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Environmental Assessment

View 88 Fuels Reduction and Forest Health Project

Amador Ranger District

Eldorado National Forest

Above: A portion of the project area, showing typical fuel loads adjacent to Highway 88.

Below: Heavy fuel loading in the project area next to highway 88.

Table of Contents

ENVIRONMENTAL ASSESSMENT
VIEW 88 FUELS REDUCTION AND FOREST HEALTH PROJECT
Amador Ranger District, Eldorado National Forest
Amador County, California

Background

The View 88 project area is located in the Eldorado National Forest in Amador County, Northern California, beginning approximately 10 miles east of Pioneer. The landscape of the View 88 Project is the western slope of the Sierra Nevada mountain range, with elevations ranging between 3,880 and 7,680 feet in an area that is primarily forested federal and private lands. The climate is a Mediterranean subtype with warm dry summers and cool moist winters. The average minimum and maximum temperatures are 32^{o} F and 96^{o} F respectively. Average annual precipitation ranges from 45 inches on the western edge of project area to 70 inches on the eastern edge of the project area. Most of the precipitation falls between October and April, and thunderstorms occur in the summer. In the western third of the project area, precipitation falls as rain and snow, with increasing proportions of snow as elevation increases. By the eastern third of the project area, most of the precipitation falls as snow.

The entire View 88 Fuels Reduction Project analysis area is classified as Wildland Urban Intermix, as defined in the Sierra Nevada Forest Plan Amendment Record of Decision (SNFPA ROD 2004). The View 88 project was also designed to be consistent with the National Fire Plan, which was developed after the severe wildfire season in 2000. Pioneer was identified in the Federal Register as a community at risk, and is 5 to 6 miles from the project area. Five locations, Dew Drop, Ham's Station, Cook's Station, Lumberyard, and Peddler Hill Maintenance Station, are classified as defense zone. The remainder of the project area is classified as threat zone. Existing fuel conditions present a high risk to lives and property. In addition, the Highway 88 corridor is designated as an emergency egress route for evacuation, and is one of the routes across the Sierra Nevada that is kept open year-round.

The project is designed to implement recommendations contained in the Highway 88 Scenic Byway Management Guidelines developed under the direction of Management Practice 13 in the Eldorado National Forest Land and Resource Management Plan (ENF LRMP) – Visual Resource Inventory and Planning. Management Practice 13 required the Forest Service to write and implement viewshed management plans for the two highway corridors that traverse the forest. The Highway 88 Scenic Byway Management Guidelines were written to meet this requirement as well as in response to a planning agreement signed in 1985 between the Forest Service, Alpine, Amador and El Dorado counties, Caltrans and the Federal Highway Administration. The Highway 88 management guidelines were mutually adopted for the purpose of providing long-term guidance to maintain and enhance Highway 88 as a forested, scenic highway of the

highest quality. The guidelines describe a process for inventorying the elements which contribute to the highway's scenic quality as well as strategies to protect and enhance those elements.

Purpose and Need

There is a need to maintain and enhance State Highway 88 as a designated state scenic highway and designated forest service scenic byway of the highest quality.

The View 88 Fuels Reduction Project is located adjacent to Highway 88. Highway 88 is a designated California scenic highway and a Forest Service scenic byway. In 1985 a six-agency Planning Agreement was signed by Amador, Alpine, and El Dorado counties; the Federal Highway Administration; the California Department of Transportation; and the Eldorado National Forest providing long-term direction to ensure a scenic and safe highway experience for forest visitors traveling the highway.

The Highway 88 Scenic Byway Management Guidelines emphasize maintaining visual integrity through creation of visual diversity, while minimizing visual evidence of vegetation management. These guidelines were written to implement current Forest Service policies as they apply to existing and proposed conditions along the highway. The guidelines identify the high sierra scenic character and historic interpretation as the primary management themes for the highway.

The landscape viewed from Hwy 88 in the project area has a number of distinctive areas characterized by different visual attributes. Although the project area currently meets an existing Forest Plan desired visual condition of retention and/or acceptable condition of partial retention, there are areas along the corridor with conditions that detract from the visual quality. There is an opportunity through vegetative management to enhance the attractiveness of the corridor. Some of these areas consist of long road tangents lined with overstocked, monotonous vegetative stands creating a tunnel effect with little variety. The opportunity exists to break up the tunnel effect by creating vistas of the nearby canyons; and maintaining more open and random spacing of trees which allows filtered views of the adjacent forest floor. Some of these areas offer opportunities to enhance the visual quality by opening up pockets surrounding attractive focal points along the corridor.

Desired conditions for the Eldorado National Forest include providing a scenic and safe highway experience for forest visitors traveling Highway 88 over the long-term. The desired condition for visual resources is to protect the most visually sensitive areas of the Forest by placing major roads, trails, and areas of concentrated visitor use in scenic corridors and managed viewsheds. The visual resource within the project area is managed according to the Standards and Guidelines for Management Areas (MA) 20, 22 and 23 of the ENF LRMP. Enhancement within the project area is needed to improve the visual quality of the entire Highway 88 corridor within the forest boundary by connecting the similar management treatments in the landscape to the west with the natural panoramic landscape to the east.

There is a need to protect private property in the wildland urban interface defense zone including Dew Drop, Hams Station, Cooks Station, Lumberyard, and the Peddler Hill Maintenance Station.

Approximately half of the View 88 analysis area is located directly north of the Power Fire that burned nearly 17,000 acres in October 2004 while pushed by strong northeast winds. Fire behavior modeling of existing timber stands and fuel types in the project area predict that flame lengths of greater than four feet would be typical and about 70% of the area would experience passive crown fire. The potential exists for a large fire in the project area with similar behavior to the recent Power Fire.

Topography, vegetation (fuels) and weather are three factors influencing fire behavior. In this area, the three are aligned for a potential high intensity fire to occur. Highway 88 is located along a major ridge with steep topography along much of the slopes leading up to Highway 88. Fuels are dense, and would readily support crown torching over much of the area. The Mediterranean climate assures numerous days of weather conditions capable of producing high intensity wildfires each year. The main factor the Forest Service is able to affect is the fuel condition through modification of the vegetation.

The 2004 SNFPA ROD describes the desired condition for the Wildland Urban Intermix (WUI) to be a zone where fuel conditions allow for efficient and safe suppression of all wildland fire ignitions. In addition, fires are controlled through initial attack under all but the most severe weather conditions. Specifically, under high fire weather conditions, wildland fire behavior in treated areas is characterized as follows: (1) flame lengths at the head of the fire are less than four feet, (2) the rate of spread at the head of the fire is reduced to at least 50 percent of pre-treatment levels for a minimum of five years, (3) hazards to firefighters are reduced by keeping snag levels to two per acre (outside of California spotted owl and Northern goshawk Protected Activity Centers (PACs) and forest carnivore den site buffers), and (4) production rates for fire line construction are doubled from pre-treatment levels. (2004 SNFPA ROD page 41)

There is a need to enhance fire safe conditions adjacent to developments and private property, and provide for a safe evacuation route along Highway 88.

There is a need to reduce surface fuels and alter the vegetation structure in strategic locations along ridge tops and upper slopes of the View 88 project area to protect scenic views and affect a reduction in fire intensity across a broad area.

Fire suppression over the past century resulted in an accumulation of surface fuel loading, exceeding 20 tons/acre in many areas. Fires in areas with these fuel loads burn at higher intensity, and are more difficult to control. The existing lack of fire has also allowed small trees and shrubs to become established and grow. As these trees grow, they reduce the average height to the base of the live crowns in the stand and form a ladder for fire to climb into and become established in crowns of the overstory trees. When the base height to the live crown is reduced below 15 to 20 feet, individual tree torching and crown fire potential increases substantially. Heights to the base of live crowns are well below 15 feet in many of the proposed units.

Forests in this area were historically subject to frequent low intensity fires that resulted in open, fire-resistant stands of trees. Fire suppression that started in the early 1900s changed these historic fire intervals, resulting in a change in species composition and

increased density on all aspects. Dense, closed canopies tend to favor shade tolerant white fir, incense cedar, and Douglas fir, and to exclude shade intolerant Jeffery pines, oaks, and sugar pines that would otherwise occur along the ridge tops and secondary ridges in the project area. Shade tolerant species form dense under-stories that act as fuel ladders to the larger overstory trees, and are generally more susceptible to mortality from fire.

The lack of large wildland fire and prescribed fire use surrounding the project area indicates a loss of 3 to 10 fire cycles and has significantly altered the fire regime condition class of the landscape. In its current condition, the watersheds can be classified as a Condition Class 2/3 where the watershed is vulnerable to fire behavior, effects, and the risk of losing key ecosystem components are high.

Highway 88 is heavily used during summer and fall seasons when wildfires are more likely to occur, and the location of the project area above deeply incised canyons at the headwaters of the North Fork of the Mokelumne River and the Middle Fork of the Cosumnes River provides pathways for wildfire to Highway 88. Predicted fire behavior modeling of timber stands and representative fuel types indicates that high intensity fire with rapid rates of spread would be likely under high fire weather conditions. Potential for a wildfire is high due to recreational use and lightning. The proximity of steep slopes and dense fuels creates the potential for a wildfire to burn at high enough intensity to prevent safe deployment of firefighters.

The topography, access, and weather patterns in the View 88 area indicate that in the event of a large wildfire, primary firefighting efforts would be focused along the major ridges and roadways. It is critical to change forest structure and reduce fuel loadings in these areas to increase safety for firefighter deployment and public evacuation.

The 2004 SNFPA ROD describes the desired condition for the Wildland Urban Intermix (WUI) to be a zone where fuel conditions allow for efficient and safe suppression of all wildland fire ignitions. In addition, fires are controlled through initial attack under all but the most severe weather conditions. Specifically, under high fire weather conditions, wildland fire behavior in treated areas is characterized as follows: (1) flame lengths at the head of the fire are less than four feet, (2) the rate of spread at the head of the fire is reduced to at least 50 percent of pre-treatment levels for a minimum of five years, (3) hazards to firefighters are reduced by keeping snag levels to two per acre (outside of California spotted owl and Northern goshawk Protected Activity Centers (PACs) and forest carnivore den site buffers), and (4) production rates for fire line construction are doubled from pre-treatment levels. (2004 SNFPA ROD page 41)

The landscape-scale fire modification strategy is based on the premise that disconnected fuel treatment areas overlapping across the general direction of fire spread are theoretically effective in changing fire spread. These treated areas slow the spread and reduce the intensity of oncoming fires and thereby reduce damage to both treated and untreated areas and the impacts of large, uncharacteristically severe wildfires. (2004 SNFPA ROD page 34)

There is a need to change stand structure and reduce surface fuels to affect a change in wildfire behavior.

There is a need to reduce stand densities in order to increase forest resilience to insect attack and density-related mortality.

Forest types within the View 88 analysis area are primarily Sierra Mixed Conifer type at the lower elevations, transitioning to white fir, and, finally, to a red fir type in the eastern portion of the analysis area. Red fir and white fir are the dominant species, with lesser amounts of incense cedar, lodgepole pine, ponderosa/Jeffrey pine, sugar pine, black oak, Douglas fir, and aspen. Overall stand attributes are: Stand Density Index (SDI) averages 466; Quadratic Mean Diameter (QMD) averages 11.5 inches; Basal Area (BA) averages 261 square feet per acre; and Canopy Cover (CC) averages 68%. Canopy cover ranges between 50 and 65 percent, and stand density indices are approaching or at the threshold for increased risk of mortality due to inter-tree competition for water, nutrients, and sunlight.

Forest stands at lower densities demand less water and other limited resources and are more resistant to insect and disease-related attack, especially during periods of extended drought.

The ENF LRMP general direction for conifer stands is to "improve long-term productivity while coordinating with the objective of associated resources" (pg. 4-91) and manage for diversity of plant communities over rather large areas (pg. 4-92).

There is a need to enhance the function and natural diversity in the vicinity of oaks, aspen and meadows.

Aspen and oaks are currently declining due to conifer encroachment and competition. Conifer encroachment, fire suppression, and livestock/ wildlife browsing and have resulted in an overall decline in the health of aspen stands. Aspen is shade intolerant and needs full sunlight for successful establishment and growth. Aspen are being shaded out by conifer encroachment throughout the northern Sierra Nevada, and the aspen clones in the project area are also declining. The aspen stands in the View 88 project are currently being overtopped by conifers, resulting in a lack of successful regeneration and declining stand health. Removing competing conifers to maximize sun exposure and reducing the insulating litter/surface fuel layer to stimulate potential for sprouting to create conditions conducive to restoring or expanding these remnant clones of aspen have proven successful on aspen restoration projects in Region 5.

Oak in many proposed units are being shaded out by conifers, resulting in small crowns and declining health. Removing conifers in and around overtopped oaks would improve conditions for oak vigor, regeneration, and mast production.

Natural successional processes are resulting in conifer encroachment in many meadow communities and in turn, diminishing the size and function of the meadows. In a region dominated by dense coniferous forest, subalpine meadows create natural fire breaks, support distinctive plant and animal communities, provide habitat and summer forage for wildlife and offer unique recreational opportunities.

The ENF LRMP (1989, pg 4-86) provides direction to "manage oaks and other hardwoods for wildlife benefits, utilizable products and esthetic values." The SNFPA ROD emphasis for hardwood management is given on page 53 "create openings around existing California black oak to stimulate natural regeneration and manage for a diversity of hardwood tree size classes". The ENF LEMP provides meadow management direction

on pages 4-277 through 4-282, emphasizing maintaining the integrity of the meadow ecosystem and specifically removing trees that are encroaching on meadows.

There is a need to:

- Improve oak vigor, regeneration, and mast production.
- Increase sunlight and create conditions conducive to restoring, regenerating, or expanding remnant clones of aspen where aspen are not shaded and the sprouts are protected from browsing animals.
- Retain meadow function, maintain meadow water tables, and enhance vegetation that supports distinctive plant and animal communities.

There is a need to conduct treatments in an economically effective manner, wherein all or most of the costs of the fuels treatment are covered by the value of the products being removed.

While it is recognized that in many instances the treatment of surface fuels and small ladder fuels (trees and brush less than 10 inches diameter breast height (dbh) is an effective fuel reduction treatment, the costs for treatment of surface fuels need to be partially or completely defrayed by removing merchantable trees between 14 and 30 inches dbh.

Decision to be Made

Given the Purpose and Need for Action, the Eldorado National Forest Supervisor would review the Proposed Action, the other alternatives, and their impacts to the resources in order to make a decision:

- Whether to proceed with the View 88 Fuels Reduction and Forest Health Project as described in the Alternative 1 (Proposed Action).

- Whether to proceed with an alternative to the proposed action (Alternative 3 or 4).

- Whether to take no action at this time (Alternative 2).

Public Involvement

The long-term protection and use of public lands is the responsibility of everyone who has an interest in and/or uses National Forest lands. The Forest Service cannot achieve this goal without providing the opportunity for full participation and commitment by the public. With this goal in mind, the View 88 project has been presented and discussed in various public forums to promote an understanding of the project and encourage community-based, collaborative stewardship.

This project was presented at quarterly Eldorado Forest collaborative monitoring meetings attended by members of the El Dorado County Fire Safe Council, the Amador County Fire Safe Council, the American Forest Resource Council, the California Forestry Association, members from local industry, representatives from the California Department of Forestry (Cal Fire), and representatives from the Eldorado National

Forest. The Amador Ranger District also participates in the annual cooperators meeting between Sierra Pacific Industries, Pacific Gas & Electric, Bureau of Land Management, Cal Fire and Amador County Supervisor for District 3, where the View 88 project proposal has been presented within the Amador District's 5-Year plan. The Amador-Calaveras Consensus Group has proposed funding for portions of the View 88 project within the Cornerstone Collaborative Forest Landscape Restoration Project as part of an overall landscape strategy to protect life and property from negative wildfire effects.

A scoping letter was sent to 130 adjacent landowners, summer home owners, and other interested and affected parties on February 22, 2008, requesting comments by March 26, 2008. The View 88 project has been included in the schedule of proposed actions (SOPA) since January, 2008. A legal notice inviting public comment for scoping was published on February 25, 2008 in the Forest newspaper of record, the Mountain Democrat in Placerville, CA. On February 25, 2008 the same legal notice was published in the Amador Ledger Dispatch in order to provide equal notice for people living in Amador County who do not subscribe to the newspaper of record. Seven comment letters were received.

Issues

An issue is a point of debate, dispute, or disagreement regarding anticipated effects of the proposed action. Issues may be "important" or "unimportant." Issues may be unimportant for any of four reasons: 1) the issue is outside the scope of the proposed action; 2) the issue is already decided by law, regulation, or Forest Plan; 3) the issue is irrelevant to the decision being made; or 4) the issue is conjectural and not supported by scientific or factual evidence. Important issues were used to develop reasonable alternatives to the proposed action that respond to the argument or controversy presented in the issue and substantially accomplish the purpose and need.

The following discussion documents the important issues identified during scoping and the development of alternatives to the proposed action based on those important issues.

A scoping comment request was received to "fully consider a reasonable range of alternatives, including an alternative with a 16" dbh limit in mechanical thinning units (retaining at least 60% canopy cover in dominant and co-dominant trees to protect spotted owl populations and other wildlife, and at least 50% canopy cover where existing canopy is between 50% and 60%, and at least 40% where canopy cover is 40-49%)." This request was developed as Alternative 3. Other comment letters were requests for information and requests for copies of the completed Environmental Assessment.

Tiering and Incorporation by Reference

In order to eliminate repetitive discussion and documentation, this environmental assessment tiers to the analysis of the Eldorado National Forest Land and Resource Management Plan (LRMP, 1989) as amended by the Sierra Nevada Forest Plan Amendment (SNFPA, 2004), the Environmental Impact Statement for the LRMP (1988), and the Eldorado National Forest Public Wheeled Motorized Travel Management

Environmental Impact Statement Record of Decision (TMP-ROD, 2008). The following documents prepared for this analysis are incorporated by reference:

- Cultural Resources Report (Whiteman, 2011)
- Heritage Resources Effects Report (Whiteman, 2011)
- Terrestrial Wildlife Species Report (Loffland, 2011)
- Terrestrial Wildlife Management Indicator Species Report (Loffland, 2011)
- Migratory Bird Report (Loffland, 2011)
- Aquatic Species Report (Grasso, 2011)
- Aquatic Management Indicator Species Report (Grasso, 2011)
- Hydrology Report (Markman, 2011)
- Riparian Conservation Objectives Consistency Report (Markman, Grasso, Nicita, & Brown, 2011)
- Geology Report (Koler, 2011)
- Soils Report (Nicita, 2011)
- Silviculture, Forest Health Protection – Insects & Diseases (Carroll, 2011)
- Economic Viability Analysis (Sweetman & Carroll, 2011)
- Climate Change Analysis (Rodman & Markman, 2011)
- Fuels and Fire Report (Woods, 2011)
- Air Quality Report (Woods & McNamara, 2011)
- Transportation Analysis Report (Koltun, 2011)
- Landscape and Visuals Report (Jowise, 2011)
- Sensitive Plants and Noxious Weeds Report (Brown, 2011)

Modifications Made Since Comment Period

As a result of the input received during the comment period the following changes were made to the Proposed Action, Alternative 1 that would apply to all action alternatives:

- Hazard tree identification guidelines have been added in Appendix E and design criteria have been added to the Vegetation Management section below to clarify hazard tree treatment, including hazard trees within riparian conservation areas (RCAs)
- Public comments clearly show confusion on the various description used for ground disturbance by various specialist. Ground disturbance has been defined in the soils design criteria, and used consistently throughout the EA document and specialist analysis and reports. Ground disturbance design criteria limit disturbance to no more than 15 percent of any unit, and no more than 15 percent of any RCA.
- Slope limits on mechanical treatments have been clarified to state: Mechanical treatments on slopes greater than 35% on listed units listed would require on-site monitoring by soil scientist. No mechanical treatments would be allowed on slopes greater than 40% slope.
- Due to concerns expressed for the temporary crossing of the only perennial stream in the project, design criteria have been added to the transportation section. The

added design criteria require the crossing to be installed, used, and removed before winter in a single operating season.

- An error that said the equipment exclusion zone would apply to "most" ephemerals has been corrected to apply to all ephemerals.
- The economic analysis has been updated for current prices, and additional per acre costs added, as requested.

Description of the Alternatives

Proposed Action (Alternative 1):

In order to meet the needs and achieve the purposes for the View 88 project, the U.S. Forest Service, Eldorado National Forest, Amador Ranger District, proposes the following activities for approximately 2106 acres in the wildland-urban interface along 22 miles of Scenic Highway 88:

Visual Resource Management

Remove trees less than 30 inches diameter around selected natural focal points such as rock formations, unique character trees, large pines, and oaks in units 59, 73, and 80.

Remove trees that impair views from Highway 88 of meadows, aspen groves, and panoramic vistas.

Create small openings (less than two acres) or wider spacing (40 ft spacing) within units 1 through 9 to enhance visual and ecological diversity.

Remove small trees (4 to 10 inches diameter), prune, and remove or burn slash and brush to create a more park-like appearance in overstocked stands.

Vegetation Management

Remove roadside hazard trees identified within and adjacent to project units for public and employee safety, along State Highway 88 and along forest classified system roads proposed for use during project operations. Identification of hazard trees to be removed would follow the guidelines in Appendix E of this EA. Hazard tree removal would follow the same design criteria as other tree removal activities. Hazard trees that cannot be reached with the feller buncher would be felled and retained in place provided the felled trees would not interfere with the safe use of the road or adversely affect a stream course and associated culverts. Should a felled hazard tree enter a stream course, the sale administrator, together with a watershed specialist (the hydrologist and/or the aquatic wildlife biologist) would determine whether repositioning of the tree is needed, and determine whether portions of the tree would be retained as felled or how the tree or logs would be repositioned.

Remove encroaching conifers that overtop oaks or conifers around oaks that exhibit small crowns due to competition.

In natural stands (units 1, 2, 3, 4, 5 ,6, 7, 8, 9, 10, 11, 12, 13, 50, 51, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89,

90, 99, 104), about 1,303 acres, cut and remove small (4 to 10 inches diameter) conifers that contribute to ladder fuels. These trees would be removed to landings, or other designated disposal sites. Cut and remove larger trees (10 to 30 inches diameter) to meet the desired trees per acre (TPA) with desired canopy and basal area density. Ground-based commercial logging equipment would be used to cut trees. Either a rubber-tired or tracked skidder would move cut trees to landings. Pile activity generated slash using either grapple, tractor or hand piling followed by prescribed fire where surface fuels remain above desired conditions.

In stands with a dense understory of small trees (units 14, 15, 16, 17), about 150 acres, cut and remove trees 4 to 10 inches diameter, prune, remove slash and brush or prescribe burn slash and brush.

In existing tree plantations (units 1100005, 1150027, 1150073, 1160017, 1160019, 1190005, 1190007, 1200019, 1200021, 1270013, 1410010, 1410011, 1410012, 1410016, 1410002), about 164 acres, cut and remove trees 4 to 10 inches diameter, prune, and lop and scatter slash.

In seven aspen stands (within units 50A, 51, 58, 61, 83, 84, 89,), about 10 acres, remove conifers less than 30 inches diameter around clumps of aspen trees or sprouts (within 100 ft. on north side of the aspen, 150 ft. for the remainder). Construct temporary fencing around aspen units as needed to prevent damage to young aspen sprouts from browsing animals.

Transportation

Reconstruct approximately 19 miles of system roads. Reconstruction and repair activities would involve the replacement of inadequate drainage crossings, elimination of ruts, ditch repair, installation of waterbars and dips with inadequate water runoff control, gate installation to control seasonal use or replacement of existing non-functional gates or barricades, and removal of brush and small trees encroaching on roads. (System Roads 8N04, 8N05A, 8N05K, 8N07, 8N26, 8N26B, 8N30B, 8N31, 8N32, 8N32A, 8N32A.1, 8N35, 8N35A, 9N13, 9N14, 9N14H, 9N14Z, 9N24, 9N24B, 9N24C, 9N96, and 10N50VA. Appendix C).

Maintain approximately 7 miles of system roads. Maintenance activities would include cleaning culverts, repairing drainage ditches, cutting encroaching brush along roadside edges, and patching pot holes. (System Roads 8N05, 8N18, 8N30, 8N37, 9N17, 9N24A, and 9N81, see Appendix C).

Reuse about 1 mile of existing temporary roads to access units 59, 61, 72, 73, 89, and 90. After the temporary roads have served their use, they would be obliterated and ripped to alleviate soil compaction and restore infiltration. For unit 59, all activities except prescribed burning would be completed in one season. The 8N32A.1 temporary steam crossing would be constructed and removed before the winter season in the same year as fuel reduction activities. Prior to mechanical treatment, the old log crossing would be removed from the stream channel and a temporary culvert would be installed for the project. The temporary culvert would be removed upon completion of vegetation treatments, returning the stream channel to a free-flowing state before the winter season.

Temporary road 8N32A.1 would then be water barred and closed to use upon project completion for this unit. Water bars would be placed to disperse runoff and would have rip rap energy dissipaters at high risk locations. The roadbed is stable, and would not be ripped. For prescribed burning, engine access would be at the top of the unit, and crews would walk into the lower part of the unit.

Physically close approximately 2 miles of system roads previously determined to not be open in accordance with the TMP-ROD. Road closures would be accomplished by installing gates. (System Roads 8N32 and 8N32A, see Appendix C).

Roads and trails within the project area would be managed consistent with the 2008 Eldorado National Forest Public Wheeled Motorized Travel Management Environmental Impact Statement. Road reconstruction on roads not identified as open to public use would be blocked by gates, rocks, or other barriers. In addition to the seasonal closure identified by the Travel Management EIS, roads identified as open for public use may be temporarily closed during inclement weather to protect reconstruction investments until those roads have stabilized.

Existing waterholes and other sites such as ponds, lakes (Bear River Reservoir), or streams, used for water drafting would be inspected for existing amphibians and flow levels prior to use. A Forest Service approved screen covered drafting box, or other device to create a low entry velocity, would be used while drafting to minimize removal of aquatic species, including juvenile fish, amphibian egg masses and tadpoles, from aquatic habitats.

Monitoring

All MBP monitoring protocols would be followed. A stream condition inventory would be accomplished on the perennial stream in Unit 59 before implementation begins in that unit. This complies with SNFPA Standard and Guideline 114. Other monitoring is found in the applicable resource design criteria below.

Design Criteria

Visual Resources

Where feasible, all log decks and slash piles (except hand piles) would be located so they are not visible from Highway 88. Hand piles would be located 50 feet away from Highway 88 where possible, and hand piles visible from the highway would be burned as soon as they are dry enough to meet smoke management criteria, mostly within one year. Stumps would be flush cut to reduce visual impacts in the area seen from Highway 88. Some large slash piles on landings adjacent to Highway 88 in the lower elevation section of the project may be visible from the highway due to the narrow width of these units from the highway. These slash piles would have priority for disposal either as biomass or burning as soon as possible. Slash piles in units 1, 8, 12, and 16 are likely to be more visible.

Air Quality

Water would used on native surface roads to maintain surface fines, minimize dust, and maintain surface compaction.

Piling of natural fuels would take 1 to 2 years to complete, and be followed by prescribed fire (under-story, jackpot and pile burns) that would be spread over 1 to 3 more years. Pile burning and prescribed understory burning would be implemented under a Smoke Management Plan, issued by the Amador/El Dorado County Air Pollution Control District, and a Burn Plan that adheres to Federal and Regional standards.

Burn piles with larger materials, greater than 6" diameter, would be cured for a minimum of 6 weeks to reduce smoke emissions. Prior to active ignition, smaller diameter material would be evaluated by the Prescribed Burn Boss for adequate curing time in order to meet the objectives for fuel consumption and reduction of smoke.

Emission reduction strategies would be used to reduce air quality impacts. For prescribed burning, desirable meteorological and fuel moisture conditions would be required in the project's smoke management plan to facilitate venting and dispersion of smoke from the project area. Smoke reduction techniques include consideration of atmospheric conditions, season of burn, fuel and duff moisture, diurnal wind shifts, appropriate ignition techniques and rapid mop-up.

Fuels

Throughout the project area, active lighting for prescribed fire would not occur within 25 feet of any stream channel in the view 88 project area. A dot ignition pattern would be used in Riparian Conservation Areas to reduce use of petroleum products while allowing prescribed fire to back into RCAs, consistent with SNFPA Riparian Conservation Objective #4 Standards and Guidelines 109, 111, and 113.

In the western third of the project, where fuels are heaviest, ground fuels and activity fuels would be grapple or dozer piled for burning, or would be available to supply a co-generation plant. During burning operations for hand piles in units 7, 9, 15, and 17 on these drier sites, fire control lines would be constructed with a "pocket" dozer with a 3 to 4 ft blade on ridges or gentle slopes, and hand line would be constructed for steeper slopes. Existing roads would also be used for fire control lines.

