Trail (TRT). A Visual Quality Objective (VQO) is a resource management objective that reflects the desired level of visual quality based on the physical characteristics and social concern for the area. Five categories of VQO's are commonly used: preservation; retention; partial retention; modification; and, maximum modification. VQO's in the project area include retention, partial retention and modification; though a large section of the analysis area was mapped as not available. Retention requires that the activities are not visually evident and the landscape retains a natural appearance. The retention areas are located on the highest elevations of the analysis area, where no project activities are planned. Partial retention requires that activities be visually subordinate to the natural character of the landscape. Modification requires the activities may be visually dominant but must conform to the natural character of the landscape in the fore- and middle-ground.

Overall, the current condition of the analysis area landscape is predominantly natural in appearance. The biggest deviation from a natural appearance is Highway 50, with its cut slopes and private residences. The area's landscape has a moderate amount of diversity in stand densities and forested and shrub vegetation patterns. Patches vary from open stands with visible

brush understories to stands with continuous canopy cover. This range of densities allows this landscape to absorb more changes in stand densities and patterns whether those changes are from natural or human causes, than a landscape with a homogenous cover.

Environmental Consequences

Direct and Indirect Effects

Overall, the reduction in fuels and thinning to enhance large tree growth in the landscape would benefit long term visual resources by providing a more stable, sustainable forest which is typical of the eastside Sierra Nevada Mountains.

In areas where helicopter harvesting is occurring, the risk of introducing unnatural lines in the viewshed would be minimal and no adverse impacts would be expected. In areas where tractor harvesting in occurring, skid roads would be re-habilitated, but may be evident to a forest user and adversely affect visual quality in the short term, but would have a long term positive impact. In areas where brush mastication occurs, some un-natural lines would be evident and adversely affect visual quality in the short term, but again would have long term positive impacts. Feathering tree and brush densities from lighter to heavier treatments would assist with reducing adverse impacts. In areas where prescribed burning occurs, short term adverse impacts would be related to smoke and a charred landscape. This would be short term in nature and the long term impacts would be positive.

With no treatments, insect or disease epidemics with high levels of mortality may occur. If insect epidemics were to occur, such as the epidemic in the early 1990's, scenic integrity would be degraded due to large numbers of dead trees on the landscape.

The risk of a crown fire in the analysis currently ranges from moderate to severe. In the absence of action to reduce fuel loadings, it is likely the area will experience a stand replacing fire. If this were to occur, visual resources would be degraded for several decades, with burned forests, then shrub fields evident, this would be a long term adverse impact.

Cumulative Effects

Past, present and reasonably foreseeable future actions that may have a cumulative effect on the visuals include Highway 50 existence and maintenance, hazardous fuels reduction projects on Forest Service, Washoe Tribe of Nevada and California, Nevada State Parks and private lands, as well as completion of private residences and developments. Fire suppression continues to increase the risk of a high severity wildland fire, which would severely degrade visuals in the area. Hazardous fuels reduction projects on the various jurisdictions will may have short term adverse impacts, but will provide long term positive impacts due to the reduced risk of a high severity wildland fire. US Highway 50 existence and maintenance will continue to have adverse visual impacts due to location of the highway and the cut banks. However occupants in vehicles traveling on US Highway 50 will have no adverse visual impacts while viewing the project area. Previous and continuing development of private lands has an adverse visual impact to the area, though this is lessened by the types of homes generally being constructed and the homesites and golfcourses being constructed to complement their natural surroundings. The proposed action would have a positive cumulative impact by reducing the risk of a high severity fire and maintaining a forested condition in the higher elevations.

CHAPTER 4
CONSULTATION WITH OTHERS

The opportunity for public participation in the analysis of this project was initiated through publication in the Schedule of Proposed Actions in 2006, 2007 and 2008. A 30-day public scoping period began on August 12, 2008, with a mailing of the Notice of Proposed Action/Opportunity to Comment mailed to 72 individuals, organizations or agencies. This document was also available on the World Wide Web at: www.fs.fed.us/r4/htnf. In addition, a public meeting was held on July 23, 2008.

Federal, State and tribal agencies and organizations involved in during the development of this environmental assessment included:

Tribal

Washoe Tribe of Nevada and California

Federal

U.S. Fish and Wildlife Service

State

Nevada Division of Wildlife

Nevada Division of Forestry

Nevada Division of State Parks

Nevada Division of State Lands

Nevada State Historic Preservation Office

Carson City Fire Department

Organizations

Nevada Fire Safe Council

Clear Creek Watershed Council

Clear Creek Fire Safe Chapter

WHO MAY FILE AN OBJECTION

Under the regulations of 36 CFR 218.6 governing the Predecisional Administrative Review Process for authorized HFRA projects, only individuals and organizations who submitted specific written comment related to the project may file and objection to the project.

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APPENDIX A
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