In the middle section of the project where fuel loads are more variable, ground fuels and activity fuels would be grapple or dozer piled where needed to reduce fuel loads to less than 20 tons per acre while retaining 70% effective soil cover. For hand piles, or in areas with lighter fuel loads, concentrations of fuel would be jackpot burned, and fire would be allowed to creep between fuel concentrations or hand piles and back into RCAs. In areas where fire control lines are needed, roads would be used where feasible. For some units, (72, 74, 75, 76, 77, 80, 99, 104), a pocket dozer or hand line may be necessary.

In the eastern section of the project, grapple piling (30 acres of unit 56, units 78, 85, 86), hand piling (units 60 and 85), or jackpot burning of fuel concentrations would be used to reduce fuel loads while maintaining 70% effective ground cover. During burning operations, fire would be allowed to creep between piles or fuel concentrations and back into RCAs. It is not expected that fire control lines would be needed at these higher

elevation, moister sites. In the event that a fire control line is needed, hand lines would be used.

Hand treatment of fuels would occur in ¼ acre of unit 1, 4-5 acres of unit 59, on slopes >35% slope, and within equipment exclusion zones along stream channels, wetlands, and meadows throughout the project where fuel loads exceed woody debris needed for ground cover and large woody debris recruitment for stream channels. The hand piles would be lit from the top, and prescribed fire would be allowed to creep between piles in order to dispose of the hand piles. Hand piles would be placed at least 25 feet from stream channels. For unit 59, hand piles on the east side of the wetland would be placed at the slope break, approximately 50 feet from the wetland edge. For the perennial stream leading away from the wetland, hand piles would be placed at least 25 feet from the channel edge. Hand pile buffers for meadows and aspen vary between 25 and 50 feet, and are specified in the project record for the individual units for meadows and aspen stands based on field evaluation. Backing fire into RCAs and equipment exclusion zones is permitted.

Heritage

Standard Resource Protection Measures (Attachment 7, Section II) of the Sierra Nevada Programmatic Agreement would be applied in order to ensure protection measures for the archaeological and historical sites (Resources at Risk) located in proposed units. All cultural resources are flagged to be avoided during project activities. Prior to implementation activities, the District Archaeologist would be contacted to check and reflag sites as needed. Archaeological sites within the project boundary would be protected from ground disturbance associated with mechanical and hand treatments during all phases of this project. Sites in units or near road maintenance/reconstruction projects would be identified with flagging and avoided during project activities.

Sites that are flammable would be protected during prescribed burning, and fuel would be cleared off of any bedrock mortars before prescribed fire ignition. All sites would be avoided during fire line construction, and the District archeologist would be consulted for burning locations and methods where prescription burning is allowed within a cultural resource site.

If any previously undocumented cultural resources are encountered during project operations, all work would cease immediately in that area until the District Archaeologist can inspect the area, document the resource, and provide for appropriate protective measures.

Terrestrial Wildlife

Surveys have not been conducted for California spotted owls and northern goshawk because the treatments proposed for this project are limited to ¼ mile from Highway 88. The highway presence with high levels of activity and noise disturbance, including snag and hazard tree removal, truck and passenger car traffic, along with construction/maintenance/repair work, have reduced this corridor to low habitat capability/suitability for these species. While there are PACs adjacent to the project area, there are no project treatments within CA spotted owl or northern goshawk PACs.

A limited operating period (LOP) for California spotted owls (March 1 through August 15) and for northern goshawks (February 15 through September 15) would restrict activities for units that are located within ¼ mile of spotted owl or goshawk activity centers, unless surveys confirm that owls or goshawks are not nesting that year or reproduction would not be affected by the activity, as determined by the District wildlife biologist. LOPs would be implemented to remove or reduce the potential for nesting disturbance to owl and goshawk PACs by activities in units 50A and 50B adjacent to PACs.

Randomly distributed pockets of small trees and understory brush would be retained during mechanical treatments to provide for wildlife habitat. Prescriptions would be designed to maintain and/or enhance hardwoods.

Snags 15 inches and greater would be retained throughout the project area unless the snags pose a safety risk to the public or employees.

Hydrology and Aquatic Resources

Aquatic features in the project area were evaluated in the field by an interdisciplinary team. Appendix B contains a comprehensive description of design features - a summary is provided below.

- Where channels were located in close proximity to each other, an equipment exclusion zone was created to protect aquatic resources and water quality.
- For all ephemeral streams and/or channels (whether natural or created/enhanced by culverts) the following design criteria apply:
    - No ground-based equipment within 50 feet of the edge of the channel.
    - No end-lining of trees within 50 feet of the edge of the channel.
    - Equipment is allowed to reach into the 50 feet equipment exclusion zone (typical reach in is 20 to 25 feet) to remove non-riparian vegetation.
    - Removal of vegetation by hand (living or dead) is allowed within 50 feet of the edge of the channel.
    - Equipment crossings would be approved by the Timber Sale Administrator, unless specified otherwise for an individual unit.
- Meadow areas with aspen release
    - Feller bunchers may operate up to the edge of meadows, and are allowed to reach-in to the meadow (approx. 25 feet) to remove vegetation.
    - No ground-based equipment (with the exception of feller-bunchers) and no skid trails would be allowed within 50 feet of the edge of the meadow.
    - One equipment crossing is allowed of each stream channel. Additional equipment crossings must be approved by the project Hydrologist and/or Fisheries Biologist.
- Meadow areas without aspen release
    - Ground-based equipment and skid trails are not allowed within 50 feet of the edge of meadows. Equipment is allowed a 25 foot reach-in to remove material.

- No new landings would be constructed in any RCA. Reconstruction or maintenance of existing landings was avoided in the RCAs of any stream or aquatic feature unless field evaluation by the project hydrologist or fisheries biologist determined there would be less impact from use of an existing landing than construction of a new landing outside an RCA. After use, landings would be scarified, re-seeded, shaped, and ditched as recommended by the Forest soil scientist and botanist.
- Existing roads would be used to cross stream channels, with no more than one crossing per stream channel. The choice of crossings is dependent on use of the crossing with the least impacts as determined by the project hydrologist. Where temporary stream crossings are necessary, the stream would be restored to a stable bank configuration when the crossing is removed. No construction of roads (including temporary roads) would occur in the RCAs of any stream or aquatic feature unless approved by the project hydrologist or fisheries biologist.
- For the West Panther Creek watershed, activities would be scheduled to spread over at least two years, with a roughly equal distribution of acres per year.

Soil Resources

A listing of the BMPs to be implemented is in the project record.

Ground disturbing activities would not exceed 15 percent in any unit, and would also not exceed 15 percent in any riparian conservation area.

Large woody material requirements would be satisfied by meeting standards (SNFPA ROD 2004, page 51) for down log retention. Where possible, these large down logs would be protected during mechanical treatment activities and underburning.

Retention strategies to increase coarse woody debris would be used on units 13, 16, 77, and 79. The strategy would retain an average of 5 logs per acre on site in cull logs or smaller whole trees (less than 16 inches DBH) and 10-15 feet long as replacement coarse-woody debris.

Effective ground cover in units 13, 12, 9, 10, 16A, 7, 17A, and 61 would meet 50 percent and in RCAs would meet 70 percent.

Following prescribed burning operations average soil cover for each treated unit would be maintained as 70% or greater. The soil scientist would monitor unit 59 and determine whether soil standards were met, and recommend placement of woody debris and/or duff if needed.

Mechanical treatment activities would be restricted and/or controlled during high soil moisture conditions. Wet areas or seeps would be avoided by, and buffered from, all mechanical activities.

There would be a limited operating period (LOP) for aspen in units 51, 58, 83, and 84. Operations would be confined to the months of September and October unless modified by the soil scientist based on conditions on the ground just prior to the beginning of operations.

No ground-based equipment would be allowed on slopes greater than 35%, hand operations would be required in steeper areas except for units 14, 11, 15, 10, 16A, 7, 6, 5, 3, 2, 17B, 17C, and 99 where slopes up to 40% can be mechanically treated. Mechanical treatments on slopes greater than 35% on those units listed above require on-site monitoring by soil scientist.

Hand-treatments are allowed and not limited by slope on any unit.

Equipment use in shallow soils/dry meadows and lava cap soils would be avoided unless consultation with soil scientist and botanist approves. (Units 4, 16A, 50A, 50B, 55, 56, 77, 80, 81, 83, 85, 88, 89) New skid trails and landings would not occur on shallow soils without consultation with the Soil Scientist.

All skid trails, temporary road rehabilitation, and fireline rehabilitation would use a minimum waterbar spacing consistent with Regional guidelines for a very high hazard rating.

Avoid skid trails that traverse steeper areas. If excess soil displacement occurs, re-contour if possible and cover with slash or other organic material to a minimum of 70 percent cover at the conclusion of thinning activities.

Units 13, 16, 5, 56, 57, 6, 87, 89 are currently at or near this threshold value for soil disturbance. To mitigate soil disturbance, landings on these units would be contour ripped to minimize erosion problems, restore infiltration, and discourage unauthorized motor vehicle use. Skid trails on these units would be ripped and then waterbarred. After ripping, landings and skid trails would be re-seeded using a native seed mix approved by the project botanist.

After temporary roads have served their use, they would be ripped and seeded to alleviate soil compaction, restore infiltration, and discourage unauthorized motor vehicle use. Water-barring would occur following ripping.

If during project monitoring it is discovered that project activities may cause Erosion Hazard Ratings to exceed a “moderate” rating based on site specific conditions, activities would be halted until mitigation measures can be implemented.

Sensitive Plants

Known sensitive plant occurrences in the project area would be flagged for avoidance. All ground disturbing activities and burn piles would be excluded from sensitive plant protection areas.

Hand thinning within sensitive plant protection areas (units 17A and 17C) may occur at the direction of the project botanist.

Disturbance from heavy equipment and other project related activities would be excluded from special habitats including lava caps, wet meadows, and during project implementation by flagging the areas off.

Post-treatment monitoring of sensitive plants, and special habitat within the project area, would be conducted for two years following project implementation to ensure that the design criteria are effective.

Prescribed burn units: District Fuels Officer or burn boss would notify the forest botanist prior to Rx burning in order to re-flag occurrences that occur in burn units. This would clarify occurrence boundaries and ensure that fire lines are not cut through occurrences.

All pile burning would be excluded from meadows within the proposed project area.

Noxious Weeds

ENF list-A noxious weed occurrences found along roadsides within the project area and within any proposed unit have been marked with flagging and mapped. Where feasible, all noxious weed occurrences would be excluded from direct ground disturbance or other project related activities in order to reduce the potential spread of noxious weeds within the project area. If an infestation area cannot be avoided, equipment would be washed prior to leaving the infested area as noted on harvest cards in the project file.

The Forest noxious weed coordinator would be contacted to assist with location of landings in unit 13 to minimize potential for spreading yellow starthistle.

All off-road equipment used during unit treatments would be cleaned to insure they are 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 infested units 13, 74, 75, and 85 to a unit that is free of such weeds.

If needed for erosion control purposes, only native seed mixes and/or certified weed free straw (preferably certified rice straw) would be used (ENF Seed and Mulch Rx 2000).

Sand, gravel, fill material, and bounders used within the project area would come from weed-free sources. Consult with the Forests Botanist for sources of weed-free material.

Proposed road reconstruction and all landings, ripped or otherwise, would be monitored for two years after project completion for weed occurrences.

Noxious weed control would occur following thinning and fuels reduction work in units 13, 74, 75, and 85. Treatment methods would involve hand pulling except for infestations analyzed and approved for other treatment methods. These units have existing ENF list-A noxious weed species with a high priority for treatment on the Amador Ranger District.

Prescribed burn units: The District Fuels Officer or burn boss would notify the forest botanist prior to Rx burning in order to re-flag ENF list-A noxious weed occurrences that occur in burn units. This would clarify occurrence boundaries and ensure that fire lines are not cut through noxious weed occurrences.

Range

The majority of the View 88 project area falls within four active range allotments (Pardoe, Corral Flat, Bear River, and Sherman), two vacant allotments (Cat Creek and the Big Meadow unit of Corral Flat) and grazing in conjunction with adjacent private land operations (in the scenic highway strip from Dew Drop to Cooks Station).

Range improvements, including fences totaling approximately 22 miles, gates, troughs and corrals, would be protected during all phases of project activities and repaired or replaced if impacted by activities.

During periods of active grazing, fences and gates would be maintained in a manner to prevent livestock movement off allotments. Livestock grazing dates range from approximately early June to late November, but could vary by location and year. The following actions would be implemented to protect range improvements and livestock use during project activities:

- Notify the Rangeland Specialist and District Resource Officer annually of planned project activities.
- The Rangeland Specialist would contact livestock operators to coordinate information regarding livestock presence and protection of improvements.
- Document fence and other range improvement type and condition prior to each phase of project implementation and obtain concurrence from the Rangeland Specialist, range permittees and owners of non-government improvements within the scenic strip.
- Fences would be protected and gates would remain closed except by written instructions from the Sale Administrator after consultation with the Rangeland Specialist.
- Any openings in the fence, by agreement or due to accidental damage, would not be left unattended. The Rangeland Specialist and District Resource Officer would be notified of any damage to range improvements and fences would be repaired immediately if livestock are present on the allotment.
- A Limited Operating Period (LOP) would be implemented for unit 81 in the Corral Flat Allotment that would restrict operations during any season of active grazing until after October 1. The range permittee would roll up ½ mile of fence that is within the unit prior to project activities. The fence alignment would be kept free of piles and debris to allow installation of the fence the following spring. Fence support trees would be protected if possible and replaced with posts if removed.
- Burn piles would be located at least 20 feet from range improvements. All burning operations would be implemented in a manner to protect range improvements including posts and wire from heat damage. The Forest would coordinate responsibility for end-of-season fence lowering with the permittee if it is determined burning operations should be conducted with wire on posts.
- Debris would be kept a sufficient distance back from fences to allow permittees to walk fence lines for maintenance and prevent buildup of debris on top of the approximate 10 miles of fencing which is lowered to the ground at the end of the grazing season. Restrict equipment from driving across or logs and slash from being dragged across barbed wire fences that have been lowered to the ground.

If project operations cannot be designed to protect range improvements, they would be replaced to equal or better condition as an expense of the project. Damaged range improvements would be restored to equal or better condition. Barbed wire would be replaced with new wire if multiple splices would be necessary and wire can no longer be stretched. Damaged wire would be removed from the project area to a disposal site.

No Action (Alternative 2):

The No Action alternative was analyzed for effects in order to disclose the effects of not implementing the View 88 project, as required under NEPA.

Under the No Action alternative, visual objectives for the scenic highway/byway would not be achieved, and the risk for visual degradation from high intensity wildfire would continue or increase. Fuels along 22 miles of Scenic Highway 88 would not be reduced, but would continue to accumulate. The risk for high intensity wildfire would remain or increase, with stand replacement mortality for much of the project area. Forest stands would continue to increase in density, with increasing risk for mortality from insect and diseases. Aspen stands would continue to shrink in the project area, and some remnant aspen at risk for loss from conifer encroachment would be lost. Montane meadows would continue to shrink in size with lowering water tables due to continued encroachment by conifers. Black oaks would continue to decline from competition and over-topping by conifers.

Alternative 3 - (16-inch DBH Limit):

Alternative 3 was developed in response to public comment requesting an alternative be developed to analyze meeting the fuel reduction purpose for the View 88 project without removal of trees greater than 16 inches DBH. The design criteria would remain the same as in the Proposed Action, except for the visual resources design criteria. Only creation of filtered views would be implemented for this alternative. The change for this alternative is to lower the maximum diameter for removal of trees to 16 inches DBH. Trees that are hazardous to users on highway 88 or to workers would be removed without regard to diameter. In evaluating activities under this alternative project units were analyzed for fuel levels, including the height between ground vegetation and the live tree crown for ladder fuels. The following units would be dropped under Alternative 3: units 9, 12, and 13 in the lower elevation section, units 63 and 74 in the mid-elevation section, and units 54 and 57 in the higher elevation project area, for a total of 118 acres. These are units where height to live crown is 15 feet or greater, and fire behavior is predicted to be a lower-intensity ground fire.

Alternative 4 (Non-Commercial, 10-inch DBH Limit)

Alternative 4 was developed to analyze meeting the fuel reduction purpose of the View 88 project without the removal of a commercial product. Alternative 4 responds to concerns that removal of trees greater than 10 inches DBH is unnecessary to meet fuels objectives or to prevent severe wildfire. Treatment methods would remain the same as the Proposed Action except that tree removal would be limited to trees 1-10 inches DBH. The same units would be dropped under Alternative 4 as in Alternative 3 as meeting fuels objectives without further treatment: units 9, 12, 13, 63, 74, 54, and 57; 118 acres total.

However, there would likely be situations where trees larger than 10 inches DBH would be removed to facilitate equipment access to treat units effectively including temporary roads, landings, and skid trails. The Design Criteria and Resource Protection Measures given for the Proposed Action (Alternative 1) would also be utilized for this Alternative except for the visual resource design criteria.

Table 1 Vegetation and Fuel Treatments for WUI Land Allocations by Alternative

Stand/ Unit	Acres	WUI Zone Defense/Threat	Alt 1 Acres	Alt 3 Acres	Alt 4 Acres	Vegetation Treatment	Fuel Treatment
1	19	Threat	19	19	19	Commercial Harvest	Grapple pile and burn piles
2	15	Threat	15	15	15	Commercial Harvest	Grapple pile and burn piles
3	13	Threat	13	13	13	Commercial Harvest	Grapple pile and burn piles
4	10	Threat	10	10	10	Commercial Harvest	Grapple pile and burn piles
5	27	Defense/Threat	27	27	27	Commercial Harvest	Dozer pile and burn piles
6	15	Defense/Threat	15	15	15	Commercial Harvest	Grapple or dozer pile and burn piles
7	33	Defense/Threat	33	33	33	Commercial Harvest	Grapple, dozer, and hand pile, burn piles
8	7	Threat	7	7	7	Commercial Harvest	Dozer pile and burn piles
9	10	Defense/Threat	10			Commercial Harvest	Tractor and hand pile, burn piles and Jackpot burn
10	7	Threat	7	7	7	Commercial Harvest	Dozer pile and burn piles
11	37	Threat	37	37	37	Commercial Harvest	Grapple or dozer pile and burn piles
12	3	Threat	3			Commercial Harvest	No surface treatment, Jackpot burn
13	24	Defense/Threat	24			Commercial Harvest	No surface treatment, burn landing piles
50	106	Threat	106	106	106	Commercial Harvest	No piling, Jackpot burn
51	48	Threat	48	48	48	Commercial Harvest	Grapple or hand pile, burn piles
54	21	Threat	21			Commercial Harvest	No piling, Jackpot burn
55	41	Threat	41	41	41	Commercial Harvest	No piling, Jackpot burn
56	85	Defense/Threat	85	85	85	Commercial Harvest	No piling, Jackpot burn
57	11	Threat	11			Commercial Harvest	No piling, Jackpot burn

Stand/ Unit	Acres	WUI Zone Defense/Threat	Alt 1 Acres	Alt 3 Acres	Alt 4 Acres	Vegetation Treatment	Fuel Treatment
58	26	Threat	26	26	26	Commercial Harvest	No piling, jackpot burn
59	53	Threat	53	53	53	Commercial Harvest	Grapple pile, hand pile in equipment exclusion areas, burn piles
60	5	Defense	5	5	5	Commercial Harvest	Hand pile, burn piles
61	21	Threat	21	21	21	Commercial Harvest	No piling, Jackpot burn
62	15	Threat	15	15	15	Commercial Harvest	No piling, Jackpot burn
63	20	Threat	20			Commercial Harvest	Grapple pile, burn piles and Jackpot burn
71	13	Threat	13	13	13	Commercial Harvest	No piling, Jackpot burn
72	24	Threat	24	24	24	Commercial Harvest	Dozer pile, burn piles
73	29	Threat	29	29	29	Commercial Harvest	Dozer pile, burn piles
74	29	Threat	29			Commercial Harvest	Dozer pile, burn piles
75	24	Threat	24	24	24	Commercial Harvest	No piling, Jackpot burn
76	15	Threat	15	15	15	Commercial Harvest	Grapple pile, burn piles
77	44	Threat	44	44	44	Commercial Harvest	Hand pile in RCAs, Jackpot burn
78	23	Defense	23	23	23	Commercial Harvest	Grapple pile, burn piles and Jackpot burn
79	3	Threat	3	3	3	Commercial Harvest	Hand pile, Jackpot burn
80	51	Threat	51	51	51	Commercial Harvest	Grapple pile, burn piles and Jackpot burn
81	78	Threat	78	78	78	Commercial Harvest	No surface treatment, Jackpot burn
82	36	Threat	36	36	36	Commercial Harvest	No surface treatment, Jackpot burn
83	10	Threat	10	10	10	Commercial Harvest	No piling, Jackpot burn
84	20	Threat	20	20	20	Commercial Harvest	No piling, Jackpot burn

Stand/ Unit	Acres	WUI Zone Defense/Threat	Alt 1 Acres	Alt 3 Acres	Alt 4 Acres	Vegetation Treatment	Fuel Treatment
85	12	Threat	12	12	12	Commercial Harvest	Grapple and small hand piles, burn piles
86	21	Threat	21	21	21	Commercial Harvest	No piling, Jackpot burn
87	22	Threat	22	22	22	Commercial Harvest	No piling, Jackpot burn
88	32	Threat	32	32	32	Commercial Harvest	No piling, Jackpot burn
89	57	Threat	57	57	57	Commercial Harvest	No piling, Jackpot burn
90	36	Threat	36	36	36	Commercial Harvest	No piling, Jackpot burn
99	35	Threat	35	35	35	Commercial Harvest	Grapple pile, Jackpot burn
104	17	Defense	17	17	17	Commercial Harvest	Grapple pile, burn piles
	1303		**1303**	**1185**	**1185**		
14	12		12	12	12	Timber Stand Improvement	Dozer pile, burn piles
15	5		5	5	5	Timber Stand Improvement	Hand pile, burn piles
16	23		23	23	23	Timber Stand Improvement	Dozer pile, burn piles
17	117		117	117	117	Timber Stand Improvement	Dozer pile, hand pile in RCAs, burn piles
	150		**150**	**150**	**150**		
1100005	1		1	1	1	Precommercial Thin	No surface fuel treatment
1150027	21		21	21	21	Precommercial Thin	No surface fuel treatment
1150073	15		15	15	15	Precommercial Thin	No surface fuel treatment
1160017	17		17	17	17	Precommercial Thin	No surface fuel treatment
1160019	22		22	22	22	Precommercial Thin	No surface fuel treatment
1190005	14		14	14	14	Precommercial Thin	No surface fuel treatment
1190007	8		8	8	8	Precommercial Thin	No surface fuel treatment

Stand/ Unit	Acres	WUI Zone Defense/Threat	Alt 1 Acres	Alt 3 Acres	Alt 4 Acres	Vegetation Treatment	Fuel Treatment
1200019	4		4	4	4	Precommercial Thin	No surface fuel treatment
1200021	15		15	15	15	Precommercial Thin	No surface fuel treatment
1270013	4		4	4	4	Precommercial Thin	No surface fuel treatment
1410010	5		5	5	5	Precommercial Thin	No surface fuel treatment
1410011	3		3	3	3	Precommercial Thin	No surface fuel treatment
1410012	2		2	2	2	Precommercial Thin	No surface fuel treatment
1410016	18		18	18	18	Precommercial Thin	No surface fuel treatment
1410002	12		12	12	12	Precommercial Thin	No surface fuel treatment
	164		**164**	**164**	**164**		
TOTAL	**1617**		**1617**	**1499**	**1499**		

[1] Treatments for Alternative 1 (Proposed Action) would allow removal up to 30” DBH
Treatment type for Alternative 3 would allow removal up to 16” DBH
Treatment type for Alternative 4 would allow removal up to 10” DBH,
which would change treatments from commercial harvest to non-commercial thinning.

Comparison of Alternatives

Comparison of the Alternatives: Elements of the Purpose and Need

This section provides a summary of effects of implementing each alternative. Table 2 below and the discussion following summarize effects of the alternatives on elements of the purpose and need: 1) maintaining and enhancing Highway 88 as a designated state scenic highway; 2) protecting private property in the WUI defense zone; 3) reducing surface fuels and altering the vegetation structure in strategic locations; 4) reducing stand densities in order to increase forest resilience to insect attack and density-related mortality; 5) enhancing the function and natural diversity in the vicinity of oaks, aspen, and meadows; and 6) conducting treatments in an economically effective manner.

Maintaining and enhancing Highway 88 as a designated state scenic highway:

Removal of trees under Alternative 1 would create strategically placed openings that reveal scenic vistas, highlight and filter views from the highway, and highlight forest points of interest including meadows, aspen stands, large oaks, and rock formations. Openings created would reveal canyon views where the forest floor is not currently visible to highway traveler as well as accentuate existing focal points such as rock outcrops. Visual quality would be improved by removal of damaged trees and overstocked stands. In the long term, the visual quality and safety would improve.

At the lower elevations leading to Hamm's Station, desired views from the highway would be an open canopy, park-like forest made up mostly of large fire-resistant trees interspersed with islands of small trees and view openings. Large black oaks would stand out as "character" trees, along with a few large snags. Conifers would be mostly ponderosa pine with some large Douglas fir and an occasional large incense cedar.

At middle elevations between Hamm's Station and Peddler Hill, the gentle slopes would display a variety of Sierra Mixed conifer vegetation with a few large snags. Conifers would have variable spacing, and include mostly large trees, with islands of reproduction. Species would include both sugar and Jeffery pine, with large black oak "character" trees. A more open canopy cover would contain a variety of trees: oak, sugar pine, Jeffery pine, large white fir and incense cedar, with islands of smaller trees. Intermittent aspen and meadows would be distinctly visible from the surrounding conifers. Views from the highway would include more variety, with some open vistas of the high peaks and the river valleys, views of open to moderately dense forest, plus the display of fall colors in the aspen stands and wildflowers in the meadows.

From Peddler Hill to Shot Rock Vista, the higher elevation section of the project would continue to provide the greatest variety of views from the Highway 88 Scenic Byway with large granite rock outcrops, dense stands of red fir, open stands of lodgepole pine, wet meadows ringed with aspen, and landscape views of the high peaks of the Mokelumne Wilderness and the Sierra Nevada. Slopes are gentle to intermediate, and vegetation changes to red fir types would be interspersed with regenerating aspen stands and wet montane meadows. Aspen stands would provide contrast to the deep green conifer forest, and aspen regeneration of small trees would be evident, especially surrounding wet meadows.

Under Alternative 2 no action would be taken so portions of the highway would continue to appear overcrowded and unhealthy. The current views along Highway 88 include overstocked stands with thick ground cover, filtered views of private land and previous harvest units, long stretches of dense vegetation, minimal vegetation diversity, attractive rock cut slopes, and turnouts with panoramic views. Scenic vistas now hidden from view would remain hidden, and likely become even less visible over time. Forest points of interest would continue to decline as over-topped oaks continue to die out, aspen stands would continue to decline, meadows would continue to shrink from conifer encroachment, and interesting rock outcrops would remain hidden from view.

Under Alternative 3 the scenic enhancement would be reduced. Removal of trees 16 inches diameter and less would reduce the tunnel view of unhealthy small trees, but openings would not be created to reveal scenic vistas. Oaks would continue to be over-topped and die out, aspen stands would continue to decline, and meadows would continue to shrink from conifer encroachment. The difference between the Alternative 2 and Alternative 3 for oaks, aspen, and meadows is that the decline would occur over a longer time and at a slower rate.

Under Alternative 4 the scenic enhancement would be further reduced because trees over 10 inches diameter would not be removed. Some small trees would be removed, but the current tunnel view along portions of the highway would remain except for removal of current ground fuels and some unhealthy trees. The sight distance into the forest would not increase and openings would not be created to reveal hidden vistas. Oaks would continue to be over-topped and die out, aspen stands would continue to decline, and meadows would continue to shrink from conifer encroachment.

Protecting private property in the WUI defense zone and reducing surface fuels and altering the vegetation structure in strategic locations:

Alternatives 1, 3, and 4 would reduce surface and ladder fuel sufficient to change expected fire behavior from a high intensity crown fire to a low intensity surface fire. All action alternatives would increase safety for fire suppression and also increase suppression effectiveness. The differences between the action alternatives are as follows: Alternative 1 is expected to meet the SNFPA guideline with fuel reduction treatments remaining effective for 15 to 20 years; Alternative 3 is expected to remain effective for a shorter time of 10 to 15 years; and Alternative 4 is expected to remain effective for 5 to 10 years.

Under Alternative 2 high intensity crown fire would remain the predominate fire behavior. Additionally, it is likely that Highway 88 would be closed in the event of a wildfire and it would not provide a safe area for fire suppression crews to work.

Reducing stand densities in order to increase forest resilience to insect attack and density-related mortality:

Alternative 1would thin stands to a density and spacing that reduces inter-tree competition for light, water, and soil nutrients while retaining and promoting healthy forest structure with increased resistance to insects and disease. Thinning under Alternative 1 would result in a stand density index (SDI) that allows for growth but is resilient to variability in precipitation. Removal of various size trees, retaining the larger trees and retaining fire-resistant pine species would lead toward the restoration of a pine-dominated forest in the project area. Alternative 1 would

remove diseased and malformed trees up to 30 inches DBH to remove sources of infection and infestation from the stands.

Alternative 2 would perpetuate the existing overcrowded stands increasing the risk for disease and insect mortality. Under Alternative 2, shade-tolerant white fire and incense cedar would continue to increase, shading out pine seedlings, and increasing mortality from inter-tree competition for soil nutrients, water, and sunlight. The forest would become less fire resistant and less resilient to moisture stress and climate change.

Under Alternative 3 removal of trees 16 inches diameter and less would preclude the removal of multiple size classes of shade-tolerant white fire and incense cedar. The 16 inch diameter limit precludes geographical tree placement so the stand density index would not be reduced and inter-tree competition would not be reduced. Trees would continue to compete for soil nutrients and water in overcrowded stand or areas of stands. Under Alternative 3 there would be minimal improvements to forest health because most diseased and mistletoe-infected trees would be retained. This alternative would produce a forest that is substantially less resilient to drought and climate change than Alternative 1.

Under Alternative 4 only small ladder fuel (white fir and incense cedar) would be removed so the overcrowding in forest stands would continue. While fuel treatments for surface fuel and removal of less than 10 inch diameter material would change fire behavior, it would not reduce mortality from inter-tree competition or the risk of insect and disease mortality. Current levels of mistletoe and other diseases would remain, and together with stress from competition for soil nutrients, water, and light, increased mortality is expected to occur. This alternative would produce a forest that would remain dominated by shade-tolerant species that are not resilient to drought or climate change.

Enhancing the function and natural diversity in the vicinity of oaks, aspen, and meadows:

Alternative 1 would remove conifers from overtopped black oaks and allow oaks to survive and reproduce in the project area. Alternative 1 would remove encroaching conifers from meadows, allowing meadows to retain groundwater and remain on the landscape in their current size. Alternative 1 would remove encroaching conifers from aspen stands and reduce competition for moisture and soil nutrients, Removal of the encroaching conifers would allow sunlight to warm soils and support regeneration of aspen shoots. Aspen stands currently at risk for loss on the landscape are expected to recover and reproduce under Alternative 1.

Under Alternative 2 the current conditions would continue with loss of black oak and aspen, and continued shrinkage of montane meadows. These diverse landscape features are at risk for loss under Alternative 2.

Under Alternative 3 removal of trees less than 16 inches diameter would not reduce the overtopping and shading of oaks because the majority of conifers are 16 inches or greater diameter. Aspen restoration success would be limited to aspen stands with the least amount of encroachment, while aspen at risk for loss because of severe encroachment would likely be lost. Meadows would continue to shrink, although slowly, due to the remaining encroachment of conifers 16 inches diameter or larger.

Under Alternative 4 the removal of 10 inch diameter trees would not be sufficient to reduce overtopping of oaks or reduce conifer encroachment of either aspen stands or meadows.

Conducting treatments in an economically effective manner:

Under Alternative 1 the removal of merchantable trees is expected to cover most, if not all, of the costs for removal of surface and ladder fuels. Removal of encroaching trees around meadows, aspen stands and oaks would contribute merchantable size trees to defray costs for those activities. Alternative 1 is expected to generate approximately $301,000 in proceeds.

Alternative 2 would have no economic return and would have high costs for wildfire suppression with the expected high intensity crown fire behavior in the project area.

Under Alternative 3 proceeds generated from removal of trees 16 inches diameter and below would be $82,000. Proceeds would cover only a portion of the costs of project activities. Other funding would be needed to implement the entire project.

Alternative 4 would generate approximately $9,000 in proceeds. Alternative 4 would cost $282,000 to implement. Other funding would be needed to implement the project.

Table 2. Comparison of Alternatives

Element of the Purpose and Need	**Alternative 1 Proposed Action**	**Alternative 2 No Action**	**Alternative 3 – 16 inch DBH removal limit**	**Alternative 4 – 10 inch DBH removal limit**
Flame Length	100% < 4 ft.	60% > 8 ft.	100% < 4 ft.	100% < 4 ft.
Height to live crown	> 15 ft.	0 to 12 ft.	> 15 ft.	> 15 ft.
Wildfire type	Surface fire	Crown fire	Surface fire	Surface, limited torching
Risk of high intensity wildfire	Low	High	Low	Low, but increasing over the longer term due to increasing mortality from overcrowding.
SDI	252	466	293	336
Canopy Closure	53.9	67.8	60.2	65.6
Basal Area per acre	187	261	208	232
Risk of forest mortality from drought, insects, and disease	Low	High, stands would continue to have high mortality rates, especially for smaller or younger trees, existing mistletoe and other insect and disease infestations would continue. Stands would not be resilient to drought.	Moderate, would leave stands with some short-term decrease in SDI, would not permit removal of trees over 16” DBH that are diseased have mistletoe, or are in an overly crowded clump of trees.	Moderate to High, would leave stands in an overcrowded condition with SDI that increases mortality and risk for insect and disease infestation. Stands would not be resilient to drought or predicted effects from climate change.
Anticipated Revenue	$310,000	$ 0	$82,000	$9,000
Anticipated Cost	$310,000	$ 0 to unknown if wildfire occurs	$282,000	$282,000

Environmental Consequences

This section discloses the environmental consequences of the proposal in relation to whether there may be significant environmental effects as described at 40 CFR 1508.27. Further analysis and conclusions about the potential effects are available in resource specialist reports and other supporting documentation located in the project record. The following are discussions of resources that have relevance to a determination of significance.

In order to understand the contribution of past actions to the cumulative effects of the proposed action and alternatives, this analysis relies on current environmental conditions as a proxy for the impacts of past actions. This is because existing conditions reflect the aggregate impact of all prior human actions and natural events that have affected the environment and might contribute to cumulative effects.

This cumulative effects analysis does not attempt to quantify the effects of past human actions by adding up all prior actions on an action-by-action basis. There are several reasons for not taking this approach. First, a catalog and analysis of all past actions would be impractical to compile and unduly costly to obtain. Current conditions have been impacted by innumerable actions over the last century (and beyond), and trying to isolate the individual actions that continue to have residual impacts would be nearly impossible. Second, providing the details of past actions on an individual basis would not be useful to predict the cumulative effects of the proposed action or alternatives. In fact, focusing on individual actions would be less accurate than looking at existing conditions, because there is limited information on the environmental impacts of individual past actions, and one cannot reasonably identify each and every action over the last century that has contributed to current conditions, Additionally, focusing on the impacts of past human actions risks ignoring the important residual effects of past natural events, which may contribute to cumulative effects just as much as human actions. By looking at current conditions, we are sure to capture all the residual effects of past human actions and natural events, regardless of which particular action or event contributed those effects. Third, public scoping for this project did not identify any public interest or need for detailed information on individual past actions. Finally, the Council on Environmental Quality issued an interpretive memorandum on June 24, 2005 regarding analysis of past actions, which states, “agencies can conduct an adequate cumulative effects analysis by focusing on the current aggregate effects of past actions without delving into the historical details of individual past actions.”

The cumulative effects analysis in this EA is also consistent with Forest Service National Environmental Policy Act (NEPA) Regulations (36 CFR 220.4(f)) (July 24, 2008).

For these reasons stated above, the analysis of past actions in this section is based on current environmental conditions.

Visual Resources

The direct, indirect and cumulative effects to visual resources are summarized from the Visual Resources Report (Jowise, 2011).

Direct and Indirect Effects – Alternative 1

Under the Proposed Action, and based on the existing visual conditions, the thinning and tree harvest prescriptions for the units in the immediate foreground would improve the visual quality and safety of the highway in the long term. In units where the existing stands are currently overstocked and have large cut and fill slopes, small openings (less than 2 acres) would reveal canyon views where the forest floor is not visible to highway travelers. Other smaller openings would accentuate existing focal points such as rock outcrops or distinctive vegetation. Feathering the openings outward from the residual stands would create diversity through variable tree spacing (40’ spacing near openings feathering to 25’ spacing further away). In overstocked stands located in more level topography visual variety would increase through a random spacing ranging from 25’ to 40’ apart for trees within the unit. Visual impact of tree removal would be further reduced because stumps would be flush cut and covered with soil. In the higher elevation portion of the project area, visual variety would be increased by random thinning of overstocked red fir stands. Visual quality would also be improved by removal of the small snowplow damaged trees from the roadside to expose the healthier pockets of red fir, aspens and brush species.

Although scenic attractiveness is subjective, studies have shown that generally, people prefer a more park-like appearing landscape and one with more visual diversity. When conifers grow abundantly in overstocked stands, a traveler moving at highway speeds is subjected to a monotony of green color and constant texture. Opening up the forest would introduce color, line, texture and form such as large platy barked pines, clusters of oaks, rock outcrops and groves of aspens, which were previously unnoticed elements, are brought into view. Thinning dense vegetation would allow these landscape elements to become points of focal interest, adding variety to the landscape. Additional sunlight would stream in to create longer views into the surrounding forest. Highway 88 offers some of the most beautiful panoramic views east of the project area. The Proposed Action allows the greatest opportunity to open vistas and display a more diverse landscape that highlights a variety of landscape features; panoramic and filtered views would become available within the project area

Proposed timber harvest, mechanical treatment of slash, soil disturbance and under-burning would be noticeable to people driving along the highway in the short term (0 – 5 years). Some of the remaining stumps may be noticeable for a longer period of time. Large piles of slash in landings and smaller hand piles would be burned as soon as practicable but may be visible for one to two years. Following under-burning, any black skeletons would be removed from areas that are visible to the highway. In the short term (0 – 5 years) the area would meet a VQO of partial retention where management activities are noticeable but do not dominate the landscape. Within a couple of years following all planned treatments, after seasonal needle drop and establishment of regenerated ground cover, the project area would meet the Forest Plan desired VQO of retention.

The effect of wildfire on the visual resource is devastating and long term. One of the goals of the Highway 88 Management Guidelines is to maintain and enhance Highway 88 as a forested,

scenic highway of the highest quality. The action alternatives, to varying degrees, would reduce the risk of high intensity wildfire along a highly used corridor (see fire and fuels section).

Cumulative Effects – Alternative 1

The landscape east of Silver Lake is rich in diversity with magnificent views of mountains, lakes, wildflowers, groves of aspens and old growth junipers. Due to the rocky soils and elevation, vegetation in the form of a forested landscape is sparse. The forested landscape in the lower elevations within the corridor appears overstocked with limited landscape diversity and appears fairly monotonous. Recent past and current projects (Sopiago, Du Bear, Hamms, Cat Lynch, Prospect Rock, Mokey Bear and Lost Horse) have/had units located along the lower elevation section of Highway 88. These projects included thinning and under-burning which has begun the process of reducing the over-stocked, unhealthy appearance of the forest within the highway corridor. Within 5 years of the completion of the proposed project, the improvement to the scenic quality of the Highway 88 scenic byway as a whole would be improved.

Direct and Indirect Effects – Alternative 2

The opportunity to enhance visual diversity with a variety of vegetation types and ages in the design elements as described in the Highway 88 Scenic Byway Management Guidelines would be forgone. The landscape would continue to appear in its existing condition. The majority of the Highway 88 viewshed within the project area would continue to meet the desired visual quality objective (VQO) and the desired Existing Visual Condition (EVC) of Type II retention.

The effect of wildfire on the visual resource is devastating and long term. One of the goals of the Highway 88 Management Guidelines is to maintain and enhance Highway 88 as a forested, scenic highway of the highest quality. The no action alternative would not reduce the risk of wildfire along this highly used corridor.

Cumulative Effects – Alternative 2

Time and natural processes would heal areas where minor evidence of previous thinning and harvest on private land is noticeable. A few years of needle drop would hide the soil disturbance and evidence of stumps along with the growth of new trees, shrubs and ground cover. All evidence of forest management would become unnoticeable at which time the disturbed areas would meet the desired Existing Visual Condition (EVC) of Type II retention.

The landscape east of Silver Lake would remain rich in diversity with magnificent views of mountains, lakes, wildflowers, and old growth junipers. Due to the rocky soils and elevation, vegetation in the form of a forested landscape is sparse. Views of aspen would be reduced over the long-term as conifer encroachment continues (see vegetation section). The forested landscape in the lower elevations within the corridor would remain overstocked with limited landscape diversity and a fairly monotonous appearance. Recent past and current projects with units located along the lower elevation section of Highway 88 began a process of reducing the over-stocked, unhealthy appearance of the forest within the highway corridor. These improvements to the scenic quality of the Highway 88 corridor would remain.

Direct and Indirect Effects – Alternative 3

Alternative 3, allowing only trees less than 16” diameter to be removed would result in a denser forest with a more homogenous appearance than the proposed action alternative. Limiting removal of trees greater than 16” diameter would result in fewer opportunities for creating visual

variety and opening up panoramic views than the proposed action. The small 2 acre and smaller openings designed to reduce the tunnel effect that exists within stands adjacent to the highway would not occur under Alternative 3.

Cumulative Effects – Alternative 3

The cumulative effects of implementing Alternative 3 would be the same as those described under Alternative 1.

Direct and Indirect Effects – Alternative 4

Alternative 4, allowing only trees less than 10" to be removed would appear closer to the No Action alternative. Limiting removal of trees to less than 10" diameter would not allow landscape elements noted above to be brought into view. Variety would not be increased and panoramic and filtered views would not become available within the project area. The existing tunnel effect caused by over-stocked homogenous stands adjacent to the highway would not be treated sufficiently to increase visual interest.

Cumulative Effects – Alternative 4

The cumulative effects of implementing Alternative 4 would be the same as those described under Alternative 1.

Fire and Fuels

The direct, indirect and cumulative effects to fire and fuels are summarized from the Fuels Report (Woods, 2011).

Direct and Indirect Effects – Alternative 1

Surface and Ladder Fuels

Creating fire resilient stands is generally based on a three-part objective: reduce the surface fuels, reduce ladder fuels, and reduce crown density. (Agee, Skinner, 2005) An increase in fire resiliency would be accomplished under the Proposed Action by a combination of fuel reduction activities. Thinning from below using both commercial and noncommercial thinning would reduce crown density. Alternative 1 would reduce both surface and ladder fuels by removing suppressed and intermediate trees, and machine piling saplings and surface fuels.

A combination of "jackpot" and pile burning would reduce remaining ground and activity fuels below 20 tons per acre. Lighting individual piles or concentrations ("jackpots") of slash and allowing fire to creep between the jackpots of fuel has been used in both the Middle Middle and Lower Middle Fork of the Cosumnes River projects without resulting in substantial duff removal. Effects of prescribed burning within RCAs would be minimized because active lighting would not occur within 25 feet of any stream channel and a dot ignition pattern for lighting uses significantly less fuel than strip lighting. All or most of the petroleum products would be consumed after ignition of the fuel bed. All of the RCAs within the View88 project would use a "Creepy" burns or Jackpot burning to allow fire to back or "Creep" into RCAs. This method results in the least use of petroleum products and also retains soil cover during prescribed burning.

In general, areas that are jackpot burned in the late fall or early winter have greater consumption of the scattered piles and fuel concentrations. Due to higher moisture content in the larger

diameter material, jackpot burning in the spring results in lower consumption of the fuel piles, even when the piles have been partially covered with water repellent paper (Middle Fork Cosumnes Jackpot Burn Plan, 2003). Either fall or spring prescribed burn is expected to reduce surface and activity fuels to the desired condition - below 20 tons per acre in the project units.

Post-Fuel Treatment Lag Time

Immediately following thinning operations, fuel loads would increase until mechanical or hand piling and prescribed fire occurs. The time lag in treating the post activity fuels by dozer/grapple piling could be as short as several weeks or as long as one year after thinning. The increase in surface fuel loading could increase fire spread and intensity for the short duration (one year). The ability of the thinned units to withstand a wildland fire during the short duration would be mitigated by the increased height to live crowns, allowing even 6 to 8 foot flame lengths to pass beneath the taller trees without initiating crown scorch or passive torching.

Post harvest treatments of mechanical piling and burning of fuels would reduce existing and activity fuel load to framework goals. It is expected that there would be some losses (tree damage and/or mortality) from post-treatment piling and burning. Thin barked trees, such as smaller diameter trees and white and red fir, would be most susceptible to damage and/or mortality.

Wildland Fire Behavior

Flame lengths less than 4' can usually be attacked successfully with hand tools. Hand line should hold the fire. Flame lengths 4 to 8 feet are too intense for direct attack on the head of the fire by persons using hand tools. Hand line cannot be relied on to hold a fire. Equipment such as dozers, engines and retardant aircraft can be effective. Flame lengths greater than 8 feet generate fire conditions where direct attack at the head of the fire is generally not successful and suppression must rely on flanking and indirect attack methods. Generally indirect attack results in a fire burning through one or more 24-hr. burn periods. "Where thinning is followed by sufficient treatment of surface fuels, the overall reduction in expected fire behavior and fire severity usually outweigh the changes in fire weather factors such as wind speed and fuel moisture" (Weatherspoon, 1996).

The change in wildland fire behavior was modeled with the use of BEHAV Plus. The 97th percentile weather and the identical weather stream were used to model all of the alternatives. The current condition analysis was used to compare the change in projected wildland fire behavior for the action alternatives. Appendix D contains a comparison of expected fire behavior indicators for the No Action and all the action alternatives. A summary of the expected changes for the Proposed Action is illustrated in Table 3 below.

Table 3: Alternative 1 Flame Length Comparison:

Flame Length Groups	**Existing Condition, % of Project Area**	**Proposed Action, % of Project Area**
</= 4 feet	40%	100%
4 – 8 feet	0%	0%
> 8 feet	60%	0%
Total	100%	100%

Alternative 1 results in a substantial drop in acres capable of producing passive crown fire; from 54% of the project acres before treatment to 0% after treatment. Removal of ladder fuels and increasing the distance between the tree crowns under the Proposed Action would reduce the potential of crown fire, torching, and spotting which in turn would reduce the rate of spread, as shown in Table 4 below.

Table 4 Alternative 1 Crown Fire Comparison:

Crown Fire Activity	**Existing Condition, % of Project Area**	**Proposed Action, % of Project Area**
Non Fire	Less than 1%	.001%
Surface Fire	40%	99.99%
Passive Crown Fire	60%	0%
Active Crown Fire	0%	0%
Total	100%	100%

While the treatments give the Forest Service options for controlling a wildfire and slowing it down, that control is dependent on weather conditions, location of fire starts and fire personnel mobilized. Areas of high stand density and high fuel loading located outside of the linear corridor project treatment units, along State Route 88, would likely produce high intensity crown fires with large areas of tree mortality as these fires burn to the treated units. Several examples over the past several years have shown that fuels reduction treatments moderate fire behavior but do not inherently stop wildfires (Examples are the Angora, Antelope, Rodeo, and Black's Mountain fires.) and large areas of high severity fire do occur in areas surrounding fuels treatments.

Fire Line Production

Flame length is just one indicator for fire control resistance and lethal fire effects. The propensity of a fire to initiate crown fire activity (lethal fire) is also based on fire line intensity (Btu/ft/s measured at the head of the fire), height to live crown, foliar moisture, crown bulk density, topography and weather.

For current conditions, the fire behavior prediction system (FBPS) fuel model equates the project areas to a fuel model 10; where slash ranges from light to heavy and a Type 1 fire crew is predicted to establish fire line at a rate of 6 chains per hour (one chain = 66 feet) (Aids to Determining Fuel Models for Estimating Fire Behavior, Anderson GTR INT-122, April 82). The Proposed action is expected to convert the treated areas to fuel models 8 (short needle conifer) and 9, (long needle pine) with a relatively closed canopy of 50%. For fuel models 8 and 9, production rates for sustained fire line construction, burnout and holding for a Type 1 fire crew jump up to an average production rate of 28 chains per hour (Fireline Handbook, NWCG Handbook 3, PMS 410-1, Nov. 89).

Cumulative Effects - Alternative 1

Cumulative Effects are bound in time by planned treatments or unplanned disturbances such as wildfire, that have occurred within the last 10 years and treatments that are likely to occur within

the next 10 years. Cumulative effects spatial boundary is the area covered by large and small fire history in the watersheds of the project.

A cumulative effect of reducing fire behavior in the project area would be to allow for more rapid containment of wildfires over the larger landscape because the View 88 project would link in combination with other projects over the landscape. The View88 Fuels project geographically links to the Scott Creek, Sopaigo, Dubear, Cobear, Bear River, Cat lynch, Hams, Mokey Bear, Goldfingers and Prospect rock Timber Sale areas. All of these projects combine to reduce potential fire behavior with similar silvicultural removal of mostly suppressed trees, ladder fuels and some co dominates while leaving the more fire-resistant and larger trees.

The linkage of the View 88 project with the others listed above would also increase the protection of Peddler Hill Maintenance Center, Hams Station, Lumberyard fire station, Dew Drop Fire Station, and the Highway 88 corridor.

Protection of natural resources, including wildlife areas and watershed values, is also enhanced when the benefits from this project are considered in combination with other projects that decrease the risk of high intensity fires in the area.

For the long term, fuels hazard reduction is a continuous process and this area would need to be revisited in approximately 15 years to sustain the effectiveness of these projects.

Direct and Indirect Effects – Alternative 2

Fire Hazard

Under the No Action alternative, surface and ladder fuels would continue to accumulate, and the risk of high intensity wildfire would remain or increase. Flame lengths would remain in their existing condition or increase, and the majority of the project area would remain unsafe for fire crews to work at the head of the fire. Heavy equipment and air retardant support would likely be needed to suppress a wildfire. The potential for a large, high intensity fire, similar to the 2004 Power Fire would remain in the landscape. Over time, the expected percentage of a wildfire to exhibit crown fire would likely increase over the 60% of the existing condition. See table 5 below for a comparison of existing expected flame lengths to the Alternative 2, the No Action alternative.

Table 5 Alternative 2 Flame Length Comparison

Flame Length Groups	**Existing Condition, % of Project Area**	**No Action, Alternative 2 % of Project Area**
</= 4 feet	40%	40%
4 – 8 feet	0%	0%
> 8 feet	60%	60%
Total	100%	100%

Height to the base of live crowns would remain the same, resulting in an increased probability of stand replacing fire.

The No Action alternative would fail to meet the purpose of the View 88 Fuels Reduction Project to reduce forest surface and ladder fuel profiles to decrease potential wildfire intensity and change fire behavior. It would also fail to protect adjacent landowners, scenic views, and habitat for sensitive species from wildfire damage.

Cumulative Effects - Alternative 2

Cumulative Effects are bound in time and space by the same factors as the Proposed Action.

Under the No Action alternative the View 88 fuels treatments would not be linked to other projects in the landscape area, and landscape benefits for fuel reduction and changes for landscape fire behavior would be forgone.

Direct and Indirect Effects – Alternative 3

Alternative 3 was created to address public comments requesting development and analysis of an alternative that would limit tree removal to less than 16 inches DBH.

Removing ladder fuels (suppressed and intermediate trees) would increase the height to the base of live crowns. The effect would be to reduce the possibility of stands torching or crowning during a wildland fire.

The following units (Table 6) are currently at the desired condition of height to live crown for surface fuels due to the fuel reduction activities under other projects. Under Alternative 3 the units in table 6 would be removed from the project. For all remaining units removal of trees less than 16 inches DBH would achieve desired conditions for fuel reduction and modified fire behavior for the 5-10 year short term.

Table 6. Units already at desired condition

Unit #	Height to live crown
9	24ft
12, 13, 54, 57, 63, 74	15ft

Assuming funding, post harvest treatments of mechanical piling and burning of fuels would reduce existing and activity fuel load to framework goals. The effect of post-treatment piling and burning is expected to be similar to the Proposed Action, shown in Table 7.

Table 7 Alternative 3 Comparison of Flame Lengths

Flame Length Groups	Existing Condition, % of Project Area	Alternative 3, 16” DBH % of Project Area
</= 4 feet	40%	100%
4 – 8 feet	0%	0%
> 8 feet	60%	0%
Total	100%	100%

Cumulative Effects - Alternative 3

Cumulative effects would be the same as the Proposed Action Alternative for fuel loading and fire behavior over the short term. For the longer term of 15 – 20 years, ingrowth of ladder fuels and mortality in stands remaining at higher density is likely to contribute fuel loads that would no longer meet desired conditions and no longer be effective to modify wildfire behavior over the landscape.

Direct and Indirect Effects – Alternative 4

Alternative 4 would not remove tress greater than 10 DBH. Under Alternative 4 the same units would be removed from the project as under Alternative 3, as they meet desired height to live condition. All remaining units would achieve desired conditions for fuel reduction and modified fire behavior with removal of trees less than 10 inches DBH for the 5-year short term

Height to the base of live crowns would meet requirements for fuel objectives. The effect of post-treatment piling and burning is expected to be similar to the Proposed Action, see Table 8.

Table 8 Alternative 4 Comparison of Flame Lengths

Flame Length Groups	Existing Condition, % of Project Area	Alternative 4, 10" DBH % of Project Area
</= 4 feet	40%	100%
4 – 8 feet	0%	0%
> 8 feet	60%	0%
Total	100%	100%

Cumulative Effects - Alternative 4

Cumulative effects would be the same as the Proposed Action Alternative for fuel loading and fire behavior over the short term. For the longer term of 10 – 15 years, growth of ladder fuels and mortality in remaining stands with higher densities would contribute fuel loads that would no longer meet desired conditions. The project are would and no longer be effective to provide a geographic link with other projects to modify wildfire behavior over the landscape.

Air Quality

The direct, indirect and cumulative effects to air quality are summarized from the Air Quality Report (Woods, McNamara, 2011).

Direct and Indirect Effects – Alternative 1

The Proposed Action can be divided into two phases in terms of air quality impacts:

- The first phase would be the thinning for forest health, removal of small diameter trees for ladder fuel reduction and piling of the activity created fuels.
- The subsequent second phase to dispose of fuels would include 1) pile burning for hazard reduction; and 2) prescribed burning.

Proposed Action activities that can affect air quality in the first phase of the project are: 1) dust from construction and use of unpaved roads, and harvest equipment activities; and 2) exhaust from log trucks and heavy equipment.

Fugitive dust caused by construction and use of unpaved roads can produce PM10 in quantities great enough to impair the visual quality of the air. These effects are localized and would be mitigated by effective dust abatement methods. Localized fugitive dust is also generated by skidding, loading, and site preparation activities. Mechanical operations are estimated to take two to three operating seasons to complete.

Table 9. Criteria pollutant totals - Mechanical Operations,

Year	NOx (tons)	VOC (tons)	PM10 (tons)
1	1.5	0.08	0.10
2	1.5	0.07	0.10
3	.13	0.1	0.01

The pollutants that would be released during the prescribed burning phase are the criteria pollutants i.e. PM10, PM2.5, Carbon Monoxide (CO), Nitrogen Oxides (NOx), Volatile Organic Carbons (VOCs) and minute quantities of non-criteria air toxics. These pollutants and air toxics are considered unhealthy for the public.

Pile and prescribed burning offers many advantages over wildfire, because the effects of prescribed fire can be manipulated to reduce adverse effects to air quality. The View 88 project includes design criteria to prevent adverse air quality effects. Desirable meteorological conditions would be required in the project's smoke management plan to facilitate venting and dispersion. Cure times for burn piles would be specified to reduce the duration of smoke emissions.

Temporary and short-term visibility impacts can be expected in the immediate project area during actual ignition and would be affected by wind speed and direction. Drainage inversions would affect nighttime dispersal of smoke, with possible smoke effects 5 to 10 miles down canyon. Smoke from burning forest fuels can impact human health, particularly for the ground crews at the site. The localized effects of burning in the project area would be short-term degradation of air quality, primarily during the burnout stage and during nighttime canyon inversions.

Table 10 Criteria pollutant totals – Prescribed Fire

Year	NOx (tons)	VOC (tons)	PM10 (tons)
1	0	0	0
2	10.3	10.2	30.5
3	10.3	10.2	30.5
4	7.4	7.5	22
5	7.4	7.5	22

Prescribed burning would begin the second year after mechanical operations begin. Staging of the prescribed burning and mechanical operations over this period would ensure compliance with federally mandated threshold levels for ozone precursors (VOC and/or NOx). The Proposed Action is in conformity with the state implementation plan.

Cumulative Effects – Alternative 1

All prescribed burning would be coordinated with the state and local air quality agencies to ensure that atmospheric stability and mixing heights are advantageous for dispersion of emissions. Amador County Air District is the permitting agency for a required smoke management plan. The smoke management plan would prescribe weather conditions (mixing heights and transport winds) that would avoid, as much as possible, smoke effects in Pioneer, a populated center, and Mokelumne Wilderness, a class 1 airshed. Therefore, although prescribed fire would contribute to cumulative effects, the effects would not exceed state and local air quality standards. The smoke management plan would also take into consideration pollutant drift from California's central valley and bay area in order to reduce cumulative effects to air quality.

Direct and Indirect Effects – Alternative 2

Under the no action alternative, if a wildfire does not occur, no increase in ozone precursors or PM10 emission levels would be produced. However, there would also be no reduction in the potential for substantial degradation of air quality from wildfire in the future. Biomass accumulation out-produces the decomposition rates in this climate, causing forest fuels to continue to increase.

During the flaming phase of a high intensity wildfire of the type that would be expected given the existing conditions, air quality degradation can exceed Federal and State standards as far as 50 miles down wind. Air quality can be severely impacted by particulate matter and other pollutants during large wildfire events. Impacts from the 1992 Cleveland Fire on the Eldorado National Forest affected air quality 60 miles away in Reno, Nevada. During the Power Fire, Amador Air District received about 10 inquiries a day regarding the poor air quality in Pioneer and Jackson and neighboring communities. People with severe respiratory effects from smoke inhalation that were not relieved by staying indoors were advised to leave the area. Sacramento Metro Air Quality Management District published a Public Health Notice on October 14, 2004 in the Sacramento region after ash fallout was reported in Rocklin, Orangevale and Carmichael from the combined effects of the Power and Fred's Fire. Sacramento Metro AQMD warned about for the possibility of smoke impacting visibility down to ground level and also advised against strenuous, sustained outdoor activity due to the possibility of increased levels of particulate matter.

Cumulative Effects – Alternative 2

Under Alternative 2, no activities would occur to produce effects that would add to pollutants drifting east from agriculture and populated areas on the prevailing winds. However, cumulative effects are likely under the No Action alternative if a wildfire occurs without fuel reduction. Because a wildfire is not a predictable event, smoke and other pollutants would add to whatever pollutants are present, with the possibility of both long term and short term cumulative effects. Long-term chronic effects of wildfires include, higher PM10 emissions, mostly due to large areas of exposed soil and ash in the aftermath of a high intensity wildfire.

Direct, Indirect, and Cumulative Effects – Alternative 3

Direct, indirect, and cumulative effects are the same as described under Alternative 1.

Direct, Indirect, and Cumulative Effects – Alternative 4

Direct, indirect, and cumulative effects are the same as described under Alternative 1.

Vegetation

The direct, indirect and cumulative effects to vegetation are summarized from the Silviculture Report (Carroll, 2011).

Direct and Indirect Effects – Alternative 1

Commercial Harvest Units

Stand Size: In the short term (1 to 5 years) stand quadratic mean diameter (QMD) would increase by about 8.7 inches to about 20.1 inches DBH, based on modeling, increasing the vegetation component of large trees. The quadratic mean diameter of the stand represents the tree with the mean basal area. This is due to a higher proportion of trees being removed from lower diameter classes. There would be no effect to tree sizes within no harvest areas of proposed units (non-harvest portions of streamside zones and other controlled areas). Overall, the increase in QMD would be expected to be less than modeled , to account for these untreated areas, and would be expected to be in the range of 5 to 7 inches.

In the long term the average stand diameters would continue to increase, at a faster rate than the more densely treed stands in the no action alternative as biomass produced would be concentrated on fewer trees.

Stand Density: Stand density is an indicator of forest health when viewed over the landscape. A variety of stand densities are required to maintain biological diversity over the landscape. The general concerns addressed in this analysis are density as it relates to canopy cover, density as it relates to susceptibility to damage from wildfire, and insect infestations. Three measures of density were utilized to analyze the effects as a result of implementing the alternatives; (1) Square feet of basal area per acre is used because it is easily measured in the field, and is commonly referenced as an indicator of density, (2) Percentage of canopy closure is more difficult to measure but is widely used in determining wildlife habitat capability, and (3) Stand density index (SDI) (Reineke, L. 1933) is used because it is easily measured in the field and the advantage of using a base or index to relate stands to each other.

Basal area per acre, the cross sectional area of trees measured 4.5 feet above the ground, can be used as an indicator of stand density. From the onset of intertree competition in a stand, trees on sites with similar productivity are subject to increased moisture stress as basal area increases. As moisture stress increases, stands become more susceptible to the effects, including mortality, of disease and insect attacks. The effects of moisture stress often show up during a year, or during several years, of extended drought.

Stand Density Index can be used as an indicator of stand density and potential risk of insect attack. It is applicable regardless of site class or age. SDI can be compared to a maximum stand density index. Stands which are rated at 55% of the maximum SDI or above are considered to be

imminently susceptible to insect attack due to inter-tree competition. This does not mean that an attack would happen, only that it is likely. At the lower end (55%) would indicate a high likelihood of mortality concentrated in the lower crown classes and the more shade-intolerant species. At higher densities, mortality would be expected across all size classes (Bakke, 1997). However, even some stands at lower densities can be subject to insect attack due to intertree competition. Oliver (1997), in a study of a westside Sierra ponderosa pine plantation, found mortality, from bark beetles and snow damage, was confined almost exclusively to stands with SDIs of more than 183, 32% of maximum SDI for ponderosa pine.

- Average stand density is reduced. At least 40 percent of existing basal area would be retained within threat zones. Live tree basal area is decreased by an average of about 75 square feet per acre, to about 185 square feet per acre. Reduced stand densities would increase available water to individual trees, improving the potential these stands would withstand drought and insect outbreaks than currently.
- Canopy cover would vary within stands, but would remain at 50 percent or greater in units outside of defense zones (greater than 40 percent within defense zones). Canopy closure would vary within units. Within the view zone, canopy closure would generally be reduced more than the stand average to meet visual objectives. Canopy closure outside of view zones would be higher than the view zone, while canopy closure within no harvest areas would be the highest, at no reduction in canopy closure. Modeled canopy closure reduction was 14 percent. Overall, the reduction in canopy closure is projected to be less than modeled to account for untreated areas, and is expected to be in the range of a 10 to 12 percent reduction. Canopy closure would not be reduced by greater than thirty percent in any single unit.
- Average stand density, as measured by stand density index (SDI), is reduced by about 215, to about 250. Maximum SDI for natural stands in this project is about 780. Average SDI for stands in the project would be reduced from 60% of maximum to about 30% of maximum.

In the long term, reduced stand density would increase available water to each individual tree resulting in the potential for these stands to withstand drought and insect outbreaks with lower probability of mortality than the other alternatives. FVS estimates of mortality twenty years after harvest would be reduced to 16 cubic feet per acre per year (10 % of growth). Resistance to drought and insect attack would remain into the future, although this resistance would dissipate as stand densities increase with stand growth. Treatments are expected to remain effective to avoid the health risks associated with density for at least 20 years. Stand density, as measured by basal area (square feet per acre), would be expected to return to current density levels in an average of about 32 years (range 15-50), based on FVS modeling.

Species Composition: Intermediate trees (trees receiving direct sunlight only from the top and not from the side) and suppressed trees (trees receiving no direct sunlight) are targeted for removal and would account for a disproportionate number of trees removed. Shade tolerant trees, primarily white fir, red fir, and incense cedar, would also be disproportionately removed. This would result in the promotion (trees per acre and basal area per acre) of Jeffrey/ponderosa pine and sugar pine. These pine species are generally more resistant to mortality from wildfire due to their thicker bark. This increase in percentage of Jeffrey/ponderosa and sugar pine would be

more apparent in lower elevation stand, which have a larger component of these species. Along Highway 88, larger trees of these species would be highlighted to forest visitors.

In the long term, canopy cover would be high enough to preclude the establishment of substantial numbers of shade intolerant pines. Seedlings of shade tolerant species would slowly invade, contributing to a ladder of fuels in 30-50 years.

Hardwood Resources: Hardwoods in the area (black oak, aspen) are intolerant of shade. This means that they generally need direct sunlight to thrive in the forest environment.

Black Oak – Black oak are not targeted for removal. Removal of conifers less than 30 inches near desirable black oaks (dominant, codominant, or vigorous intermediates) would improve growing conditions for these shade intolerant trees as more sunlight would reach their crowns. Large "character" trees would be highlighted along Highway 88.

In the long term, black oak in the dominant and codominant positions would continue to benefit from an increase in sunlight. The benefit to black oak that remain in a partially shaded position after treatment because of their height or proximity to larger conifers would diminish as canopy cover increases over time. As sunlight decreases, these trees would continue to be overtopped and eventually die out of these stands.

Aspen – Removal of most of the conifers less than 30 inches DBH in and around aspen stands and the resulting increase in sunlight would stimulate vigorous vegetative reproduction from the extent of aspen roots. Areas occupied by aspen would be expected to increase in size. Residual large aspen would remain, surrounded by high densities of seedling and sapling sized aspen.

In the long term, aspen would remain the dominant tree in areas in and around aspen stands. Young aspen would progress to sapling and pole-sized trees.

Other: Post harvest treatments of mechanical piling and burning of fuels would expose mineral soil to varying degrees. This, combined with an increase in light reaching the forest floor, could result in an increase in germination of the seeds of various tree and brush species. These plants would be primarily shade tolerant species because of the low light levels, but in the scattered openings some shade intolerant trees and brush may survive. These plants would develop and grow at a slow rate because of the low light levels reaching the plants.

Direct and indirect effects outside of commercial harvest units

In plantations, trees would be precommercially thinned to reduce intertree competition. Because of the small numbers of shade tolerant trees in present in these plantations, they would generally be retained to increase their percentage in the stand. The effect would be the retention of a mix of species to promote stand heterogeneity. Longer term, species composition would remain in roughly the same proportions, as most trees would be in a codominant position in the stand.

Canopy cover would vary within precommercially thinned stands because small lightly stocked inclusions, but is estimated to reduced to about 25 percent, based on an average residual stocking of 135 TPA and an average residual DBH of 5 inches. Overall, canopy closure is projected to be reduced by an average of about 15-20 percent.

Precommercially thinned stands would maintain current growth rates, accelerating the development of key habitat and old growth forest characteristics. As diameter increases, these trees would be less susceptible to mortality in a fire, reducing the risk of loss to wildland fire.

Roadside hazard tree felling (including removal) would contribute to forest visitor safety.

Canopy closure in TSI stands is expected to remain close to current levels, with reductions not to exceed 10 percent, as primarily suppressed and intermediate non-commercial trees would be removed. Effects of these treatments would be primarily Visual - longer sight distances into these stands, and Fuels - Treatments would remove ladder fuels and increase spacing between trees, reducing the risk of loss to wildland fire.

Cumulative effects – Alternative 1

The View 88 analysis area for the project encompasses an area within roughly ¼ mile of Highway 88. In addition to the direct and indirect effects, past actions include several thinning sales, including Sopaigo, Bear River, Cat Lynch, Hams, Mokey Bear, Lost Horse, and Prospect Rock. These sales all utilized a thinning from below type of prescription, with similar effects of fuel treatments and density reduction. There are no known foreseeable future actions.

This alternative would to contribute to visual enhancement along the Highway 88 corridor. Past and current projects with a portion of their areas along Highway 88 include Sopiago, Bear River, Cat Lynch, Hams, Mokey Bear, Lost Horse, and Prospect Rock. Uncompleted work includes about 500 feet of the Lost Horse Project, located in view of Highway 88 near Foster Meadows Road, and about 1,000 feet of the Mokey Bear Project, located in view of Highway 88 in the vicinity of Lumberyard. The primary effect along Highway 88 was/would be a decrease in stand density and an increase in tree size.

This alternative is not expected to contribute to cumulative effects, such as density-related effects, effects to hardwoods, and effects to species composition and tree size, in other stands and those areas covered by past actions. Treatments within the View 88 area are not expected to affect other stands and those areas covered by past actions.

This alternative would contribute about 164 acres of precommercially thinned plantations. These stands would accelerate their development of old forest characteristics.

Direct and Indirect Effects – Alternative 2

Commercial Harvest Units

Stand Size: There would be no effect to tree size. The stand quadratic mean diameter would remain at about 11 inches DBH.

In the long term, individual tree growth rates would decline as a result of inter-tree competition. Stand diameters would continue to increase at a rate slower than the other alternatives, as biomass growth would be distributed among many more stems per acre.

Stand Density: Canopy cover remains at an average of about 70 percent.

Average stand density would remain the same, with an average SDI of about 466, about 60 percent of maximum SDI, near to the lower end of a “zone of eminent mortality” (SDI’s between 55 and 85 percent of maximum). These stands would be at a greater risk of density-related mortality than the other alternatives.

In the long term, canopy cover would be limited primarily by site conditions. On a project basis canopy cover would likely slowly increase over time. The risk of density-related morality would increase as stand densities increase with stand growth. FVS estimates of mortality at twenty

years are about 68 cubic feet per acre per year (about 32 % of growth). Stands, currently averaging about 60% of maximum SDI, would remain in the "zone of eminent mortality" at SDI's between 55 and 85 percent of maximum. Density-related mortality, in the form of drought or insect attack, would have the highest probability of occurring of any alternative.

Species Composition: Current species composition would remain the same.

In the long term, as canopy cover conditions continue into the future, shade tolerant conifers would dominate species composition. As individual shade intolerant pines die, they would likely be replaced by shade tolerant fir and cedar that easily establish themselves under a shady canopy.

Hardwood Resources

Black Oak - Maintaining current canopy cover would continue to stress shade intolerant oak by limiting sunlight. The effect to oaks would be a higher risk of mortality than the proposed action or 16 inch alternative. Within the view zone of Highway 88, black oak would be remain as it currently exists, with many oak sheltered from view by conifers in their proximity.

In the long term, as canopy cover conditions continue into the future, shade intolerant oak with limited exposure to sunlight would be stressed and would continue to die out of these stands. Oaks with crowns in the overstory would continue to maintain their position. Oak reproduction would be severely limited be shade, with few oaks becoming established.

Aspen – Maintaining current canopy cover would continue to stress shade intolerant aspen by limiting sunlight. Those aspen in the canopy would continue their current growth patterns. The area occupied by aspen would remain roughly the same.

In the long term, as canopy cover conditions continue into the future, aspen would decline. As individual aspen trees are disturbed by windthrow, they would produce sucker sprouts, but under a shady canopy they would quickly die out. The area occupied by aspen would decline.

Forest Health: This alternative would not meet several purposes of the project, including:

Reduce tree densities to improve resistance to drought, insects, and disease mortality for conifers.

Restore and enhance oaks, aspen stands, and montane meadows.

Maintain and enhance Highway 88 as a state designated scenic highway and designated forest service scenic byway of the highest quality while providing for public safety and emergency egress.

Other: Current levels of ladder fuels would continue into the future. Increases in the height to the base of live crowns of larger trees, that slowly increase as lower branches die from lack of sufficient sunlight, would be replaced by an ingrowth of small shade tolerant trees (primarily fir) growing into a position that would contribute to ladder fuels. Ground fuels would continue to accumulate, without disturbance, from within stand mortality.

Direct and Indirect Effects outside of commercial harvest units

Noncommercial sized plantations would remain untreated. Intertree competition for site resources would slow individual tree growth. Current stand species composition would remain the same. Timber stand improvement (TSI) units would remain untreated.

No roadside hazard tree felling would occur under this project but CalTrans would continue to fell hazard trees along the highway.

Cumulative Effects - Alternative 2

The View 88 analysis area for the project encompasses an area within roughly ¼ mile of Highway 88. In addition to the direct and indirect effects, past actions include several thinning sales, including Sopaigo, Bear River, Cat Lynch, Hams, Mokey Bear, Lost Horse, and Prospect Rock. These sales all utilized a thinning from below type of prescription, with similar effects of fuel treatments and density reduction. There are no known foreseeable future actions.

This alternative is would not contribute to visual enhancement along the Highway 88 corridor.

This alternative would not contribute any acres of plantations to begin accelerating their development of old forest characteristics.

Other potential cumulative effects are the same as the Proposed Action.

Direct and Indirect Effects – Alternative 3

Commercial Harvest Units

Stand Size: Stand quadratic mean diameter (QMD) would increase by about 8.2 inches to about 19.7 inches DBH, essentially the same as the proposed action, increasing the vegetation component of large trees. The primary effect on stand diameter results from removing a large proportion of trees from lower diameter classes, thus the retention of trees in the 16 to 30 inch class would have little effect on stand diameters. There would be no effect to tree sizes within no harvest areas of proposed units (non-harvest portions of streamside zones and other controlled areas). Overall, the increase in QMD would be expected to be less than modeled, to account for untreated areas, and would be expected to be in the range of 5 to 7 inches.

In the long term, average stand diameters would continue to increase at about the same rates as the proposed action. The rate of increase would be faster than the more densely treed stands in the no action alternative or 10 inch alternative as biomass produced would be concentrated on fewer trees.

Stand Density: Average stand density is reduced. At least 40 percent of existing basal area would be retained within threat zones. Live tree basal area is decreased by an average of about 55 square feet per acre to about 210 square feet per acre. Reduced basal area would increase available water to individual trees, improving the potential these stands would withstand drought and insect outbreaks than currently.

Canopy cover would vary within stands, but would remain at 50 percent or greater in units outside of defense zones (greater than 40 percent within defense zones. Modeled canopy closure reduction was 8 percent. Overall, the reduction in canopy closure is projected to be less than modeled to account for untreated areas, and is expected to be in the range of a 4 to 6 percent reduction. Canopy closure would not be reduced by greater than thirty percent in any single unit.

Average stand density, as measured by stand density index (SDI), is reduced by about 175, to about 295. Maximum SDI for natural stands in this project is about 780. Average SDI for stands in the project would be reduced from 60% of maximum to about 38% of maximum.

Restrictions on harvesting trees greater than 16 inches would result in substantial areas of within stands with higher stand densities than the SDI of 295 indicated above because of the spatial arrangement of trees within stands. There would be more acreage in these higher stand density areas in this alternative as compared to the proposed action.

In the long term, canopy cover would slowly increase over time, limited primarily by site conditions. Reduced stand density would increase available water to individual trees resulting in the potential for these stands to withstand drought and insect outbreaks with a lower probability of mortality than the untreated stand (no action) or the 10 inch alternative. Conversely, comparing the denser stands from this alternative to the proposed action would result in resistance dissipating more quickly as stand densities increase with stand growth. FVS estimates of mortality twenty years after harvest would be to 26 cubic feet per acre per year (14 % of growth). Overall, treatments are expected to remain effective to avoid the health risks associated with density for less than 20 years. Stand density, as measured by basal area (square feet per acre), would be expected to return to current density levels (60 percent of maximum SDI) in an average of about 20 years (range 5-40), based on FVS modeling.

Species Composition: As under the proposed action, Jeffrey/ponderosa pine and sugar pine would be promoted; however the effect would be minor as the stands are predominately fir. The presence of trees greater than 16 inches along Highway 88 would reduce the ability to meet visual objectives, such as highlighting large trees to forest visitors.

In the long term, canopy cover would be high enough to preclude the establishment of substantial numbers of shade intolerant pines. Seedlings of shade tolerant species would slowly invade, contributing to a ladder of fuels in 30-50 years.

Hardwood Resources

Black Oak – Treatments to restore and enhance black oak would not be as successful as the proposed action, where a tree over 16 inches DBH near a hardwood could be removed. These 16-30 inch trees would continue to contribute to shading and competition for site resources with hardwoods. Along Highway 88, black oak would be highlighted by removing conifers less than 16 inches encroaching into their crowns. Conifer trees between 16 and 30 inches would be left, and continue to screen visitor views.

In the long term, black oak management would be marginally effective under this alternative. Black oak in the dominant and codominant positions would continue to benefit from increases in sunlight. More black oak would remain in a partially shaded position than under the proposed action due to the 16 inch limit. The benefit to black oak that remain in a partially shaded position after treatment because of their height or proximity to greater than 16 inch conifers would diminish as canopy cover increases over time. As sunlight decreases, these trees would continue to be overtopped and eventually begin to die out of these stands.

Aspen –Removal of most of the conifers less than 16 inches DBH around aspen trees would increase sunlight to a very limited degree. Canopy closure would be near 50 percent. Under these conditions, existing aspen in the upper canopy would maintain their presence in the stand. Sunlight would stimulate sucker sprouting from aspen roots to a limited degree, initially increasing the area occupied by aspen. These seedling- sized aspen would develop slowly and, under these low sunlight conditions, would begin to die out within five years.

In the long term, it is likely that aspen management under this alternative would fail or be marginally effective, as this alternative would not provide smaller aged class aspen the full or nearly full sunlight they require to develop.

Forest Health: Trees greater than 16 inches account for about 75 percent of the basal area, 60 percent of the stand density, and about 10 percent of the number of trees in a stand (Table 2). Retention of trees greater the 16 inches DBH in the stand would substantially reduce the ability to meet forest health objectives because they account for such a large percentage of the basal area and stand density. To promote forest health objectives on this project, trees are designated for removal for many reasons, including;

- Density management, to reduce moisture stress
- Disease, to promote thrifty trees and reduce disease spread
- Spacing, to reduce intertree competition
- Species mix, to promote stand heterogeneity
- Release of shade intolerant species, such as Jeffrey pine, sugar pine, for fire resistance
- Hardwood release, for ecological and wildlife
- Physical attributes (poor form, mechanical damage)

This alternative would retain all trees over 16 inches solely, and only, on the basis of diameter. Trees over 16 inches would remain on site, even though, with no diameter restrictions, they would be targeted for removal based on any of the above factors.

The consequences of restricting the performance of operations to promote forest health to substantially less than half of the stand (basal area and stand density) are that many of the desired characteristics of a healthy stand would not be accomplished, or would be accomplished to a lesser degree. This alternative would reduce the ability to meet several purposes of the project to a much greater degree than the proposed action including:

- Maintain and enhance Highway 88 as a state designated scenic highway and designated forest service scenic byway of the highest quality while providing for public safety and emergency egress.
- Reduce tree densities to improve resistance to drought, insects, and disease mortality for conifers.
- Restore and enhance oaks, aspen stands, and montane meadows.

Other: The primary difference between this alternative and the proposed action is that fewer scattered opening would be produced, with fewer opportunities for establishment of shade intolerant trees and shrubs in these openings.

Direct and Indirect Effects outside of commercial harvest units

Effects to plantations, TSI units, and roadside hazard tree felling would be the same as the proposed action.

Cumulative Effects – Alternative 3

The View 88 analysis area for the project encompasses an area within roughly ¼ mile of Highway 88. In addition to the direct and indirect effects, past actions include several thinning sales, including Sopaigo, Bear River, Cat Lynch, Hams, Mokey Bear, Lost Horse, and Prospect Rock. These sales all utilized a thinning from below type of prescription, with similar effects of fuel treatments and density reduction. There are no known foreseeable future actions.

To the degree a 16 inch limit would accomplish visual objectives, this alternative would contribute to visual enhancement along the Highway 88 corridor. Past and current projects with a portion of their areas along Highway 88 include Sopiago, Bear River, Cat Lynch, Hams, Mokey Bear, Lost Horse, and Prospect Rock. Uncompleted work includes about 500 feet of the Lost Horse Project, located adjacent to Highway 88 near Foster Meadows Road, and about 1,000 feet of the Mokey Bear Project, located in view of Highway 88 in the vicinity of Lumberyard. The primary effect along Highway 88 was/would be a decrease in stand density and an increase in tree size.

Other potential cumulative effects are the same as the Proposed Action.

Direct and Indirect Effects – Alternative 4

Commercial Harvest Units

Stand Size: Stand quadratic mean diameter (QMD) would increase by about 7.1 inches to about 18.6 inches DBH, less than both other action alternatives, increasing the vegetation component of large trees. This is due to all trees being removed from lower diameter classes. There would be no effect to tree sizes within no harvest areas of proposed units (non-harvest portions of streamside zones and other controlled areas). Overall, the increase in QMD would be expected to be less than modeled, to account for untreated areas, and would be expected to be in the range of 4 to 6 inches.

In the long term, individual tree growth rates would decline as a result of inter-tree competition. Stand diameters would continue to increase at a rate slower than the proposed action or the 16 inch alternative, as biomass growth would be distributed among many more stems per acre.

Stand Density: Average stand density is reduced. At least 40 percent of existing basal area would be retained within threat zones. Live tree basal area is decreased by an average of about 30 square feet per acre to about 230 square feet per acre.

Canopy cover would vary within stands, but would remain at 50 percent or greater in units outside of defense zones (greater than 40 percent within defense zones). Modeled canopy closure reduction was 2 percent. Overall, the reduction in canopy closure is projected to be less than modeled to account for untreated areas, and is expected to be in the range of a 0 to 2 percent reduction. Canopy closure would not be reduced by greater than thirty percent in any single unit.

Average stand density, as measured by stand density index (SDI), is reduced by about 130, to about 335. Maximum SDI for natural stands in this project is about 780. Average SDI for stands in the project would be reduced from 60% of maximum to about 43% of maximum. .

Restrictions on harvesting trees greater than 10 inches would result in large areas within stands with higher stand densities than the SDI of 335 indicated above because of the spatial

arrangement of trees within stands. There would be more acreage in these higher stand density areas in this alternative as compared to the proposed action or the 16 inch alternative.

In the long term, canopy cover would be limited primarily by site conditions. On a project basis canopy cover would likely slowly increase over time. The risk of density-related morality would increase as stand densities increase with stand growth. FVS estimates of mortality at twenty years are about 38 cubic feet per acre per year (about 18 % of growth). Overall, treatments are expected to remain effective to avoid the health risks associated with density for less than 20 years. Stand density, as measured by basal area (square feet per acre), would be expected to return to current density levels in an average of about 9 years (range 3-24), based on FVS modeling.

Species Composition: Trees would be targeted for removal based on diameter. Incense cedar, with higher trees per acre in smaller size classes, would account for a disproportionate number of trees removed. Other than a reduction in the proportion of incense cedar, there would be little change in species composition. The presence of trees greater than 10 inches along Highway 88 would make visual objectives, such as highlighting large trees to forest visitors, largely unattainable.

In the long term, as canopy cover conditions continue into the future, shade tolerant conifers would dominate species composition. As individual shade intolerant pines die, they would likely be replaced by shade tolerant fir and cedar that more easily establish themselves under a shady canopy.

Hardwood Resources

Black Oak - There would be few opportunities to reduce canopy cover near black oak, as trees to be removed under this alternative are primarily from the lower portion of the canopy and are not overtopping black oak. The effect to oaks would be a higher risk of mortality than the proposed action or the 16 inch alternative, and would be similar to the no action alternative. Within the view zone of Highway 88, black oak would be remain as it currently exists, with many oak sheltered from view by conifers in their proximity.

In the long term, as canopy cover conditions continue into the future, shade intolerant oak with limited exposure to sunlight would be stressed and would continue to die out of these stands. Oaks with crowns in the overstory would continue to maintain their position. Oak reproduction would be severely limited by shade, with few oaks becoming established.

Aspen – Maintaining current canopy cover (or a slight reduction) would continue to stress shade intolerant aspen by limiting sunlight. Those aspen in the canopy would continue their current growth patterns. There would be little opportunity to initiate aspen reproduction, and the area occupied by aspen would remain roughly the same. Thus, this alternative would result in effects similar to the no action alternative.

In the long term, as canopy cover conditions continue into the future, aspen would decline. As individual aspen trees are disturbed by windthrow, they would produce sucker sprouts, but under a shady canopy they would quickly die out. The area occupied by aspen would decline.

Forest Health: Trees greater than 10 inches account for about 88 percent of the basal area, 75 percent of the stand density, and about 18 percent of the number of trees in a stand (Table 2). Retention of trees greater the 10 inches DBH in the stand would not meet forest health objectives

because they account for such a large percentage of the basal area and stand density. This alternative would not meet several purposes of the project, including:

- Maintain and enhance Highway 88 as a state designated scenic highway and designated forest service scenic byway of the highest quality while providing for public safety and emergency egress.
- Reduce tree densities to improve resistance to drought, insects, and disease mortality
- Restore and enhance oaks, aspen stands, and montane meadows.

Other: The primary difference between this alternative and the proposed action and the 16 inch alternative is that fewer scattered opening would be produced, with fewer opportunities for establishment of shade intolerant trees and shrubs in these openings.

Direct and Indirect Effects outside of commercial harvest units

Effects to plantations, TSI units, and Sanitation/salvage operations along Highway 88 and roadside hazard tree felling would be the same as the proposed action.

Cumulative Effects – Alternative 4

The View 88 analysis area for the project encompasses an area within roughly ¼ mile of Highway 88. In addition to the direct and indirect effects, past actions include several thinning sales, including Sopaigo, Bear River, Cat Lynch, Hams, Mokey Bear, Lost Horse, and Prospect Rock. These sales all utilized a thinning from below type of prescription, with similar effects of fuel treatments and density reduction. There are no known foreseeable future actions.

- This alternative would be unlikely to accomplish visual objectives and would not contribute to visual enhancement along the Highway 88 corridor.
- Other potential cumulative effects are the same as the Proposed Action.

Table 11 Vegetation Effects Summary Comparison of Alternatives

	Existing	Alt. 1 Rx	change	Alt 3 16 inch	change	Alt 4. 10 inch	change
TPA	481	87	-394	104	-377	128	-354
DBH	11.5	20.1	8.7	19.7	8.2	18.6	7.1
SDI	466	252	-215	293	-174	336	-131
Canopy Closure	67.8	53.9	-14	60.2	-8	65.6	-2
BA/acre	261	187	-74	208	-53	232	-29
ccf/acre		1237		528		113	
bdft/acre		5585		1791		0	
QMD removed tree		5.87		5.09		3.89	
Growth 20 years	217	153		180		209	
Mortality 20 yrs	68	16		26		38	
Mortality % of Growth	31.5	10.5		14.4		18.2	

Sensitive Plants

The direct, indirect and cumulative effects to botany are summarized from the Biological Assessment and Evaluation for Botanical Species (Brown, 2011). Approximately 176 acres of potential habitat for Pleasant Valley mariposa lily, Hutchison's Lewisia, and three-bracted onion were surveyed by FS botanists during the summer of 2006, 2007, 2008, and 2010. Additional surveys were conducted of potential habitat for mountain lady slipper orchid (*Cypripedium montanum*), and sensitive species associated with streams, seeps, springs, fens, and other mesic habitats (*Botrychium* spp., *Helodium blandowii*, and *Peltigera hydrothyria*). Surveys found two new occurrences of Hutchison's Lewisia in the project area (Pg 6, View 88 botany report).

Direct and Indirect Effects - Alternative 1

Direct negative effects are not expected for TESP plants because specified project design criteria would prevent direct disturbance to known Sensitive plant species. Flagging for equipment avoidance would prevent impacts to Pleasant Valley Mariposa lily and Hutchison's Lewisia occurrences. If additional Sensitive plant occurrences are discovered during the proposed project they would also be protected by flag and avoidance.

Because surveys can only positively state a species presence, not its absence, it is possible to overlook Sensitive or Special Interest plants. If surveys inadvertently overlook sensitive plants, individual plants may be affected directly by trampling from vehicles and project personnel, uprooting during project activities such as fire line creation, and exposure to lethal temperatures during prescribed fires. Undiscovered occurrences of Pleasant Valley mariposa lily, Hutchison's Lewisia, and three-bracted onion could be impacted from landing construction during timber harvest because these plants occur in naturally open areas.

Pleasant Valley mariposa lily (*Calochortus clavatus var. avius*): There would be no direct impact during vegetation management activities because ground based equipment would be excluded from known occurrences and the resulting reduction in overstory canopy increases suitable habitat for this shade intolerant species. The two occurrences within View 88 FRP units are likely to experience some positive effects from thinning and prescribed fire activities. Thinning in the area outside of the Sensitive Plant protection zone would provide expansion habitat for the Pleasant Valley Mariposa lily. Additional benefits to *C. clavatus var. avius* by hand thinning of small brush and saplings in locations on the shoulder of Highway 88 may occur within the sensitive plant protection area at the direction of a FS Botanist. Indirect effects are not expected for the four occurrences of Pleasant Valley mariposa lily found outside of proposed View 88 units because they are too far from proposed View 88 units to benefit from thinning and fuel reduction. Where yellow starthistle and non-native annual grasses have been observed in Pleasant Valley mariposa lily populations the sensitive plant has appeared to be relatively unaffected suggesting that these noxious weeds would not outcompete the sensitive species.

Hutchison's Lewisia (*Lewisia kelloggii ssp. hutchisonii*): Two new occurrences of Hutchison's Lewisia (*Lewisia kelloggii ssp. hutchisonii*) were found in the project area near units 74 and 77. Both populations occur in open granitic areas with potential impacts from vehicle travel. Flagging would be used to insure that vehicle travel associated with the View 88 Fuels Reduction Project would not impact these occurrences. Positive indirect effects from project activities are not expected.

Mountain lady's slipper (*Cypripedium montanum*): Effects to undiscovered orchids is expected to be relatively remote since the orchid has never been found on the forest after twelve years of surveys. Botanical surveys found some potential habitat throughout much of the western half of the project area but mountain lady's slipper orchids were never found. Undiscovered mountain lady's slipper orchid would be susceptible to direct impact from heavy equipment in the project area. The species may tolerate less intense fires that do not eliminate the duff layer and leave the forest canopy fully or partially intact. Depending on burn intensity, spring burns would likely result in a greater impact to the orchid, when much of the plants' resources are devoted to the development of above-ground leaves, stems, and flowers. Fall burns are less likely to directly impact the orchid because they would be dormant. The prescribed fire in the View 88 Fuels Reduction project area is expected to be patchy in intensity and distribution. Overall the expected reduction in fuel loading accomplished after implementing the project would improve habitat quality for Mountain lady's slipper orchid by reducing the potential for future high intensity wildfires.

Three-bracted onion (*Allium tribracteatum*), Hutchison's lewisia (*Lewisia kelloggii var. hutchisonii*): Both species occur in rock outcrops with either cobbly lava cap or granitic soils. Three-bracted onion was not found but some potential habitat was observed in the project area. Design criteria excluding equipment from shallow soils (unless approved by unit botanist and soil scientist) would limit indirect effects from equipment staging and operation in potential habitat for three-bracted onion and Hutchison's lewisia.

Kellogg's Lewisia (*Lewisia kelloggii ssp*): Landing construction on undiscovered populations is a potential impact since the species often occurs in flat open areas and large equipment would adversely impact this plant. Other impacts include off-highway vehicles since they travel easily across the flat, open habitat of where Kellogg's lewisia often occurs. Other threats include camping; hiking and other activities that compact soil and/or trample plants; and horticultural collection.

Blandow's bogmoss (*Helodium blandowii*) and Moonworts (*Botrychium ssp*): These species occur in mesic habitat including wet meadows, fens, springs, stream banks, and wet ditches. Indirect effects of concern for undiscovered individuals include altered microsite hydrology and canopy cover. Direct or indirect impacts to undiscovered Blandow's bog moss, veined aquatic lichen, and moonwort species are not expected because of design criteria for special aquatic features would exclude mechanical disturbance and active ignition from their potential habitat.

Noxious Weeds: Soil disturbances from project related activities provide opportunities for the introduction and proliferation of invasive plant species (USDA Forest Service, 2001). These species have the potential to quickly outcompete native plants including Sensitive plants for sunlight, water, and nutrients. These species often form dense monocultures which may adversely impact habitat for Sensitive plants (Zouhar et al, 2008). Seeds of these species could be carried into Sensitive plant areas on equipment, vehicles, and workers boots and clothing. The magnitude of this impact is difficult to predict since it is contingent on the introduction of a noxious weed species into an area, an event which may or may not occur. Design criteria for cleaning equipment prior to arriving in the project area which would reduce the potential introduction of noxious weeds into locations near sensitive plants, but these preventive measures cannot completely eliminate potential introductions of noxious weeds.

There are a number of noxious weed infestations along Highway 88 including yellow starthistle, scotch broom, barbed goat grass, rush skeletonweed, and tree of heaven. All known infestations would be flagged. Most infestations would be avoided, and if the infestation cannot be avoided, equipment would be washed prior to leaving infested unit. These measures would reduce the potential spread of known noxious weeds during implementation of the View 88 Fuels Reduction project. Of the known noxious weeds in the project area, there are three infestations in relatively close proximity to known sensitive plant occurrences. Both occurrences of Pleasant Valley mariposa lily within unit 17c are approximately 0.5 miles east of small roadside infestations of yellow starthistle and barbed goatgrass. There is also a large roadside infestation of yellow starthistle within 0.5 mile of a Hutchison's lewisia population near unit 74. These infestations would have the greatest potential to be spread to sensitive plant occurrences, but flag and avoid measures for both sensitive plant and noxious weed infestations would greatly reduce the potential to spread these invasive plants to sensitive plant areas. If noxious weeds are found in sensitive plant occurrences they would be removed at the direction of a Forest Service botanist.

Cumulative Effects – Alternative 1

Past timber harvest activities, off-road vehicles, grazing, and dispersed camping likely resulted in loss of habitat from soil compaction in forested areas as well as degradation of special aquatic features (fens, wet meadows, seeps) and stream channels in the proposed project area. The construction of Highway 88 has also altered hydrologic processes throughout much of the project area as well as serving as a corridor for the spread of noxious weeds. These past actions likely impacted plant species currently listed as FS Sensitive plant species.

Uneven-aged timber management, and thin from below harvest prescriptions appears to have had a neutral to favorable effect on *C. clavatus var. avius* habitat on the Eldorado National Forest.

Past activities also introduced non-native invasive species and may have caused the extirpation of undiscovered Sensitive plant populations. Unfortunately it is impossible to quantify losses and changes in biodiversity for the project area, but it is generally accepted that many plant communities in the Sierra Nevada are outside the historic range of variability due to past human activities (Skinner and Chang 1992, Stephens SL and JJ Moghaddas. 2005, Shevock, 1996). The potential for noxious weed introduction is expected to remain within the View 88 Fuels Reduction project area due to continued roadside maintenance and vehicle travel along Highway 88. The Eldorado National Forest Noxious Weed program is expected to continue monitoring and managing noxious weed infestations across the forest, and would take necessary actions to address new noxious weed infestations when they are discovered in the project area.

Adverse impacts to Sensitive plants from recent (1989-current) activities have been largely minimized by surveys to enable sensitive plants to be flagged for avoidance on NFS lands. It is anticipated that future impacts to Sensitive plants would continue to be minimized through continuing these practices. Therefore, the potential for adverse cumulative effects is expected to be negligible for Sensitive plants under Alt 1; considering past, present, and reasonably foreseeable actions.

Direct and Indirect Effects – Alternative 2

Under the no action alternative Pleasant Valley mariposa lily originally noted south of highway 88 would likely remain overgrown. Plants were not seen south of highway 88 in 1997 or 2007, and the lack of observed Pleasant Valley mariposa lily south of the highway is believed to be the

result of increasing shade from encroaching young conifers. If conifers remain it is likely that the plants would remain dormant until conditions become favorable. It is unknown how long the bulb can remain dormant before losing viability. However, large wildfires have also benefited Pleasant Valley mariposa lily temporarily on the Eldorado National Forest by removing competing brush and conifers so the potential effects would vary for sensitive species in the project area.

Under the No Action alternative the risk of noxious weed introduction and spread is expected to be less throughout the View 88 Fuels Reduction project area over the short-term. However, continued road maintenance along the Highway 88 would provide numerous vectors and ground disturbance for the introduction and spread of noxious weeds in the proposed project area under the no action alternative. Three Pleasant Valley Mariposa lily populations occur adjacent to the highway or major roads and would continue to be at a high risk for noxious weed introduction from highway 88 activities. Remaining known Sensitive plant occurrences within the View 88 Fuels Reduction project area would be less vulnerable to noxious weed introduction under the no action alternative.

The risk of high intensity crown-fires is expected to remain without the proposed fuel reduction in the action alternatives (see fuels section). High intensity crown-fires in the Sierra Nevada tend to result in homogenous conditions post-fire with less diversity of understory plant species when compared to low intensity underburns (Knapp and Keeley, 2006). High-intensity wildfires can also result in accelerated erosion, sedimentation, and altered hydrologic processes, all of which could negatively affect habitat quality for Sensitive plant species (Neary et al, 2005), especially those found in forested habitat. In addition, fire-suppression activities during large uncontrolled wildfires may increase the spread of invasive plant species which could negatively impact potential and occupied habitat for Sensitive plants (Zouhar et al, 2008). Together, these studies suggest that uncontrolled high-intensity wildfires are likely to impact some sensitive plant species by altering habitat quality and potentially facilitating the invasion of noxious weeds. Some species, including Pleasant Valley mariposa lily, tri-bracted onion, and Hutchison's lewisia are less likely to be affected during large stand replacing fires. These species are usually dormant during the fall fire season with perennial structures buried underground and protected from potentially lethal temperatures.

Mountain lady's slipper is susceptible to drastic reductions in canopy cover (USDA R5, 2005). The effects of fire on lady's slipper species appears to depend on fire intensity and landscape scale. High intensity fires are one of the greatest threats to mountain lady's slipper since the orchid is intolerant to fires that burn through the litter layer above mineral soil (USDA R5, 2005).

Cumulative Effects – Alternative 2

Existing environmental condition in the project area for Alternative 2 is the same as described for Alternative 1. Current and future management activities expected within the proposed project area include hazard tree removal and road maintenance along Highway 88.

The cumulative effects of past activities (logging and fire suppression), current and future management, and the no action alternative are potentially adverse for known and undiscovered sensitive plants within the project area. Past fire suppression and continued increases in fuel loads and stand density under the no action alternative would likely increase the probability of

high severity wildfire occurring within the proposed project area. Both fire suppression activities and large tracks of bare ground after high severity wildfire are extremely susceptible to invasive plants (Zouhar et al, 2008). The potential introduction and proliferation of invasive species as well as potential sedimentation and altered hydrologic processes (Neary et al, 2005) after an uncontrolled wildfire are likely to adversely impact potential habitat for some Sensitive plants under the no action alternative.

Direct, Indirect, and Cumulative Effects – Alternatives 3 and 4

Direct and indirect effects for Alternatives 3 and 4 are expected to be similar to the proposed action, since the action alternatives would include ground disturbing activities and prescribed fire over largely similar areas in the View 88 project area. However, some units with potential habitat for Sensitive plants were dropped from Alternatives 3 and 4 which would slightly reduce the potential for effects to undiscovered sensitive plants in the project area.

Alternatives 3 and 4 are expected to be similar to Alternative 1 in reducing the risk for high intensity wildfire within the project area. The expected reduction in risk for high severity wildfire would benefit Sensitive plant species as described for Alternative 1.

Indirect effects from ground based harvest equipment for Alternatives 3 and 4 are expected to be similar to Alternative 1. However, Alternatives 3 and 4 are expected to maintain slightly more canopy cover within the project area as a result of the lower diameter limit. Alternatives 3 and 4 would be slightly less susceptible to noxious weed establishment than Alternative 1 because noxious weeds are generally less competitive when shaded by overstory conifers. In addition, two of the units dropped from Alternatives 3 and 4 (unit 13 and 74) are adjacent to known noxious weed infestations and would have a greater potential for spread under Alternative 1. Without noxious weeds introduction into the project area the expected differences in forest structure between the proposed action and Alternatives 3 and 4 would not substantially alter the quality of potential or existing Sensitive plant habitat within the project area.

Cumulative effects for Alternatives 3 and 4 would not be measurably different from those described for Alternative 1.

Noxious Weeds

Direct, Indirect, and Cumulative Effects – Alternatives 1, 3, and 4

Noxious Weeds Present In or Near Project Area (Moderate)

Existing noxious weed records were reviewed for the View 88 Fuels Reduction project (ENF 2010 weed layer) and the project area was surveyed for noxious weeds in 2007, 2008, 2009 and 2010. There are a number of small infestations scattered throughout the project area, predominantly restricted to roadsides areas along highway 88. Below is a listing of View 88 units with ENF list-A noxious weed infestations:

- Unit 13- Approximately 6 acres are infested with yellow starthistle (*Centaurea solstitialis*), within the vicinity of the Helipad and surrounding plantation. The infestation has been treated as a part of ENF Yellow Starthistle control project and is nearly eradicated but a few plants are still present in the infestation. A few Scotch

broom plants were pulled along the road to the helipad in 2008. No seedlings have been seen since and the infestation is unlikely to be disturbed during project activities.

- Unit 09 and 11- There are two small yellow starthistle infestations along Highway 88. Infestations were not included in the ENF noxious weed control project and have not been treated.
- Unit 14 and 11- There is a roadside infestation of rush skeleton weed (*Chondrilla juncea*) and yellow starthistle along highway 88.
- Unit 10 and 11- There are two roadside infestations of Yellow starthistle (north and south of highway 88) and one infestation of barbed goat grass (*Aegilops triuncialis*) (north side of 88). The Yellow starthistle in unit 10 is on the north side of highway 88 in a Caltrans dump area.
- Unit 16 and 7- Yellow starthistle was reported on the western edge of both units but plants were not seen in 2008 or 2009. Site would be revisited in the spring of 2011 and flagged if present.
- Unit 8 and 7- There is a small roadside infestation of yellow starthistle along the north side of highway 88.
- Unit 5- There is a small infestation of barbed goatgrass on the south side of highway.
- Unit 17b- There is a small roadside yellow starthistle infestation on north side of highway 88 in turnout.
- Unit 99- There is a small roadside infestation of tree of heaven *(Ailanthus altissima)* on the north side of unit 99. Plants are growing in cattle grate and have been cut since discovery in 2006. The tree has resprouted multiple times but has not produced seeds.
- Unit 80- There is a small infestation of yellow starthistle on the north side of 88 in highway pullout. Infestation is nearly 0.20 miles east of unit 80 and would not be disturbed during project activities.
- Unit 74 and 75- One acres of fill slope south of 88 (near intersection with Bear River Road and 88) is heavily infested with cheatgrass (*Bromus tectorum*) and yellow starthistle. Scattered yellow starthistle plants occur on north and south side of highway 88. Infestation is well established and has not been treated under the ENF yellow starthistle control project. Majority of infestation is outside of unit 74 and 75 but equipment would not move through infestation when accessing unit 74 and 75.
- Unit 50A- Two perennial pepperweed (tall whitetop, *Lepidium latifolium)* stems were observed along highway 88 in 2009 and treated by Amador County. Occurrence is on private property on west side of highway 88 near the south east corner of unit 50a. Plants were not seen in 2010 but would be flagged for avoidance.
- Unit 85- A large five acre infestation of spotted knapweed (*Centaurea maculate)* was discovered in 2010 at the Iron Mountain ski resort just north of unit 85. Infestation is on private and was treated with herbicides in 2010 by Eldorado County.
- Unit 89- One plant of perennial pepperweed was pulled in 2001 along highway 88 on the north side of the unit. Plant was not found after multiple revisits and has likely been eradicated.
- Roadside hazard unit- there are a number of noxious weed infestations along the 22 miles of roadside hazard tree removal including yellow starthistle, barbed goatgrass, cheatgrass, perennial pepperweed, rush skeleton weed, and spotted knapweed. Many of these infestations are discussed above under specific View 88 units.

There are also a number of ENF list B noxious weeds in the project area including cheatgrass (Bromus tectorum), bull thistle (Cirsium vulgare), Klamath weed (Hypericum perforatum), sweet clover (Melilotus alba and M. officianalis), Russian thistle (Salsola kali), and mullein (Verbascum thapsus). The above species are currently rated as lower priority species for the Forest (ENF list B) and are believed to be either less aggressive than list A species or are already widespread throughout the forest. Design criteria have been included for the project to limit the spread of the above species within the proposed project area. There are also a number of non-native species within the project including; *Ambrosia artemisifolia, Chamaesyce maculata, Chenopodium album, Chenopodium botrys, Dactylis glomerata, Elytrigia intermedia, Helianthus annuus, Lactuca serriola, Lepidium nitidum, Phleum pratense, Polygonum arenastrum, Rumex acetosella, Spergularia rubra, Taraxacum officinale, Tragopogon dubius.* These species are believed to be largely naturalized throughout the forest and will not be addressed further in this document.

It is always possible for surveys to overlook some individual plants or small clumps of star thistle, barbed goatgrass, perennial pepperweed, or other list-A invasive species. If areas of overlooked plants are disturbed during project activities, new seedlings would become established. Newly detected weed locations would be flagged for avoidance and reported to the Forest Botanist. As long as the mitigations described in this document are followed, the spread of these noxious weeds would be reduced. This would make post-fuels reduction weed control treatments less costly and more effective.

West of the project area there are numerous and extensive infestations of noxious weeds including yellow starthistle, scotchbroom, and cheatgrass. These infestations of high priority noxious weeds represent a "leading edge" of invasion that has been marching upslope from the foothills across the Sierras. The leading edge for many of the high priority noxious weeds has yet to reach the View 88 Fuels Reduction project area so it is important to prevent the introduction and spread of ENF list-A noxious weeds during project implementation.

Habitat Vulnerability (Low)

Project Units are predominantly densely vegetated either with small trees, small trees and shrubs, or sparse understory vegetation with a dense overstory of mixed conifer species. The understory vegetation is composed of native species and the degree of shade under these stands is not conducive to invasive weed growth. The project would temporarily reduce native vegetation cover, which may provide enough sunlight for some weed species, but the lack of weed seeds/stems/roots to propagate new weed plants for the majority of the project area substantially reduces the risk of weed invasion. For units with noxious weeds infestation within or in the vicinity there would be a greater vulnerability for invasion.

Habitat Alteration Expected as Result of Projects (Moderate)

The action alternatives would result in habitat alteration due to hazard tree removal, fire control line construction, prescribed fire, hand thinning, road construction, and timber harvest. All thinning and fuels removal treatments would temporarily increase the amount of light reaching the ground level and in some instances the exposure of bare mineral soil. These activities would provide seeds of potential and known list-A noxious weeds the sunlight and contact with mineral soil required for germination and growth (Zouhar, 2008). In addition, prescribed burning would benefit noxious species by: inducing seed germination, temporarily reducing or eliminating competition from native plants, and increasing nutrient availability for noxious weeds. All these

factors combine to make conditions ideal for weed seed to germinate and flourish immediately following mechanical thinning and prescribed fire (Asher et al., 2001).

Long-term habitat alterations conducive to the spread and establishment of noxious weed (i.e. increased bare ground and light) are not expected for much of the project area because remaining conifers and native vegetation would provide sufficient canopy cover to exclude most invasive species. During the interim period required for native vegetation to re-establish in the understory monitoring and removal of any new noxious weeds that occur would prevent weed spread into newly open areas created after prescribed fire.

Increased Vectors as a Result of Project Implementation (Moderate)

The action alternatives would temporarily increase potential weed vectors due to the increase in project related traffic (ground based thinning equipment) in the treatment units. The management requirements incorporated into the project would reduce or eliminate the likelihood of most vector opportunities. Vectors include: vehicles and equipment used for project related activity, revegetation material brought into the project area, and straw or mulch used for erosion control. Potential for project related vectors to pick up and spread noxious weeds is greatest for units with established infestations near or within units. Impacts would be reduced by avoidance of these infestations whenever possible during project activities. Impacts would also be reduced by cleaning equipment if it enters a noxious weed exclusion area. Impacts from noxious wee spread would be avoided because equipment would be cleaned on site prior to moving to uninfested areas in the project.

Units 13, 74, 75, and 85 all have high priority noxious weeds either within or immediately adjacent to the units. There is a high potential for equipment to vector noxious weeds within these units and throughout the project area. Effects from vectoring noxious weeds would be avoided because the above units would implement the following prevention measures: 1) equipment would be cleaned prior to moving to uninfested areas 2) the FS botanist would assist with the location of the landing for unit 13 to avoid existing yellow starthistle infestation and 3) the four units would be monitored and treated following project completion to prevent infestations from spreading within the units.

Management requirements were not incorporated into the alternatives to prevent the potential spread of new and existing noxious weeds on project workers' clothing or shoes. There is a low risk of these potential vectors actually moving seed and no reasonable mitigation measure exists to prevent this potentially minimal seed movement.

Implementation of the View 88 project design criteria would reduce or eliminate the risks of introducing or spreading noxious weeds in the project area. The determination for the risk of spreading noxious weeds in the project area is Low.

Direct, Indirect, and Cumulative Effects – Alternative 2

The No Action alternative would not create openings or increase equipment traffic in the project to provide opportunities for introduction or spread of noxious weeds, therefore Alternative 2 would create no direct, indirect, or cumulative effects in the project area. However, the risk of high intensity wildfire would remain or increase. While wildfire cannot be predicted, the effects if it occurs would create larger areas of bare mineral soil with increased sunlight where there would be ideal growing conditions for invasive noxious weeds.

Hydrology

The direct, indirect and cumulative effects to hydrology are summarized from the Hydrology Report (Markman, 2011).

Direct and Indirect Effects – Alternative 1

Direct and indirect effects to water quality and aquatic habitat in the project area and downstream of the project area are expected to be minor or negligible. There would be no adverse impacts to beneficial uses of water in the 15 HUC 7 watersheds or the three drainage basins that contain the View 88 Project.

A minor, short-term increase in the suspended sediment concentrations and turbidity levels of the streams that flow through or adjacent to Units of the View 88 Project may occur during and immediately after large rainfall events. This increase - if it occurs - is not expected to exceed state water quality standards for turbidity or sediment for the following reasons:

- A number of protection measures in the project design criteria would minimize the amount of sediment delivered to the streams and aquatic features as a result of the View 88 Project. The protection measures were developed by several resource specialists as a result of on-site visits to aquatic features. The single most important protection measure in this regard is the zone of no ground disturbing activities (or "buffer zone") adjacent to streams and other aquatic features. It is well documented in the literature that buffer zones are effective in reducing the amount of sediment reaching aquatic features from nearby land disturbances (USDA 2010; Parkyn 2004; Dissmeyer 2000). The protection measures for individual aquatic features, as well as the rationale for the protection measures, are described in detail in Appendix B.
- Several road segments near streams would be repaired. Repairs to these roads include re-grading, outsloping, and construction of waterbars/dips to distribute runoff to allow it to percolate into the soil rather than concentrate into rills or gullies. In the long-term, this should reduce the amount of road-related sediment delivered to aquatic features as described below:
    - Repair of road 08N32A would prevent erosion from the road reaching the wetland in Unit 59 by preventing road runoff concentration.
    - Repair of road 09N96 would promote healing of several eroding channels that flow into wet meadows in Units 83 and 84.
    - Repair of a segment of road 09N14 would prevent concentration or road runoff and allow several eroding channels in Unit 55 that flow into an intermittent stream to recover.
    - There would be no construction of new, permanent roads, and only 1.0 miles of temporary roads would be constructed. The temporary roads would cross one perennial stream (in Unit 59) and several ephemeral or intermittent streams. In forested watersheds that contain roads, the roads are frequently a major source of sediment that reaches streams and other aquatic features (Dissmeyer 2000

There would be a negligible or minor increase to the temperature of the perennial stream in Unit 59 for the following reasons:

- The reduction in the amount of shade on the surface of the stream from trees would be minor because of the protection measures in Appendix B that greatly limit the number of trees and other vegetation that can be removed within 100 feet of the stream.
- The baseflow of the stream is largely fed by cold groundwater from an upstream wetland. On July 20, 2010, the temperature of the stream was 48 degrees Fahrenheit (oF) and the air temperature was 78oF. The pH of the stream was 7.0, the electrical conductivity was 33 uS, and the flow was approximately 0.2 cubic feet per second (cfs.).
- According to a stream temperature model, the maximum potential stream temperature increase would be between 1.3 and 2.7 degrees Fahrenheit. The calculations and assumptions are in Appendix A of the Hydrology Report (Markmaan, 2011, project record).
- It should be noted that for small streams in a forested setting, the research indicates that elevated water temperatures usually decrease to pre-disturbance levels within 500 feet downstream of the zone of vegetation removal (USDA 2010).

The View 88 Project would result in no measurable increase in the temperature of ephemeral and intermittent streams because these streams have no surface flow during the time of year when an increase in stream temperatures can occur, from early summer to early fall.

Changes to the water yield, peak flow, and timing of flow of all streams in the project area and downstream are expected to be negligible and not measurable. The research indicates that "fuels reduction treatments in forested watersheds have little detectable impact on water yields either on-site or downstream. Most prescriptions are not likely to remove the 20 percent of the basal area that is needed in most areas to generate a detectable change in flow." (USDA 2010).

The decrease in the recruitment of large woody debris (LWD) to streams in the View 88 Project is expected to be minor or negligible. For many streams in the project area, this is because only a small portion of the length of the stream would have trees removed near the stream. This is discussed above. For the perennial stream in Unit 59, few large trees would be removed within 100 feet of the stream. It has been shown that approximately 96 percent of the LWD that reaches a stream is from within a ground distance of one site potential tree height of the stream channel (Reid and Hilton 1998).

Alternative 1 would help protect this wetland by removal of excess vegetation and fuel loads to prevent the ignition of the logs in the MODDs during a high intensity wildfire.

Cumulative Watershed Effects – Alternative 1

A number of land disturbances have occurred or are expected to occur in the watersheds that contain the View 88 Project.

Past timber harvest has occurred, both in the Eldorado National Forest and on private land. Past timber harvest activities are evident next to the channels of a number of streams. Evidence of past timber harvest includes cut tree stumps and skid trails next to stream channels and throughout the nearby forest. The past timber harvest appears to be more than 20 years ago.

Most of the Units are within 2,000 feet of Highway 88. A number of other roads are adjacent to Units, as shown in maps in Appendix C.

The Power Fire of 2004 and subsequent salvage logging occurred in portions of four watersheds that are now part of the View 88 Project: West Panther Creek, East Panther Creek, Bear River, and Bear River Reservoir.

The View 88 Project would involve a number of fuels reduction activities on approximately 2,153 acres, enhancement of aspen at several locations, reconstruction of approximately 18.8 miles of existing roads, and construction of 1.0 miles of temporary roads. Implementation of the View 88 Project is expected to start in 2011 and require several years to complete.

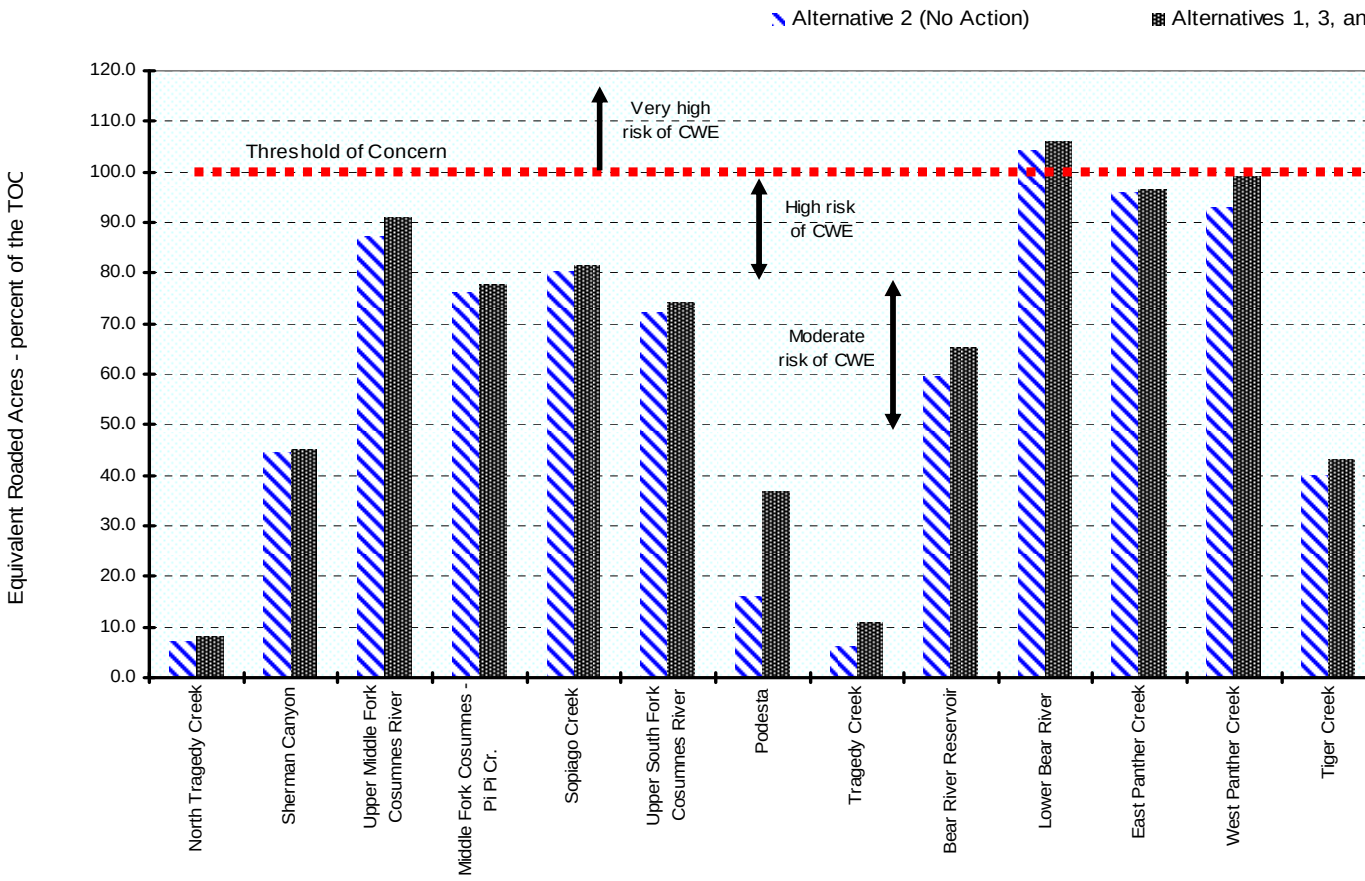
A power line for the Kirkwood Municipal Utility District is in the planning phase. The power line, much of which would be underground, would be adjacent to Highway 88 and start from near the intersection of Highway 88 and the road to the Bear River Reservoir.

The use of recreational vehicles - both on and off of current designated routes - is evident in some areas. The use of recreational vehicles on current designated routes is likely to increase in the coming years in response to the expected increase in the population of the nearby Sacramento metropolitan area.

The above land disturbances - combined with the View 88 project - resulted in the following conclusions concerning the risk of CWE.

- The existing risk of CWE ranges between low and very high in the 15 watersheds (HUC 7 scale) that contain the View 88 Project (Figure 1).
- The View 88 Project would not increase the risk of CWE in any of the 15 watersheds (HUC 7 scale) that contain the project. The View 88 Project occupies only a small portion of any individual watershed, and the View 88 Project generates only a small portion of the total equivalent roaded acres for most of the watersheds. The above conclusions hold true under the worst-case scenario, which is that the entire View 88 Project would occur in 2011 for 14 of the 15 watersheds and implementation in the West Panther Creek watershed would occur in 2011 and 2012.
- The risk of CWE in this analysis is the same for all alternatives despite the fact that the risk of a large wildfire in the project area is not the same for all alternatives. The reason for this is that the occurrence and magnitude of a large wildfire cannot be accurately predicted and therefore was not included in the ERA model. The likely direct and indirect effects from a large wildfire to specific resources have been previously discussed.

Figure 1. Risk of Cumulative Watershed Effects (CWE) in 2012 for the HUC 7 watersheds of the View 88 Fuels Project without wildfire.[1]



[1] The risk of Cumulative Watershed Effects (CWE) is the same for all alternatives without wildfire. It is assumed that the entire View 88 Project is implemented in 2011. The single exception is the West Panther Creek watershed, where the implementation of the View 88 Project was assumed to occur in 2011 and 2012.

Direct and Indirect Effects – Alternative 2

Aspen groves would continue to decline because conifer encroachment next to aspen groves in Units 83, 84, 51, and 58 would continue under Alternative 2 (No Action).

Because the repairs to roads 08N32A and 09N46 would not occur under Alternative 2, road-related sediment would continue the current level of negative impacts to the wetland in Unit 59 and the meadow in Unit 83.

The greater risk of a high severity wildfire in the project area than any of the action alternatives is the most substantial effect of the No Action alternative. The hydrologic effects of high severity wildfires are well documented. Runoff and erosion rates increase by two or more magnitudes for several years after a high severity fire, and frequently require at least four or five years to decline to near pre-wildfire levels. However, the effects to aquatic features and beneficial uses of water both within and downstream of a high severity wildfire are difficult to predict and depend on many factors. The single most important factor is often the size of the rainfall event(s) that occurs during the first several years after the wildfire when the ground is most vulnerable to accelerated runoff and erosion (USDA 2010; Dissmeyer 2000). Appendix A of the Hydrology Report (project record) summarizes the effects to water quality and aquatic habitat from rainfall events after the Power Fire of 2004, which is adjacent to the View 88 project.

Since the View 88 Project includes headwater portions of 15 watersheds, a high-severity fire is expected to affect all of the streams within the fire area, which could be any or all of the steams in the project watersheds depending on the extent of the wildfire. The following downstream effects are likely following wildfire:

- Suspended sediment and turbidity levels of streams would increase for at least the first 3 years post-fire during and immediately after rainfall events and periods of rapid snowmelt. This is likely to directly affect the health and survival of fish and other aquatic organisms. For example, the growth of rainbow trout (Onchorhychus mykiss) decreases when turbidity pulses of 23 NTU occur over a number of days (Shaw and Richardson 2001).
- Deposition of fine-grained sediment in stream channels, which can reduce the amount and quality of habitat for all life phases of fish. This effect can last for many years after runoff and erosion rates in the wildfire area have declined to pre-burn levels.
- A negligible or minor decrease in the water quality of reservoirs used as a drinking water supply. This effect is likely to be minor for two reasons: 1) the nearest major reservoirs used for drinking water are located more than 20 miles downstream on the Mokelumne River, and 2) the Power Fire of 2004, which burned portions of four watersheds that are part of the View 88 Project resulted in minor effects to the water quality of reservoirs used for drinking water by the East Bay Municipal Utility District (USDA 2005).

Unit 59 contains a small spring-fed wetland created by a moving organic debris dam (MODD) or logjam (Geology Report, Koler, 2011). The no action alternative consequences from a high intensity wildfire would most likely be complete or nearly complete combustion of the organic materials in the MODDs which would result in

serious deleterious effects to the riparian area. Once logs burn out of these log jams, negative effects are likely within the riparian corridor both in and downstream from the wetland, potentially including the loss of the wetland.

Cumulative Watershed Effects – Alternative 2

There would be no cumulative watershed effects from Alternative 2.

Direct, Indirect, and Cumulative Effects – Alternative 3

Direct, indirect, and cumulative effects are the same as described under Alternative 1.

Direct, Indirect, and Cumulative Effects – Alternative 4

Direct, indirect, and cumulative effects are the same as described under Alternative 1.

Soil Resources

The direct, indirect and cumulative effects to soils are summarized from the Soils Report (Nicita, 2011).

Direct and Indirect Effects - Alternative 1

Understory Thinning and Commercial Thinning in Natural Stands.

Short term soil exposure would be expected as a direct result of mechanical tree harvesting and skidding, even though the natural stands currently have adequate to excessive litter cover. This displacement would be limited to skid trails, landings and limited areas within the treatment units. Localized soil detachment and transport may occur during precipitation events immediately following harvest activities. Expected seasonal needle fall and applying Best Management Practices (BMPs) would limit this effect to the season following harvest activities. Sedimentation was modeled using the Water Erosion Technology Project (WEPP 2001), and showed little to no increase in erosion is with cover values prescribed in the design criteria for the View 88 project.

Soil texture within the project area is generally loamy coarse sand and coarse sandy loam for the granitic soils and sandy loam to loam for the soils derived from volcanic deposits. In the coarse-textured soils found within the project area, soil aggregates are prone to destruction because of the lack of clay. Although the volcanic lahar soils contain enough clay (10-18 percent clay) to maintain structure with minor soil disturbance, the granitic soils are prone to long term destruction of soil structure with minor disturbance. With no soil structure, the granitic soils are prone to dry-raveling. Adequate to excessive litter (both fine and coarse) is prevalent within the project area and would help mitigate soil structure degradation.

Negligible erosion would occur on either granitic or volcanic soils with to the minimum 70 percent ground cover and water bar construction specified in the project design criteria for the slopes most susceptible to erosion.

On the lahar-derived soils, commercial thinning of the natural stands would decrease the overstory canopy cover and shift the understory component from being nearly absent to having an increase in herbaceous understory. Known nitrogen-fixing species such as

bear clover and species of lupine, ceanothus, and snowbrush are expected to increase in cover. The indirect effects would include increased carbon and nitrogen mineralization which would increase the long-term productivity of the soil and improve soil tilth.

Frigid volcanic and granitic soils tend to create a droughty site condition when both overstory removal and litter removal occur. Within the granitic soil areas, either plant communities dominated by sparse annual forbs or patches resembling sand piles develop. The nutrient bank within the granitic soils would be decreased and have negative effects on the long-term soil fertility (Laacke, 1996), but would be limited to less than 15% of the area of any project unit.

Landings and Skid Trails in Natural Stands

Compaction currently exists and is expected to increase on skid trails. Most soil compaction occurs with three to four passes of log laden equipment (Williamson and Neilson 2002, Grigal 2000). Compaction resulting from single to double pass harvesting off skid trails is expected to be incidental and would not alter soil productivity or soil hydrologic function. The coarse-textured soils within the project area are not prone to severe compaction. Re-use of existing skid trails and standard harvest unit layout would limit cumulative disturbance to less than 15 percent of any one unit.

Reusing existing skid trails would not substantially increase the disturbed area, but would increase the disturbance intensity and set back natural recovery. Skid trail systems are typically designed to occupy 15 percent of a management area, however, the portion of the skid trail network that sees less than four passes generally are not compacted beyond thresholds for compaction.

The existing conditions within the soil analysis area indicate legacy skid trails and landings are recovering with evidence of surface structure development and accumulation of litter which decreases soil erosion risk. Skidding would destroy surface structure and litter cover leaving skid trails prone to erosion. Reusing old skid trails would result in increased erosion hazards immediately following skidding. Implementation of BMPs would mitigate short term effects and insure that Forest Plan standards and guidelines (S&Gs) are not exceeded.

There would likely be an increase in new skid trails and landings where existing skid trails and landings do not meet the needs of current objectives. Adherence to Forest Plan S&Gs and BMPs would limit the extent of new skid trails and landings such that any unit would not exceed 15 percent extent. Compaction would be reduced below 15% for those units that currently exceed S&Gs, because no new skid trails or landings would be created and existing skid trails and landings would be treated to reduce compaction.

Machine Piling in Natural Stands after Thinning

Generally, not more than two passes are made with a low ground pressure tractor (5-6 psi) to pile slash, which would meet soil porosity Forest Plan S&G threshold values and not result in substantial soil displacement or compaction.

The effects of machine-piling on erosion would conform to Forest Plan S&Gs, and are included in erosion estimates for understory thinning. WEPP values were modeled with the amount of cover remaining following all mechanical treatments.

Soil cover would be reduced on volcanic, frigid soils. On volcanic soils, up to 30 percent (50 percent on slopes with low risk of erosion) of the soil surface would be exposed from tractor treads and transport of slash material. The soil textures and water-holding capacity of soils derived from volcanic parent material promote strong herbaceous response. Increasing light to the soil by decreasing canopy and organic material cover would increase the herbaceous response. This would have the indirect effect of increasing nutrient mineralization mechanisms for improved long-term soil productivity.

To protect the existing thin organic material accumulations and preserve water-holding capacities for soils with a high sensitivity to organic soil loss (volcanic, cryic and granitics), machine-piling would be excluded.

Prescribed Understory Burning

Low-severity prescribed burns would increase erosion risk on all soil types for the short term until the expected needle fall restores effective soil cover, generally within the first year following prescribed fire.

Soils with granitic parent material and coarse textured surface horizons are naturally hydrophobic. Because hydrophobicity depends on soil type and burn intensity, and the mosaic nature of prescribed burns, the change in extent and severity of hydrophobicity cannot be predicted, but increases are expected to be slight.

The retention of a minimum of 50-70% soil cover would meet the Soil Erosion Hazard Rating S&GS rating of “moderate” on maximum operating slopes of 35%.

Increased forest soil fertility is expected from prescribed burning. Forest soils generally have low fertility primarily due to nutrient sequestration in forest litter and decomposing woody debris. In contrast to a high intensity fire where fuel loads greater than 20 tons/acre increase the atmospheric release of soil nutrients through volatilization, low-intensity burning rapidly releases minerals to the soil and increases the potential of soil flora and fauna to mineralize sequestered nutrients. Mineralization is the process where nutrients in the soil are made plant-available. Low intensity fire would generally stimulate growth of grasses, forbs and shrubs that enhance soil fertility.

Cutting brush in plantations

Because plantations are deficient in ground cover, cutting brush with ground placement would increase ground cover and decrease erosion and sedimentation rates. Retention of 70 percent soil cover would meet Forest Plan S&Gs and result in a low to moderate erosion hazard rating in the plantations with highest risk.

Aspen Enhancement

Regardless of tree removal methods, soil surface organic layers would be displaced and no less than 30 percent mineral soils would be exposed. Canopy reduction would increase solar radiation (light and heat) on the soil surface. Increases in soil temperature and photosynthetic potential of the aspen stands would increase herbaceous biomass and biodiversity, thereby decreasing the effects of compaction and increasing soil nutrient cycling potential. The aspen enhancement stands have little slope so no measurable sedimentation would be expected.

Tractor fire lines

The soil would be compressed by fire line construction, however, one tractor pass is expected and would result in little impairment of infiltration. Forest Plan S&Gs threshold values for soil bulk density increase would not be exceeded. Soil displacement would not occur on more than 15 percent of the tractor lines. A soil is considered displaced when the surface organic material and the humic rich A-horizon is displaced.

Cumulative Effects – Alternative 1

The zone of cumulative effects influence for soil analysis in the View88 project area is limited to the management units where mechanical activities would occur.

Existing disturbance is primarily associated with historical skidding operations. All but three units conform to Forest Plan S&Gs for soil disturbance. Primary skid trails and landings reflect existing detrimental soil disturbance whereas disturbance that resulted from single-pass tree removal is no longer evident. Although the productivity and hydrologic function of skid trails and landings are impaired, they are recovering with time as evidenced by platy soil structure converting to blocky soil structure, and greater root penetration observed within old skid trails than was likely when the skid trails were first constructed.

The effect of re-using the skid trails would reverse the natural recovery process and increase disturbance, but the extent of detrimental disturbance would not exceed Forest Plan S&Gs. Existing landings account for the greatest long-term disturbance. Because existing landings would be re-used and new landings would occupy a small percentage of units, the extent of disturbance would not substantially increase and would not be likely to push units over threshold values of disturbance.

Although no other activities are planned within the View 88 zone of influence for soils, it is foreseeable that low impact fuels maintenance, specifically understory burning, would occur within the next ten years. Low intensity burning at prehistoric intervals is the desired condition for soil resources and would not result in detrimental cumulative effects.

Direct Effects – Alternative 2

Because there are no treatments or activities in the No Action alternative, it would not directly affect soils within the project area.

Indirect Effects – Alternative 2

Because skidding and piling would not occur within the analysis area, additional compaction and displacement would not occur. During disturbance surveys, conversion from platy to blocky structure was evident in all stands sampled, indicating that compacted soil is trending towards improved productivity and hydrologic function. Without mechanical incursions into the units, this natural recovery would continue.

Without treatments planned in the action alternatives, canopy cover would continue to increase and canopies continue to close. Closed canopy stands within the analysis would likely reduce the understory vegetative diversity (Wayman 2006) and not support healthy

understory communities. Soil nutrient cycling by microflora and fauna would likely be suppressed.

At the lower elevations of the project area, soils are mostly well-drained soils derived from primarily andesitic volcanic geologic formations. The high fuel loads within this zone have two primary potential consequences to the soil resources. Most importantly, current fuel loads may lead to widespread high burn soil severity during a wildfire resulting in loss of soil structure, soil cover and soil matrix roots. Soil powdering caused by wildfire result in excessive sedimentation and loss of soil productivity.

The risk of erosion increases as the risk of stand-replacement wildfire increases. A comparison of erosion rates with and without a high severity fire is summarized in Table 12 below.

Table 12 Erosion Rates Comparison

Alternative/Activity	**Soil Type; Sediment in Tons/Acre/Year3**		
	Volcanic, frigid1	**Volcanic, cryic2**	**Granitic2**
No Action Alternative, without wildfire	0	0	0
2 year climate	0.01	0	0
25 year climate	0.01	0	0
No Action Alternative, high severity wildfire			
2 year climate	20.37	14.66	14.17
25 year climate	24.13	20.98	23.94

With continued fire suppression, canopy cover and fuel load would continue to increase and vegetative diversity would continue to decrease. Without fuels treatments, the amount of fuel build-up would continue to increase. As fuel load and fire conditions overwhelm the ability of fire control efforts to suppress wildland fire, it becomes increasingly likely that a high intensity, high-severity fire would occur within the project area. Following high-intensity wildland fire, severe nitrogen loss occurs when total fuel loads exceed 20 tons/acre (Brown et. al. 2003); therefore, soil burning is expected in the project area as a result of high intensity wildfire. With increasing fuel loads the potential for soil burning also increases.

Cumulative Effects – Alternative 2

Because there would be no actions from the View 88 project to create direct or indirect effects, there would be no cumulative effects from the project under the No Action alternative.

Direct, Indirect, and Cumulative Effects – Alternative 3

Direct, indirect, and cumulative effects are the same as described under Alternative 1 except there would be no effect on the 118 acres in units 9, 12, 13, 63, 74, 54, and 57 which were dropped from this alternative. Skid trails, landings and machine-piling account for nearly the entire soil disturbance extent in a harvest unit. Because skid trail and landing extent, along with machine piling activity, would be the same for the 16" maximum removal diameter limit as for the Proposed Action, the soil disturbance difference between Alternatives 1 and 3 are not likely to be measurable. The smaller the diameter limit in Alternative 3 would result in somewhat greater future large woody debris recruitment.

Direct, Indirect, and Cumulative Effects – Alternative 4

Direct, indirect, and cumulative effects are the same as described under Alternative 1 except there would be no effect on the 118 acres in units 9, 12, 13, 63, 74, 54, and 57 which were dropped from this alternative. Skid trails, landings and machine-piling account for nearly the entire soil disturbance extent in a harvest unit. Because skid trail and landing extent, along with machine piling activity, would be the same for the 10" maximum removal diameter limit as for the Proposed Action, the difference in soil disturbance between Alternatives 1 and 4 would be negligible. The smaller the diameter limit in Alternative 4 would result in the greatest future large woody debris recruitment of all the action alternatives.

Cultural Resources

These direct, indirect, and cumulative effects are summarized from report *R2008-05-03-10005a – Heritage Resource Report for View 88 Fuels Reduction Project Amendment* (Whiteman 2008).

Alternative 1 (Proposed Action), Alternative 3 (16" harvest), Alternative 4 (10" harvest)

Alternatives 1, 3, and 4 have the potential to affect twenty-one (21) historic and prehistoric sites or features. One (1) site has been evaluated for the National Register of Historic Places and been determined eligible for inclusion on the National Register. The remaining twenty (20) sites have not been evaluated. Three (3) are not resources at risk from project activities. Eighteen (18) are resources at risk from all project activities proposed.

Design criteria have been developed to protect the known sites from potential adverse impacts of implementing the proposed action. They outline Standard Resource Protection Measures (Attachment 7 - Section II, and Interim Protocol for Non-Intensive Inventory Strategies for Hazardous Fuels and Vegetation Reduction Projects) of the *Programmatic Agreement among the U.S.D.A. Forest Service, Pacific Southwest Region, the California State Historic Preservation Officer and the Advisory Council on Historic Preservation Regarding the Identification, Evaluation and Treatment of Historic Properties Managed by the National Forests of the Sierra Nevada, California* (SPA, USDA 1996) that would be implemented to avoid effects to Resources at Risk identified

during this study. These protection measures include flagging of site boundaries and no ground disturbing activities allowed within site boundaries.

If previously unknown sites are encountered during project activities contract provisions would protect them. By following standard protection measures there would be ***no direct, indirect, or cumulative effects*** to Resources at Risk from implementing any of the action alternatives; the Proposed Action, Alternative 3 or Alternative 4.

Alternative 2 (No Action)

There would be no impacts to cultural resources from the No Action Alternative. However, the risk of catastrophic wildland fire within the project area would not be reduced.

Aquatic Wildlife

The direct, indirect and cumulative effects to aquatic resources are summarized from the Aquatic Species Biological Assessment and Biological Evaluation (Grasso, 2011).

Direct and Indirect Effects – Alternative 1

Timber Harvest

Aquatic wildlife individuals may be crushed by harvest machinery or falling timber, and sheltering habitat would be removed by removal of downed woody debris that contribute to fuel loads exceeding 20 tons/acre. Noise and ground vibration from timber activities are likely to disturb daytime aquatic wildlife activities. Retention of soil cover would insure that loss of leaf/needle litter does not result in substantial changes in shade, soil and air temperature, soil moisture, relative humidity, wind speed, or prey base. Retaining the future supply of large woody debris recruitment to the stream through adequate buffer criteria would ensure that important pool formation and bank stabilizing characteristics would be maintained and/or enhanced. No localized changes to water temperature are anticipated because equipment exclusion zones would limit mechanical tree removal within RCAs well below the level that would cause water temperature increases from reduction of shading. Any increase in water temperatures are expected to be short term and to recover after a year or two of riparian growth. Hand thinning in the equipment exclusion zone between 100 and 300 feet from the small wetland in Unit 59 is designed to reduce ladder fuels without the loss of larger trees. Hand piling outside of a 25 to 50 ft buffer from the Unit 59 wetland would prevent warming or drying the riparian area, which would protect aquatic habitat during prescription burning.

Sediment deposition and aggradation is a natural function of streams, however, prevention of increased sedimentation is important to prevent amphibian egg mass mortality from deposition of sediment, avoid filling-in of important interstitial spaces in the streambed, and preserve aquatic species food sources. Design criteria with buffer zones and designated stream channel crossings would be implemented to prevent increased sediment deposition and aggradation of material in stream channels.

Road construction and Maintenance

Aquatic wildlife individuals may be crushed by road construction and maintenance equipment. Road maintenance and reconstruction is included in the project with design criteria would maintain and restore the hydrologic connectivity of streams, meadows, and wetlands within the project area. Design criteria would also prevent roads and trails from intercepting, diverting, or disrupting natural surface and subsurface water flow paths. A culvert inventory of the project area identified locations where road runoff from Highway 88 drains into the project area. Restructure of Highway 88 culvert systems or runoff is beyond the scope of this project, but where feasible actions would be implemented to minimize culvert effects to aquatic-dependent species. The one mile of temporary road in Unit 59 would cross the stream at an old crossing and is not expected to increase effects to stream channel morphology nor increase the existing down cutting of the stream channel. Water drafting sites for dust abatement during road work would follow best management practices and be selected to avoid adverse effects to in stream flows or depletion of pool habitat.

Fuels treatment

Prescribed burning activities would result in a loss of sheltering habitat where existing down wood exceeds fuel loads of 20 tons/acre. There would also be disturbance effects from noise and piling activity. Piling and burning slash piles may result in mortality or wounding of individuals. Piles which remain more than one season to cure before burning are dense and tend to retain moisture; they provide potentially favorable sheltering habitats for amphibians and aquatic reptiles even when piled outside of RCA's.

Soil contamination from fuel used for prescribed burn ignition would be minimized by lighting piles from the top during pile and jackpot burning. This would also reduce effects to sheltering habitat by allowing aquatic amphibians and reptile's time for escape. Use of hand thinning in RCAs would prevent loss of larger trees if prescribed fire backs into RCAs. Prescribed fire is expected to produce cool burning conditions and prevent drying or warming of riparian areas to protect aquatic habitat. Water drafting sites for fire control during prescribed burning would follow best management practices and be selected to avoid adverse effects to in stream flows and depletion of pool habitat.

Direct and Indirect Effects - California red-legged frog

The nearest known sighting location (Sopiago Creek) is approximately 0.5 miles north-west of the project area boundary, and no permanent streams or ponds are within one mile. Project treatments occurring within core recovery habitat are confined to the areas immediately adjacent to Highway 88 within 100 – 300 feet and contain no aquatic features. Therefore, no direct, indirect, or cumulative effects to the California Red-legged frog are expected under any of the alternatives. Based on these criteria no consultation with the U.S. Fish and Wildlife Service was initiated.

Determination of Effects

The View 88 project will have no effect on the California red-legged frog.

Direct and Indirect Effects - Foothill yellow-legged frog

RCA protection measures provided in the project design criteria would minimize potential adverse affects to the foothill yellow-legged frog. Based on: 1.) elevation of the proposed project, 2.) the mean elevation for detection of this species, 3.) lack of focused surveys for this species in the project area, and 4.) the distance of the proposed project to previous detections, potential indirect effects from sediment to foothill yellow-legged frogs would be expected under all action alternatives.

Determination of Effects

The View 88 project may affect individuals, but is not likely to result in a trend toward Federal listing or loss of viability for the foothill yellow-legged frog.

Direct and Indirect Effects - Sierra Nevada yellow-legged

RCA protection measures provided in the project design criteria would minimize potential adverse affects to the foothill yellow-legged frog and Sierra Nevada yellow-legged frog. Based on: 1.) elevation of the proposed project, 2.) the mean elevation for detection of this species, 3.) proximity of known populations near the project area, and 4.) the distance of the proposed project activities to previous detections, potential indirect effects from sediment would be expected to Sierra Nevada yellow- legged frog under all action alternatives. Cumulative effects are related to habitat, and described under cumulative effects for all aquatic species.

Determination of Effects

The View 88 project Proposed Action may affect individuals, but is not likely to result in a trend toward Federal listing or loss of viability for the Sierra Nevada yellow-legged frog.

Direct and Indirect Effects - Western Pond Turtle

Female western pond turtles may deposit their eggs up to 0.25 miles away from a water source. Females and hatchlings may be affected by project activities in the six acres of nesting habitat in Unit 9 even though there are no aquatic features in this unit.

If western pond turtles were overwintering within the proposed project area, crushing of individuals could occur during over-wintering movement timeframes. However, based on the limited amount of potential nesting habitat and the lack of observations in the Forest database, disturbances to western pond turtle individuals would be expected to be minimal.

Cumulative Effects Unique to Western Pond Turtle

One major cause in the decline of western pond turtle populations was extensive commercial harvest of the species as a food source (Holland 1994). And, although there has been a ban on the sale and/or exhibition of native reptiles and amphibians since the 1980s, illegal collection of turtles still occurs (Holland 1994). Deliberate shooting, incidental catch by fisherman, predation by non-native species, water contamination and habitat loss or alteration are all major threats to western pond turtle populations (Holland 1994). Furthermore, since western pond turtles need to overwinter and deposit eggs in terrestrial habitats this makes them more susceptible to management activities as well as encounters with motorized vehicles.

Determination of Effects
The View 88 project alternatives may affect individuals, but is not likely to result in a trend toward Federal listing or loss of viability for the Western pond turtle.

Cumulative Effects - Alternative 1

Past disturbances from timber harvest, road building, and grazing adjacent to meadows and streams in the View 88 project area have affected aquatic habitats and the presence or absence of aquatic and aquatic dependent species within, adjacent to, and downstream of the proposed project. During the last decade, protective measures for streamside zones have become more restrictive. Although timber harvest on private land during the last decade included buffers next to streams, the intensity and size of private timber harvest activities resulted in habitat fragmentation for many species, making National Forest System lands increasingly important for sustaining habitat for aquatic and riparian-dependent species.

Additionally, cumulative effects to riparian systems due to human disturbance from recreational activities near or in streams is believed to have adversely affected threatened, endangered, and sensitive aquatic species through removal of riparian vegetation and/or the accumulation of sediment. In both the short- and long-term, amphibian and aquatic-dependent reptile populations could be adversely affected by collection of individuals or by human habitat disturbances such as off-highway vehicle use in and adjacent to streams.

Changes in habitat, along with the introduction of non-native species into the Sierra Nevada, have adversely affected many native aquatic species. Jennings (1996) notes that several Sierra Nevada amphibian species have shown dramatic declines in abundance, distribution, and diversity due to the introduction of aquatic predators such as trout and bullfrogs.

In the past, dams and impoundments have altered daily water temperature regimes, altered natural flow regimes, and fragmented habitat in many riverine systems, resulting in loss of connectivity for aquatic and riparian species within and between watersheds and completely isolating populations of some species.

Future disturbances that are reasonably expected to occur in the View 88 project area include fuel reduction, timber harvest, road reconstruction and maintenance, off-highway vehicle use, and grazing. The level of recreational use on all National Forest System lands is expected to continue and increase over time as the human population continues to increase. Recreation activities in and around perennial and seasonal headwater channels in the project area are likely to decrease streambank stability, resulting in down-cutting and higher levels of fine-grained sediment deposition in stream channels which adversely affect macroinvertebrate and aquatic food sources. Although amphibian and reptile species may be lacking in headwater channels, changes in these headwaters are likely to affect downstream aquatic habitats, and affect the presence or absence of some aquatic wildlife species.

The cumulative effects of human activities on private lands adjacent to the project area influence aquatic habitats on National Forest lands. The California Department of Forestry website (CDF 2011) timber harvest plan listing dated 11 February 2011 indicated three timber harvest plans within the 15 watershed area View 88 project

analysis area. Each project is located too far distant from the View 88 project area to contribute toward negative effects for any species or habitat on National Forest lands.

Future Eldorado National Forest vegetation management activities would follow Forest Plan standards and guidelines established under the Sierra Nevada Forest Plan Amendment (USDA Forest Service 2004a). Under these standards and guidelines, the effects of future projects in the View 88 analysis area are expected to maintain and restore the species composition and structural diversity of plant and animal communities in riparian areas and retain larger trees to contribute large down woody debris to RCAs.

The contribution to cumulative effects from the View 88 project would be minimal due to several factors:

- There are few identified natural aquatic features in the headwater areas of the 15 HUC 7 watersheds in the project area.
- The proportion of unit acreage in each watershed is a small percentage of the watershed.
- Most impacts to aquatic systems are the result of proximity to Highway 88.
- Aquatic effects from project activities in the West Panther Creek watershed would be minimized by distributing treatments across multiple years.

Direct and Indirect Effects – Alternative 2

Because no project activities would occur, no direct or indirect effects would occur to aquatic species as the result of project activities.

No action could lead to a greater risk of erosion effects to aquatic features during periods of increased run-off and snowmelt in the years following a high severity wildfire than the action alternatives.

Under the No Action alternative, fuels along 22 miles of Scenic Highway 88 would not be reduced, but would continue to accumulate. The risk for high intensity wildfire would remain or increase, with stand replacement mortality the predicted result for much of the project area.

High intensity wildfire effects include ash input into streams changing chemical and pH balances, changes to overland water flow, increases in sedimentation into streams, and overall changes in water yield to drainages. High intensity wildfire can lead to various erosion processes and habitat alterations that are likely to make habitat conditions unfavorable for aquatic species. Losses of trees within the RCAs have the potential to warm and dry riparian areas which is also likely to reduce aquatic habitat.

In the human-altered landscape of the View 88 project area, wildfire followed by debris flow in headwater reaches (most of the View88 project area) is likely to result in areas of scour, which would be a major disturbance with lasting impacts to benthic macroinvertebrates, fish and amphibian distribution; and stream channel morphology that can alter riparian zones for years (Cover et al. 2010; Koester et al. 2010).

Effects to aquatic habitat both within and downstream of a high severity wildfire are difficult to predict and depend on many factors. The increased erosion rate response to a high severity wildfire would impact aquatic habitat for several years before returning to near pre-wildfire levels in approximately four or five years. However, often the single

most important factor for wildfire impacts to aquatic habitats the size of the rainfall event that occurs during the first several years after the wildfire - when the ground is most vulnerable to accelerated runoff and erosion, (Markman, 2011).

Disturbance effects (direct, indirect and cumulative) from mechanized equipment in riparian conservation areas along meadow aspen enhancement would not occur in Units 51, 58, 83 and 83. Conifer encroachment would continue and meadows and aspen area habitats would continue to shrink.

Under the No Action alternative, the amount of road-related sediment to two special aquatic features - spring (Unit 59) and meadow (Unit 83) would continue or increase due to the lack of road reconstruction/maintenance.

Cumulative Effects - Alternative 2

Current management practices, such as firewood cutting, recreation, and fire suppression would continue. Past, present, and reasonably foreseeable actions would remain, but without the additive effect from the View 88 project, there would be no cumulative effects.

Direct, Indirect, and Cumulative Effects – Alternative 3

Direct, indirect, and cumulative effects would be the same as described under Alternative 1, because design criteria would remain the same, with the only change being the limit of 16 inches DBH for tree removal and that activities would not occur on 118 acres (see Fire and Fuels Alternative 3 description).

Direct, Indirect, and Cumulative Effects – Alternative 4

Direct, indirect, and cumulative effects would be the same as described under Alternative 1, because design criteria would remain the same, with the only change being the limit of 10 inches DBH for tree removal and that activities would not occur on 118 acres (see Fire and Fuels Alternative 4 description).

Aquatic Management Indicator Species (MIS)

The direct, indirect and cumulative effects to aquatic species are summarized from the Aquatic Management Indicator Species Report (Grasso, 2011).

Riverine (steam)& Lacustrine (lake/pond)

Direct and Indirect Effects – Alternative 1

Effects for Alternative 3 and Alternative 4 are the same as Alternative 1 since all of these alternatives involve the use of mechanized ground-based equipment to remove trees. Therefore they will be discussed together. Long-term impacts to stream habitats from project activities are not expected because ground–disturbing activities would not exceed 15 percent of the perennial RCA. Potential increases in lateral erosion and stream bank destabilization along the perennial stream would be minimized through exclusion buffers for ground-based equipment (75- 100 feet) as well as limiting fuel treatments to hand thinning within the riparian zone. No treatments would occur within 25 feet of the

channel edge. Improvements to re-contour and increase dip placement on native surface road 8N32A in this unit would also limit the amount of sediment delivered to the stream. Riparian buffers would limit the amount of fuels treatment and prescribed burn ignition buffers would reduce both the risk of severe wildfire and potential sediment input to streams during surface water run-off. The potential amount of Riverine habitat that could be affected is less than one percent of the total project area.

Cumulative Effects – Alternative 1

Based on the potential direct and indirect effects to aquatic and aquatic-dependent species and the Protection Measures incorporated into the Design Criteria, overall cumulative effects to flow, sedimentation and water surface shade from implementation of the Proposed Action to aquatic macroinvertebrates and their habitats would be minimal for the following reasons:

- The physical structure and the biological integrity of the aquatic and riparian environments would be maintained by the protection measures that are part of project design criteria.
- The small percentage of area treated within each HUC 7 watershed would be negligible.
- There would be no construction of new, permanent roads and only 1.0 mi. of temporary roads constructed.
- Increases in the suspended sediment concentrations and turbidity levels of the streams in the project area are expected to be minor from the tributary streams, however given the head water terrain with high gradient characteristics the potential for higher yields of run-off during massive precipitation and snowmelt events should be noted. Water quality downstream should not exceed state standards for turbidity and suspended sediment under normal weather conditions post-project.
- Best Management Practices would be implemented.
- Paired watershed studies indicate that increases in water yield as a result of forest thinning and fuels management activities are quite small unless extensive thinning is conducted in wet, high elevation watersheds, which is not proposed in the View 88 project.
- Because of the reduced amount of intermittent and perennial riparian physical characteristics at the project level scale (i.e, areas affected), downstream changes to algal, macroinvertebrate, and periphyton assemblages are expected to be minimal.
- Changes to the water yield, peak flow, and timing of flow of all streams in the project area are likely to be negligible and not measurable. Any changes as a result of vegetation removal would be short term and expected to recover from a year or two of growth.
- Riparian water surface shade would be maintained. Implementation of the Proposed Action would result in minimal reductions in riparian canopy cover and minor increases in solar radiation. Increase to the temperature of the perennial streams downstream of the project area would be a minor or negligible. Any localized changes to water temperature from a reduction of shading as a result of

vegetation removal is expected to be short term and expected to recover after a year or two of riparian growth.

- Several design criteria would minimize the amount of sediment delivered to intermittent and ephemeral streams in the View 88 Fuels Reduction Project. These protection measures include areas of no ground disturbing activities (or "buffer zones") adjacent to aquatic features.

Direct, Indirect, and Cumulative Effects – Alternative 2

Conifer encroachment would continue and aspen enhancement (release) would not occur in Units 51, 58, 83 and 83, which would eliminate any disturbance effects (direct, indirect and cumulative) as a result of mechanized equipment in riparian conservation areas along meadows where activity is proposed to occur. Aspen would continue to decline.

Lack of road reconstruction/maintenance would continue road-related sediment input into two special aquatic features: the spring in Unit 59 and meadow in Unit 83 would continue to experience negative impacts from road sediment. Current management practices and activities, such as firewood cutting, recreation, and fire suppression would continue.

Direct, indirect or cumulative effects to aquatic species as the result of project activities, either positive or negative, would not occur.

Direct, Indirect, and Cumulative Effects – Alternative 3

Direct, indirect, and cumulative effects would be the same as described under Alternative 1, because design criteria would remain the same, with the only change being the limit of 16 inches DBH for tree removal and that activities would not occur on 118 acres (see Fire and Fuels Alternative 3 description)

Direct, Indirect, and Cumulative Effects – Alternative 4

Direct, indirect, and cumulative effects would be the same as described under Alternative 1, because design criteria would remain the same, with the only change being the limit of 10 inches DBH for tree removal and that activities would not occur on 118 acres (see Fire and Fuels Alternative 4 description).

Wet Meadow Habitat

Direct and Indirect Effects – Alternative 1

Conclusions for Alternatives 3 and 4 are the same as Alternative 1 since all of the action alternatives involve the use of mechanized ground-based equipment to remove trees and prescribed burning. Therefore, all the action alternatives will be discussed together here. Very specific protection measures developed to reduce changes in meadow hydrology and excessive sediment input would be effective to minimize project activities for aspen enhancement within 50 percent of the Riparian Conservation Areas of Units 51, 58, 83 and 84 and ground-based activity up to the meadow edge. In Units 55 and 59 up to 6 acres of ground-based equipment exclusion polygons would maintain existing meadow habitats. Hand thinning between 25 and 50 feet from the wetland in Unit 59 and loss of trees during prescribed burning has a potential to warm and dry riparian areas, potentially reducing aquatic habitat. As stated above, it is unknown whether the duration of the standing water features are enough to support the breeding of Pacific chorus frogs. It is unknown what the localized changes to water temperature would be from the reduction of

shading as a result of vegetation removal from hand thinning and mechanical timber harvest within the RCA. Any increase in water temperatures are expected to be minor and short term and recover after a year or two of riparian growth.

Cumulative Effects – Alternative 1

Based on the potential direct and indirect effects to aquatic and aquatic-dependent species and the Protection Measures incorporated into the Design Criteria, overall cumulative effects to wet meadow habitats from implementation of and of the action alternatives to Pacific Chorus frog habitats would be minimal for the following reasons:

- The physical structure and the biological integrity of the aquatic and riparian environments would be maintained.
- The small percentage of area treated within each HUC 7 watershed would be negligible.
- There would be no construction of new, permanent roads and only 1.0 mi. of temporary roads constructed.
- Changes to the water yield, peak flow, and timing of flow of all streams in the project area are likely to be negligible and not measurable. Any changes as a result of vegetation removal would be short term and expected to recover from a year or two of growth. Erosion can increase down-cutting, thus reduce aquatic habitat.
- Several protection measures would minimize the amount of sediment delivered to wet meadows in the project area, including equipment exclusion zones adjacent to aquatic features.

Direct, Indirect, and Cumulative Effects – Alternative 2

Conifer encroachment would continue and aspen enhancement (release) would not occur in Units 51, 58, 83 and 83, which would eliminate any disturbance effects (direct, indirect and cumulative) as a result of mechanized equipment in riparian conservation areas along meadows where activity is proposed to occur. Aspen would continue to decline.

Lack of road reconstruction/maintenance would continue road-related sediment input into two special aquatic features: the spring-fed small wetland in Unit 59 and the meadow in Unit 83 would continue to experience negative impacts from road sediment. Current management practices and activities, such as firewood cutting, recreation, and fire suppression would continue.

Direct, indirect or cumulative effects to aquatic species as the result of project activities, either positive or negative, would not occur.

Direct, Indirect, and Cumulative Effects – Alternative 3

Direct, indirect, and cumulative effects would be the same as described under Alternative 1, because design criteria would remain the same, with the only change being the limit of 16 inches DBH for tree removal and that activities would not occur on 118 acres (see Fire and Fuels Alternative 3 description)

Direct, Indirect, and Cumulative Effects – Alternative 4

Direct, indirect, and cumulative effects would be the same as described under Alternative 1, because design criteria would remain the same, with the only change being the limit of

10 inches DBH for tree removal and that activities would not occur on 118 acres (see Fire and Fuels Alternative 4 description)

Terrestrial Wildlife

The direct, indirect and cumulative effects to terrestrial wildlife are summarized from the Biological Evaluation and Assessment for Terrestrial Threatened, Endangered, and Sensitive Wildlife Species (Loffland, 2011).

California Spotted Owl

Direct and Indirect Effects – Alternative 1

Suitable Habitat

Direct effects to habitat are limited to the area that is currently suitable for spotted owl nesting or foraging. As was stated previously, suitable nesting habitat is not expected within the proposed units due to stand conditions and the highway effects. The existing suitable foraging habitat is primarily found in commercial fuel reduction and hazard tree removal units. The suitability of this habitat for foraging is expected to be lower than the stand data would indicate due to the adjacency to the highway, and associated disturbance and management for the highway. Effects from the proposed treatments on these areas would mainly reduce existing and future snags, reduce canopy closure 10-15% in the commercial fuel reduction units, with <3% canopy reduction in hazard tree removal units outside of commercial units. There are approximately 1,020 acres which are presently believed to be suitable for foraging, and all but the 8 acres of aspen treatment would retain sufficient canopy closure after implementation to remain suitable for foraging (>50% canopy closure) for spotted owl. The aspen treatment areas would fall below 50% canopy closure, but they are small discreet areas, which would not affect either connectivity of habitat or the amount of suitable foraging habitat available for this species. Other proposed activities for Alternative 1 would have no measurable short or long term effects to habitat suitability, and will not be further analyzed here.

The Proposed Action is expected to have a limited affect on the quality of future spotted owl habitat and length of time required for its establishment. North et al. (1999) found that stands with high foraging use by northern spotted owls typically included many 'legacies' (large trees and snags) that survived a fire or windstorm that destroyed much of the previous stand. The study suggested that the carry-over of these large structures into the regenerating stands produced sufficient foraging habitat for the owl, even though other attributes of the stand were typical of younger forests. Remaining green trees in the project area are a valuable resource for spotted owls, since they would provide the future supply of large decadent trees and snags within the forested habitat into the future. This alternative would primarily remove and reduce suppressed and intermediate trees, leaving behind most of the larger and older trees to provide future legacy habitat structure.

PACs

Within the two PACs, AM011 and ED149, approximately 24 acres of moderate suitability habitat based on canopy and tree size and low suitability due to road proximity, would receive hazard tree removal (a corridor approximately one tree height, or 150-200 feet either side of the roadway). As described for the road side hazard treatment above, a <3% change in canopy cover along this corridor would occur with

implementation. The reality of the situation is that while the Proposed Action may more efficiently fall and remove these hazard trees than the no action alternative, these same trees would be felled and left as normal maintenance of the highway under the no action alternative. Disturbance along this corridor is the highest of the treated areas under all alternatives, including the No Action alternative, and is therefore the lowest suitability, even for foraging activity, of the proposed treatment areas. There are no other proposed activities within spotted owl PACs under any of the action alternatives. All of the treated areas would retain 50 percent canopy closure after treatment where it is currently at or above 50 percent canopy closure.

HRCAs

Indirect effects from the project may influence adjacent owl PACs, AM009, AM011, AM021, and ED149 and there associated Home Range Core Areas (HRCAs) to varying extents. The HRCA for AM009 would have no commercial thinning unit treatments and 21 acres of roadside hazard treatment within the 1,650 acre HRCA. The HRCA for AM011 would have 49 acres of commercial thinning acres, and 88 acres of roadside hazard treatments, for a total of 137 acres of proposed treatment within the 818 acre HRCA. The HRCA for AM021 would have 51 acres of commercial thinning acres, and 5 acres of roadside hazard treatments, for a total of 56 acres of proposed treatment within the 1,092 acre HRCA. The HRCA for ED149 would have no commercial thinning acres, and 16 acres of roadside hazard treatments, for a total of 16 acres of proposed treatment within the 1,416 acre HRCA. As was described for the road side hazard treatment previously, a <3% change in canopy cover would occur along this corridor with implementation.

As was described in the discussion above for PACs Alternative 1 may more efficiently fall and remove these hazard trees than the No Action alternative, but these same trees would be felled and not removed as normal maintenance of the highway under the No Action alternative. Post treatment all of the treated areas would retain 50 percent canopy closure where it presently exists. The ongoing disturbance along this highway corridor is the highest of the project area, and is therefore the lowest suitability, even for foraging, of the proposed treatment areas.

Disturbance

The disturbance related effects of the highway presently contribute ongoing negative effects on habitat suitability in areas proposed for treatment, which are all within ¼ mile of the highway. Because roadside hazard treatment units are in closest proximity to the road (200 feet either side), they have the highest intensity and most continuous disturbance of the proposed treatment units. The existing level of disturbance, the no action alternative, is expected to render the habitat within the project unsuitable for sustainable nesting for this species, and of lower forage habitat suitability than areas of with similar stand characteristics outside of the highway corridor.

The implementation of the project design criteria, together with a limited operating period (LOP) for units within ¼ mile of existing PACs, would remove the potential for nesting disturbance, should owls be nesting near planned units. If implementation-related disturbance takes place, it is expected to consist of temporary displacement of foraging individuals, with no effects to reproduction.

Cumulative Effects – Alternative 1

This cumulative effects analysis considers the impacts of Alternative 1 when combined with past, present, and foreseeable future actions and events that have affected or may affect the quantity or quality of spotted owl habitat within the proposed treatment area. PACs and associated HRCAs were analyzed for direct or indirect effects from proposed units. These PACs are: AM009, AM011, AM021, and ED149. This includes approximately 6,810 acres, of both Federal and privately owned lands, and includes treatments which have affected habitat from 1951 to the present and foreseeable future.

The geographic scopes of the cumulative effects analysis were selected considering the effects to the local population (affected HRCAs and PACs), and the linear nature of the project. This analysis provides an evaluation of the project's cumulative effects on the owl PACs and HRCAs, and the forest matrix near them, that is most likely to see effects from changes to habitat capability. Also included are dispersal capabilities of spotted owls within and adjacent to the project area.

The actions contributing to cumulative effects are the past and future actions, which have affected or would affect the quantity or quality of spotted owl habitat within this analysis area. Within the cumulative affects area past timber harvest, fuels treatments, and hazard tree removal projects have altered the quantity and quality of spotted owl habitat, affecting spotted owl sites within and adjacent to the project area. Appendix A displays the relevant projects which have had or potentially would affect the areas adjacent to the proposed units or adjacent PACs/HRCAs.

These past and foreseeable future actions have affected or will affect the four owl sites (PACs and associated HRCAs) within cumulative effects analysis area. A total of 1,239 acres (18%) of the 6,810 acre analysis area has existing past or planned future moderate alteration of habitat. Approximately 1,100 acres (24%) of the total alteration is within the 4,660 acres of the analyzed HRCAs. The remaining 139 acres fall within the proposed units for Alternative 1. These past, present, and foreseeable future alterations have/would generally reduce nesting habitat capability, but retain foraging habitat suitability for spotted owl. The Proposed Action would add an additional 220 acres of habitat alteration to the existing 1,239 acres. These 220 acres are associated with the highway corridor, and presently provide low habitat suitability due to highway management disturbance and continuing habitat alteration. As time passes, early treatments in the analysis area tend to have less of an effect, depending on the type of treatment. The Proposed Action contributes an approximately 3% increase in treated area to these cumulative effects. This increase in treated area would cause a short term degradation of habitat, but is not expected to reduce the number of spotted owls that can be supported in the analysis area.

When considered with other present and foreseeable projects, the Proposed Action is expected to increase fire resiliency and protect PACs outside of the proposed units and suitable habitat in the project area from future high intensity wildfires. Therefore, the Proposed Action is likely to increase the amount of habitat that remains available to spotted owls in the long-term. Spotted owl sites are currently well distributed across the cumulative effects analysis area, and the Amador Ranger District, without evidence of population or habitat gaps.

Determination
The Proposed Action, Alternative 1, may affect individual California spotted owls but is not likely to result in trend toward Federal listing or loss of species viability.

Direct, Indirect, and Cumulative Effects - Alternative 2

Although there are approximately 1,020 acres of habitat which meets these criteria within proposed project units, the capability of the habitat is expected to be low to unsuitable for nesting. Several reasons this habitat would provide low suitability for nesting are associated with its location in a state highway corridor, and include: high levels of past, present and future modification of the highway corridor for use as a state highway; constant maintenance, repair, and reconstruction of the highway; and high levels of disturbance from commercial and non-commercial traffic on the highway. These constant disturbances are expected to render the highway corridor unsuitable for sustained nesting of spotted owls through time. The corridor may provide foraging habitat, but foraging habitat is also compromised for the reasons given above, and is expected to provide low to moderate foraging capability for this species.

There are two spotted owl Protected Activity Centers (PACs), AM011 and ED149, in close enough proximity to be affected by the road side hazard tree removal, which would continue to occur as part of highway management for public safety under the No Action Alternative.

Under current management, the existing conditions and associated risks of wildfire and habitat loss outside of the highway corridor would continue unchanged. There would be no increased capacity for fire suppression along and adjacent to the highway corridor, and nearby spotted owl PACs, HRCAs and other habitat could suffer more intense and larger wildfires than would be expected to occur with the three action alternatives. The no action alternative would therefore provide less protection for existing high quality habitat, and could in the longer term result in loss of habitat that might be retained with the implementation of the action alternatives.

Direct and Indirect Effects – Alternative 3

Direct and indirect effects of Alternative 3 and 4 are similar enough as to be difficult to show any difference in effects to owl habitat. Based on modeling of canopy closure, there is little canopy closure difference between Alternatives 3 and 4 when compared to Alternative 1, but it would appear likely that retaining more large trees per acre would result in some difference in the arrangement, if not the total canopy closure after thinning. Both of these alternatives are anticipated to be similar for spotted owl use and habitat to Alternative 1, with the following exceptions: 1) Retention of trees above 16” and 10” DBH within all proposed thinning units would retain more larger trees. For this analysis a 1-5% increased retention of effective canopy closure was within the proposed thinning units. 2) Thinning units 9, 12, 13, 54, 57, 63, and 74 would be dropped, with no reductions outside of hazard tree removals. Fuels objectives would be met within all proposed units under both Alternatives 3 and 4, therefore, wildfire protection and resiliency would be achieved in a similar manner to Alternative 1. The slightly higher canopy closure retention may provide slightly higher quality foraging habitat, but due to the highway corridor use and management, nesting habitat is not expected to be present in the project, and foraging habitat is compromised to some extent. No other differences

in direct or indirect effects to habitat would be expected between the three action alternatives. Disturbance effects would be essentially the same, as the LOP would be applied in all action alternatives.

Cumulative Effects – Alternative 4

Similar to the Proposed Action, Alternatives 3 and 4 would contribute to cumulative effects, mainly through a short term degradation of habitat from adding approximately a 3% increase in treated area. However, neither alternative is expected to reduce the number of spotted owls that can be supported in the analysis area. To the degree that these alternatives increase fire resiliency and protect PACs, HRCAs, and suitable habitat outside of the proposed units from future wildfires, it may increase the amount of habitat that remains available to spotted owls in the long-term when considered with other past, present, and foreseeable projects. Spotted owl sites are currently well distributed across the cumulative effects analysis area, and the Amador Ranger District, without evidence of population or habitat gaps.

Determination
Alternatives 3 and 4 may affect individual California spotted owls but are not likely to result in trend toward Federal listing or loss of species viability.

Northern Goshawk

Direct Effects and Indirect Effects - Alternative 1

Suitable Habitat
Direct effects to habitat are limited to the area that is currently suitable for goshawk nesting or foraging. Habitat for spotted owl and goshawk are very similar, in fact often goshawk and owl PACs overlap partially or completely. For this reason impacts described for the spotted owl previously are essentially the same for goshawk from all action alternatives and will be summarized. As was stated previously, there is not believed to be suitable nesting habitat within the proposed units due to stand conditions and the highway effects. The existing suitable foraging habitat is primarily found in the commercial fuel reduction units, and hazard tree removal units. The suitability of this habitat for foraging is believed to provide lower suitability habitat than the stand data would indicate due to the adjacency to the highway and associated disturbance and management for the highway. The described reduction in canopy closure in the spotted owl analysis, would have similar effects on goshawk habitat suitability. There are approximately 1,020 acres which are presently believed to be suitable for foraging, and all but the 8 acres of aspen treatment would retain sufficient canopy closure after implementation to remain suitable for foraging (>50% canopy closure) for goshawk. Goshawks are also known to use aspen stands for foraging. The other proposed activities for this alternative would not have measurable short term effects to habitat suitability, and will not be further analyzed here.

This project is expected to have a limited affect on the quality of future goshawk habitat and length of time required for its establishment. Remaining green trees in the project area are a valuable resource for goshawks, since they would provide a future supply of large decadent trees and snags within the forested habitat. The Proposed Action would

primarily remove and reduce suppressed and intermediate trees, leaving behind most of the larger and older trees to provide future legacy habitat structure.

PACs

PAC, G35-06, contains approximately 28 acres of low to moderate suitability foraging habitat based on canopy and tree size, with low suitability due to road proximity, which would receive hazard tree removal (a corridor approximately one tree height, or 150-200 feet either side of the roadway). As was described for the road side hazard treatment above, a <3% change in canopy along this corridor would occur with implementation of all alternatives. Alternative 1 may more efficiently fall and remove these hazard trees than the No Action alternative, but these same trees would be felled and left as normal maintenance of the highway under the no action alternative. All of the treated areas would retain 50 percent canopy closure after treatment where this canopy closure exists. The disturbance along this hazard tree removal corridor is the highest of the treated areas, and is therefore the lowest suitability, even for foraging activity, of the proposed treatment areas.

Disturbance

Disturbance related effects of the highway presently contribute ongoing negative effects on habitat suitability in the areas proposed for treatment, which are all within ¼ mile of the highway. The roadside hazard treatment units have the highest intensity and most continuous disturbance of the proposed treatment units, because they are in closest proximity to the road (200 feet either side). The existing level of disturbance (No Action alternative) is expected to make the habitat within the Alternative 1 treatment areas unsuitable for sustainable nesting for this species, and of lower forage habitat suitability than areas of with similar stand characteristics outside of the highway corridor area of influence.

The implementation of the project design criteria, including limited operating period (LOP) for units within ¼ mile of existing PACs, would remove the potential for nesting disturbance, if goshawks are nesting near planned units. If implementation related disturbance occurs, the expectation is that the effect would be temporary displacement of foraging individuals, with no expected effects to reproduction.

Cumulative Effects – Alternative 1

This cumulative effects analysis will consider the impacts of the Proposed Action when combined with past, present, and foreseeable future actions and events that have affected or may affect the quantity or quality of goshawk habitat within the proposed treatment area. For this analysis the cumulative effects area previously analyzed for spotted owl is used, as these species share similar habitat needs and the analysis area would give a good indication of cumulative effects for northern goshawk. The 205 acre goshawk PAC was added to the spotted owl cumulative effects analysis area, for a total of an approximately 7,010 acre analysis area. The same data set for past and foreseeable actions was utilized for this analysis as described for the spotted owl analysis. Because the effects are similar for the two species, spotted owl and goshawk, the analysis is summarized where possible, rather than restated.

Geographic scopes of the cumulative effects analysis were selected considering the effects to the local population (goshawk PACs), and the linear nature of the project. This analysis provides an evaluation of the project's cumulative effects on the existing goshawk PAC, the suitable habitat adjacent to the project, and the nearby forest matrix most likely to be affected through changes to habitat capability. Also included are dispersal capabilities of northern goshawks within and adjacent to the project area.

The actions contributing to cumulative effects are the past and future actions which have affected or will affect the quantity or quality of goshawk habitat within this analysis area. Within the cumulative affects area past timber harvest, fuels treatments, and hazard tree removal projects have altered the quantity and quality of goshawk habitat, affecting goshawk sites within and adjacent to the project area. Appendix A displays the relevant projects which have or potentially will affect the areas adjacent to the proposed units or adjacent PACs and relevant habitat.

A total of 1,239 acres (18%) of the 7,010 acre analysis area has seen past or planned future moderate alteration of habitat from previous activities. These past and foreseeable future alterations have/would generally reduce nesting habitat capability, but retain foraging habitat suitability, for goshawk. The Proposed Action would add 220 acres of habitat alteration to the existing 1,239 acres. As discussed above, the 220 acres affected presently provide low habitat suitability due to disturbance and continuing habitat alteration associated with the highway corridor. As time passes, effects from early treatments in the analysis area are reduced, depending on the type of treatment. The Proposed Action contributes an approximately 3% increase in treated area to these cumulative effects. This increase in treated area would cause a short term degradation of habitat, but is not expected to reduce the number of northern goshawks that can be supported in the analysis area.

When considered with other present and foreseeable projects, the proposed Action is expected to increase fire resiliency to protect PACs within and outside of the proposed units as well as suitable habitat in the adjacent project area from future wildfires. Therefore, the Proposed Action is likely to increase the amount of habitat that remains available to goshawks in the long-term. Goshawk sites are currently well distributed across the cumulative effects analysis area, and the Amador Ranger District, without evidence of population or habitat gaps.

Determination

The Proposed Action, Alternative 1, may affect individual northern goshawks but is not likely to result in trend toward Federal listing or loss of species viability.

Direct, Indirect, and Cumulative Effects – Alternative 2

Suitable habitat has been mapped for northern goshawk on the forest, based on California Wildlife Habitat Relations (CWHR) types 4M, 4D and 5D representing vegetation which is believed to provide suitable foraging and nesting habitat. Key habitats are designated as northern goshawk protected activity centers (PACs) which include 200 acres with the highest nesting habitat capability (CWHR type 5D) surrounding known goshawk activity centers. Although there are approximately 1,020 acres of habitat meeting suitable habitat criteria within proposed units, the capability of the habitat is expected to be unsuitable for sustainable nesting.

There is one goshawk Protected Activity Centers (PACs), G35-06, which could be affected by road side hazard tree removal, which would occur as part of highway management for public safety under the No Action alternative. This PAC was established in 2008 based on an active nest. Subsequent surveys of this PAC (2009 and 2010) have not detected occupancy or nesting within this PAC. There are no other proposed activities within goshawk PACs under any of the action alternatives.

Under No Action current management, the existing conditions and associated risks of wildfire, and habitat loss outside of the highway corridor would continue unchanged. There would be no increased capacity for fire suppression along and adjacent to the highway corridor. Nearby goshawk PACs and other habitat is likely to suffer more intense and larger wildfires, than would be expected to occur with any of the three action alternatives. The no action alternative would therefore provide less protection for existing high quality habitat, and could in the longer term result in loss of habitat that might be retained with the implementation of an action alternative.

Direct and Indirect Effects – Alternatives 3 and 4

Direct and indirect effects of Alternative 3 and 4 are similar enough as to be difficult to show any difference in effects to goshawk habitat. Based on modeling of canopy closure, there is little canopy closure difference between Alternatives 3 and 4 when compared to Alternative 1, but it would appear likely that retaining more large trees per acre would result in some difference in the arrangement, if not the total canopy closure after thinning. Both of these alternatives are anticipated to be similar for goshawk use and habitat to Alternative 1, with the following exceptions: 1) Retention of trees above 16" and 10" DBH within all proposed thinning units would retain more larger trees. For this analysis a 1-5% increased retention of effective canopy closure was within the proposed thinning units. 2) Thinning units 9, 12, 13, 54, 57, 63, and 74 would be dropped, with no reductions outside of hazard tree removals. Fuels objectives would be met within all proposed units under both Alternatives 3 and 4; therefore, wildfire protection and resiliency would be achieved in a similar manner to Alternative 1. The slightly higher canopy closure retention may provide slightly higher quality foraging habitat, but due to the highway corridor use and management, nesting habitat is not expected to be present in the project, and foraging habitat is compromised to some extent. No other differences in direct or indirect effects to habitat would be expected between the three action alternatives. Disturbance effects would be essentially the same, as the LOP would be applied in all action alternatives.

Cumulative Effects – Alternatives 3 and 4

Similar to the Proposed Action, Alternatives 3 and 4 would contribute to cumulative effects, mainly through a short term degradation of habitat from adding approximately a 3% increase in treated area. However, neither alternative is expected to reduce the number of goshawks that can be supported in the analysis area. To the degree that these alternatives increase fire resiliency and protect PACs, and suitable habitat outside of the proposed units from future wildfires, it may increase the amount of habitat that remains available to goshawks in the long-term when considered with other past, present, and foreseeable projects. Northern goshawk sites are currently well distributed across the cumulative effects analysis area, and the Amador Ranger District, without evidence of population or habitat gaps.

Determination
Alternatives 3 and 4 may affect individual northern goshawks but are not likely to result in trend toward Federal listing or loss of species viability.

American marten, Pacific Fisher, and Sierra Nevada Red Fox

Direct Effects and Indirect Effects – Alternative 1

Suitable Habitat
Direct effects associated with the Proposed Action would be habitat alteration from fuel reduction operations, hazard tree removal, and piling and burning. Similar to the analysis for spotted owl, the types of habitat these species utilize is expected to remain suitable after project implementation, with greater than 50 percent canopy closure for suitable habitat and more than 60 percent canopy closure for preferred habitat. As has been described for the spotted owl and goshawk, the existing 1,020 acres considered suitable habitat based on stand conditions, is likely to be of lower value to these species due to the disturbance from traffic and management of the highway corridor.
Denning by these species would not be expected to take place and be maintained over time along the Highway 88 corridor due to the high levels of disturbance, but foraging and travel through this corridor is expected to occur. There have been incidental sightings of marten within the project boundary in the past. The Proposed Action fuel reduction treatment effects would reduce canopy closure, but retain suitable habitat for foraging and travel ways (>50% canopy closure for most treated stands). The other proposed activities for this alternative would not have measurable short or long term effects to habitat suitability, and will not be further analyzed here.

Key Habitat (denning sites)
There is no key habitat identified within the project area. Therefore there are no direct or indirect effects expected for key habitat for marten, fisher, or Sierra Nevada red fox from project implementation.

Disturbance Effects
Project activities may take place during breeding or young rearing periods. Noise disturbance resulting from the mechanical treatments and physical disturbance of den locations would not be expected because these areas are not expected to support denning by these species. Marten have been detected within the project area and near it during past surveys. Fisher and SNRF have not been detected to date either within the project area or on the district. Should either species be present within the project area, these effects are unlikely to affect more than one or two individuals, due to large species home ranges and the relatively low percentage of home range habitat potentially affected. Should disturbance occur during foraging or travel activities, the result would be temporary displacement of individuals. No effects on reproduction, population numbers, or species viability would be expected to occur.

Cumulative Effects – Alternative 1

A total of 1,239 acres (18%) of the 6,810 acre analysis area has seen past or planned future moderate alteration of habitat from previous activities. These past and foreseeable future alterations have/would generally reduce denning habitat capability, but retain

foraging habitat suitability for marten, fisher, and Sierra Nevada red fox. The proposed action would add 220 acres of habitat alteration to the existing 1,239 acres. These 220 acres affected presently provide low habitat suitability due to disturbance and continuing habitat alteration associated with the highway corridor. Early treatments in the analysis area tend to have less of an effect as time passes, depending on the type of treatment. The proposed action contributes to cumulative effects, mainly by adding approximately a 3% increase in short term degradation of habitat within the treated area. This slight reduction is not expected to reduce the number of marten, fisher, and Sierra Nevada red fox that can be supported in the analysis area.

As with spotted owl and goshawk habitat, where this alternative increases fire resiliency and protects suitable habitat within and outside of the proposed units from future wildfires, it may increase the amount of habitat that remains available to marten, fisher, and Sierra Nevada red fox in the long-term when considered with other present and foreseeable projects. Marten are currently believed well distributed across the cumulative effects analysis area, and the Amador Ranger District, without evidence of population or habitat gaps.

Determination
The Proposed Action, Alternative 1, may affect individual American marten, Pacific Fisher, and Sierra Nevada Red Fox's but is not likely to result in trend toward Federal listing or loss of species viability.

Direct, Indirect, and Cumulative Effects – Alternative 2

Pacific fisher is believed to have been extirpated from the Eldorado National Forest in the last century. Several project area track plate/camera surveys have occurred on the ENF in compliance with 1992/1993 Regional survey protocols. All surveys have had negative results for fisher. In addition, the Pacific Southwest research station surveyed sample points over a 10 km grid spacing aligned with National Forest Inventory vegetation sampling points across the forest (Zielinski et al. 1997). The sampling design for this survey effort was designed to provide information about regional distribution. Negative results of this survey provide further indication that fisher, if they occur on the ENF, are likely at very low densities. Where they presently occur, Pacific Fisher inhabit similar habitat to marten, although at lower elevations, overlapping between 5,000 to 7,000 feet. Habitat suitable for marten would be expected to provide suitable habitat for Pacific fisher because known habitat preferences are similar to marten with the possible exception of elevation. Because Pacific fisher is believed to be extirpated, marten habitat will be used to analyze for effects to Pacific fisher habitat.

Sierra Nevada red fox (SNRF) current distribution and population is uncertain. Complicating an assessment of their status is the fact that California is home to both the indigenous SNRF and not-native introduced red fox. The SNFPA FEIS summarizes the recent information about both of this species and is incorporated by reference (USDA 2001b:Vol.3, Ch.3, part 4.4, pages 2-6 and 19-44). There have been sightings in the last year of Sierra Nevada red fox on the neighboring Stanislaus National Forest. The extent of and health of this population is not presently known. Sierra Nevada red fox inhabit forested areas interspersed with riparian and meadow habitat, and brush fields. Preferred forest types include red fir, lodgepole pine and sub alpine fir in the higher elevations of the Sierra Nevada (Schempf and White 1977). In the northern Sierra Nevada, most

records occur in fir and mixed conifer types, with a large number of sightings also in pine and lodgepole. In the southern Sierra, most sightings were in mixed conifer forests, although lodgepole pine and fir were also important (Schempf and White 1977).

Although no specific criteria for analyzing red fox habitat has been developed and little is known about this species, it is assumed that red fox may be more adaptable than other furbearers. Further, it is assumed that if the more restrictive habitat requirements of fisher, marten, willow flycatcher, and California spotted owls are provided, the habitat requirements would be met for red fox (Freel 1991). For this reason the SNRF will be included here with marten and fisher habitat for effects.

American marten appear to be well distributed above 5,500 feet in elevation on the Eldorado National Forest based on incidental sightings and track plate/camera surveys. Preferred marten habitat is characterized by dense (60 to 100% canopy), multi storied, multi species late seral coniferous forests with a high number of large (> 24 inch dbh) snags and downed logs (Freel 1991). These areas are often in close proximity to both dense riparian corridors used as travel ways and interspersed small (<1 acre) openings with good ground cover used for foraging. Forest stands dominated by Jeffrey pine did not appear to support marten on the Tahoe National Forest (Martin 1987).

Under No Action current management, the existing conditions and associated risks of wildfire, and habitat loss outside of the highway corridor would continue unchanged. There would be no increased capacity for fire suppression along and adjacent to the highway corridor. Nearby martin habitat is likely to suffer more intense and larger wildfires, than would be expected to occur with any of the three action alternatives. The no action alternative would therefore provide less protection for existing habitat, and could in the longer term result in loss of habitat that might be retained with the implementation of an action alternative.

Direct and Indirect Effects – Alternatives 3 and 4

Direct and indirect effects of Alternative 3 and 4 are similar enough to each other as to be difficult to show any difference to marten, fisher, and Sierra Nevada red fox habitat. Based on the modeling there is little canopy closure difference between Alternatives 3 and 4 when compared to Alternative 1, but it would seem likely that retaining more large trees per acre would result in some difference in the arrangement, if not the total canopy closure after thinning. For this analysis a 1-5% increased retention of canopy closure was assumed. Both of these alternatives are anticipated to be similar for marten, fisher, and Sierra Nevada red fox, and their habitat as Alternative 1, with the following exceptions: 1) Retention of trees above 16” and 10” DBH within all proposed thinning units would retain more larger trees. For this analysis a 1-5% increased retention of effective canopy closure was within the proposed thinning units. 2) Thinning units 9, 12, 13, 54, 57, 63, and 74 would be dropped, with no reductions outside of hazard tree removals. Fuels objectives would be met within all proposed units under both Alternatives 3 and 4; therefore, wildfire protection and resiliency would be achieved in a similar manner to Alternative 1. The slightly high canopy closure retention may provide slightly higher quality foraging habitat, but foraging habitat is compromised to some extent due to the highway corridor use and management. As has been discussed, denning habitat is not believed to be present in the project. No other direct or indirect effects to habitat would be expected due to treatment changes from Alternative 1. Disturbance effects would be

essentially the same as in the proposed action; temporary displacement of individuals, but no effects to reproduction would be expected.

Cumulative Effects – Alternatives 3 and 4

Similar to the Proposed Action, Alternatives 3 and 4 would contribute to cumulative effects, mainly through a short term degradation of habitat from adding approximately a 3% increase in treated area. However, neither alternative is expected to reduce the number of marten, fisher, or Sierra Nevada red fox that could be supported in the analysis area. To the degree that this alternative increases fire resiliency and protects suitable habitat both inside and outside of the proposed units from future wildfires, it may increase the amount of habitat that remains available to marten, fisher, and Sierra Nevada red fox in the long-term when considered with other past, present, and foreseeable projects. Marten are currently well distributed across the cumulative effects analysis area, and the Amador Ranger District, without evidence of population or habitat gaps.

Determination
Alternatives 3 and 4 may affect individual American marten, Pacific Fisher, and Sierra Nevada Red Fox's but are not likely to result in trend toward Federal listing or loss of species viability.

Pallid Bat

Direct and Indirect Effects – Alternative 1

Pallid bat tends to be both a roosting and foraging generalist. Suitable roost sites, such as large snags, oaks and rock crevices; suitable foraging occurs from grasslands to higher elevation coniferous forests. For this reason all acres within the project area which are proposed for treatment are considered to be suitable habitat for this species. Because pallid bats use of a variety of habitats, no key habitat has been defined for this species. Direct effects are limited to the area that is currently suitable for Pallid bat roosting or foraging.

Suitable Habitat
Conservation measures considered important to pallid bats include promoting development of hardwood stands and maintaining existing oaks; creating open understories that allow for flight; reducing overstocked conditions; and maintaining a mosaic of shrub cover as opposed to dense, continuous stands (USDA Forest Service 2001). Removal of hazard trees, particularly large oaks, could remove roosts utilized by pallid bat. None of the action alternatives would purposely remove oaks unless they pose a hazard to human health or safety, typically within the identified hazard tree removal units and zones along roads, or landings. This project may improve stand characteristics for pallid bat by increasing the openness of the understory that would likely favor foraging by this species. There would be no removal of large conifer snags outside of hazard trees, and these small decreases would not be expected to limit habitat utilization or reduce habitat capacity for this species.

All action alternatives may positively affect the quality of future pallid bat habitat. Snag and large tree retention under all action alternatives would retain legacy structure, well

distributed across the landscape. Retention of the largest snags maximizes the potential that these snags would remain standing and contribute to structural heterogeneity into the future.

Disturbance Effects
Disturbance could occur to day roosting bats where roosting location coincide with project activities. The amount of potential disturbance and effect on individuals is difficult to assess as the pallid bat population status and use of the project area is not known. Temporary displacement would be possible where roosting sites and project activities coincide. Due to the wide variety of roosting habitats used, the action alternatives would not be expected to have any long term population effects on this species, as few individuals would be likely to be affected.

Cumulative Effects – Alternative 1

Affects from the action alternatives would not result in adverse cumulative effects on this species and future actions on National Forest lands are likely to be complementary to these measures. Snags and oaks are retained in large numbers under current Forest Plan direction, except where they are hazard trees within recreational sites, administrative sites, and along important roadways. Therefore, cumulative effects to the pallid bat from activities on National Forest lands should be quite limited. Where this project opens up the understory and improves oak health and vigor it may result in a small improvement in pallid bat habitat and would not contribute to substantial cumulative impacts. As there are minimal direct and indirect affects expected, with the possible exception of inadvertent disturbance affects, no further analysis of cumulative effects will be discussed here.

Determination
Alternatives 1, 2, or 3 may impact individual pallid bat but is not likely to result in trend toward Federal listing or loss of species viability.

Direct, Indirect, and Cumulative Effects – Alternative 2

Pallid bat is a designated sensitive species for the ENF. Throughout California, the pallid bat is usually found in low to middle elevation habitats below 6,000 feet elevation. (ENF 2001), however, the species has been found up to 10,000 feet in the Sierra Nevada (ENF 2001). Pallid bats are most common in open, dry habitats that contain rocky areas for roosting. They are a year-long resident in most of their range and hibernate in winter near their summer roost (Zeiner et al. 1990). Day roosts may vary but are commonly found in rock crevices, tree hollows, mines, caves, and a variety of human-made structures. Tree roosting has been documented in large conifer snags, inside basal hollows of redwoods and giant sequoias, and bole cavities in oaks (ENF 2001). Cavities in broken branches of black oak are very important and there is a strong association with black oak for roosting (ENF 2001).

Pallid bat are known to feed predominantly on ground-dwelling arthropods, such as scorpions and Jerusalem crickets (USDA 2001b). Foraging occurs over open ground, where pallid bats are more often found along edges and open stands, particularly hardwoods (USDA 2001b).

There are no known mine or cave sites within the project area that would provide suitable roosting habitat in rock crevices. Large conifer snags and bole cavities in oaks for

roosting are also present in the project area, but are scarce due to highway corridor management within the immediate 200 foot strip either side of the highway. There have been no comprehensive surveys for pallid bat on the ENF. Surveys associated with the SNFPA were conducted in 2001 for pallid bats along the Highway 50 corridor about 20 miles north of the project area. There was a capture of a pallid bat during that survey effort (ENF 2002).

Under No Action current management, the existing conditions and associated risks of wildfire, and habitat loss outside of the highway corridor would continue unchanged. There would be no increased capacity for fire suppression along and adjacent to the highway corridor. Nearby pallid bat habitat is likely to suffer more intense and larger wildfires, than would be expected to occur with any of the three action alternatives, including the loss of the limited number of existing large conifer snags and oak bole cavities. The no action alternative would therefore provide less protection for existing habitat, and could in the longer term result in loss of habitat that might be retained with the implementation of an action alternative.

Direct, Indirect, and Cumulative Effects – Alternatives 3 and 4

Direct, indirect, and cumulative effects of Alternatives 3 and 4 are similar enough to Alternative 1 as to be difficult to show differences to any pallid bat or their habitat. The potentially higher retention of canopy closure under Alternatives 3 or 4 would not be expected to affect pallid bat habitat noticeably different than Alternative 1. No difference in direct, indirect effects or cumulative effects is evident between the three action alternatives for this species.

Townsend's Big-Eared Bat

Direct and Indirect Effects – Alternative 1

There is no known roosting habitat, effects conclusions for Townsend's big-eared bat are essentially the same for all action alternatives as was discussed for the pallid bat. Changes in canopy closure may open up stands and improve foraging efficiency. All action alternatives would retain a variety of habitat associations, and would not result in the removal of any abandoned building or structures (key habitat) that might provide habitat. This project would not be expected to affect habitat capability for this species.

Disturbance

Disturbance to this species is unlikely, because no roosting locations are expected to be affected, and most project activities would take place during the day when bats are not actively foraging. No temporary displacement of individuals or affects on reproduction is expected to occur for this species should any of the action alternatives be implemented.

Cumulative Effects – Alternative 1

As stated previously action alternatives would not affect key habitat for this species, and minimal direct or indirect affects would be expected to result from the proposed treatments of presently suitable habitat within the project area/cumulative effects area. Since all of the action alternatives are unlikely to result in direct or indirect effects to Townsend's big-eared bats, they would also not contribute to adverse cumulative effects.

Determination
Alternatives 1, 3 and 4, the action alternatives, will have no impact upon Townsend's big-eared bat and would result in no loss of species viability.

Direct, Indirect, and Cumulative Effects – Alternative 2

Townsend's big-eared bats are associated with a variety of habitats including desert, native prairies, coniferous forests, mid-elevation mixed conifer, mixed hardwood-conifer forests, riparian communities, agricultural lands, and coastal habitats. For this reason, the entire project area is believed to provide suitable habitat. Key habitats for this species appear to be roosting sites. Key habitat for Townsend's big-eared bats is roosts sites. This species is highly selective in their choice of roost locations, which include old buildings, mines, or caves that remain undisturbed. No roosting structures have been identified within any of the treatment areas; therefore, key habitat will not be affected, nor analyzed further here.

Direct, Indirect, and Cumulative Effects – Alternatives 3 and 4

There is no known roosting habitat in the project are so effects conclusions for Townsend's big-eared bat are essentially the same for all action alternatives as was discussed for the pallid bat. Changes in canopy closure may open up stands and improve foraging efficiency. All action alternatives would retain a variety of habitat associations, and would not result in the removal of any abandoned building or structures (key habitat) that might provide habitat. This project would not be expected to affect habitat capability for this species.

Migratory Landbird Conservation

The direct, indirect and cumulative effects to migratory landbirds are summarized from the Migratory Landbird Conservation on the Eldorado National Forest.

Direct, Indirect, and Cumulative Effects - Alternatives 1, 3, and 4

All Action alternatives would produce similar effects for migratory landbirds and will be discussed together here. Under all action alternatives the project design criteria would reduce effects and maintain habitat to the greatest extent possible, while meeting the purpose and need of the project and safety needs for project implementation (hazard tree removal). While the View 88 project is designed to avoid or reduce various impacts to migratory birds (loss of habitat, reduction in nesting potential or direct disturbance or morality), some migratory birds might be killed or harmed through project activities such as harvesting, prescribed burning, and associated equipment use.

Direct and indirect impacts to habitats and migratory bird populations expected from the action alternatives are summarized below:

- There would be reductions in the medium to large tree cover and snag habitat along the State Route 88 highway corridor, as tree and snags would be removed to reduce fuel loading, reduce hazards, and meet project purposes and needs. As a general rule, canopy closure would be reduced by 10-15% across treated stands.

- Due to the limited area affected and linear nature of the impact across diverse habitats, the project would not adversely impact migratory land bird species or their associated habitats over the larger adjacent area.
- Potential impacts to migratory species would be minimized through the adherence of Forest Plan Standards and Guidelines for snags/down woody debris within the larger stand context, limited ground disturbance, and maintenance of canopy closure where it does not compromise the safety and project objectives.
- The majority of the project takes place along a major ridge system and out of most riparian areas; riparian reserve buffers would be implemented to insure that few impacts to riparian areas and associated species would occur.

When considered with other past present and foreseeable projects (see Appendix A), the action alternatives are expected to increase fire resiliency and protect migratory landbird habitat within the project units and for adjacent suitable habitat in the project area from future high intensity wildfires. Therefore, the action alternatives are likely to increase the amount of habitat that remains available to migratory landbirds in the long-term.

Direct, Indirect, and Cumulative Effects – Alternative 2

Under current management, and the No Action alternative, the existing conditions and associated risks of wildfire and habitat loss within and outside of the highway corridor would continue unchanged. There would be no increased capacity for fire suppression along and adjacent to the highway corridor, and nearby migratory landbird habitat could suffer more intense and larger wildfires than would be expected to occur with any of the action alternatives. The no action alternative would therefore provide less protection for existing high quality habitat, and could in the longer term result in loss of habitat that might be retained with the implementation of the action alternatives.

Because there would be no activities associated with project implementation under the No Action alternative, there would be no direct or indirect effects to contribute to cumulative effects.

Terrestrial Management Indicator Species

The direct, indirect and cumulative effects to terrestrial wildlife are summarized from the Biological Evaluation and Assessment for Terrestrial Management Indicator Species Report (Loffland, 2011).

Shrubland (West-Slope Chaparral) Habitat (Fox Sparrow) MIS

Direct and Indirect Effects to Habitat – Alternatives 1, 3, and 4

There is less than 1/2 acre of fox sparrow habitat within the units dropped to create alternative 3 and 4, so there is a negligible difference in total acres of habitat effect among all action alternatives, and they will be analyzed together. There would be no net loss or gain in the amount of these habitat types. Most of the 89 acres would likely be avoided during harvest, hazard tree removal, and thinning treatments, and is expected to remain unchanged by the other proposed treatments. Prescribed piling and burning is not expected to either remove or create any habitat for this species. As a general rule chaparral shrubland habitat types respond favorably to prescribed fire or wildfire, with a short 1-2 year reduction in structure utilized for nesting immediately following the fire.

Piling and burning is the only proposed treatment that is likely to have an effect on this habitat and species. Piling and prescribed burning would help regenerate increased new growth and shrub vigor on portions of the 89 acres of existing habitat where pile burning and prescribed burning would occur. Prescribed burning would not cause a net loss or gain in the amount of this habitat type.

Cumulative Effects – Alternatives 1, 3, and 4

Past management, and naturally occurring events within the project area include, grazing, wildfire, timber harvest, highway corridor use and maintenance, roads created for timber harvest, dispersed camping, fire suppression, and off-highway vehicle use. Appendix A lists past, present and future projects. These past and present activities have had and would have short term effects on chaparral shrubland habitat types, usually resulting in short term increases in younger age classes, but with little change in the total acreage in these habitat types.

As this alternative would neither create, nor remove any of the habitat for fox sparrow; no cumulative effect would result from implementation of the proposed action.

Direct and Indirect Effects to Habitat – Alternative 2

Under Alternative 2, the No Action alternative, the risk of a large wildfire in the project area would be greater than under Alternatives 1, 3 and 4. As a general rule these habitat types respond favorably to wildfire, with a short 1-2 year reduction in structure utilized for nesting immediately following the fire. The potential effects of a large wildfire could include a short-term (generally <10 years) increase in shrub vigor and overall decrease in age of plants occupying the habitat in the project area. The severity and extent of such effects from large wildfires is highly variable.

Cumulative Effects - Alternative 2

The cumulative effects for Alternative 2 are expected to be the same as Alternative 1, except the beneficial effects of the canopy closure reductions and burning would not occur unless wildfire occurred in this area in the same time frame. No net increase or decline in habitat acres would occur.

As this alternative would neither create, nor remove any of the habitat for fox sparrow; no cumulative effect should result from implementation of the no action alternative.

Oak-Associated Hardwoods and Hardwood/Conifer Habitat (Mule deer)

Direct and Indirect Effects to Habitat – Alternatives 1, 3, and 4

Presently there 11 acres of within units proposed for treatment, within the habitat type analyzed for this species here. There are approximately 3 acres of mule deer habitat within the units which were dropped to create alternative 3 and 4, so there is only a small difference in total acres of habitat effect from what was analyzed for Alternative 1, and all of the action alternatives will be analyzed together to avoid needless repetition. The proposed thinning, hazard tree removal, plantation thinning, piling and burning would enhance conditions for the oak-associated hardwoods. There would be a reduction in competition with the conifers (average 13-15% reduction in canopy closure) within the commercial treatment units, resulting in reduced shading and more available water for the

oaks, which should increase vigor of existing oaks and may stimulate stump sprouting, and seedling growth where openings are of sufficient size. In addition, removal of competing conifers to enhance and visually highlight oaks is an objective of all action alternatives.

Cumulative Effects to Habitat – Alternatives 1, 3, and 4

Past management, and naturally occurring events within the project area include, grazing, wildfire, timber harvest, highway corridor use and maintenance, roads created for timber harvest, dispersed camping, fire suppression, and off-highway vehicle use. Appendix A lists past, present and future projects. As a general rule, these past and present activities have had and would have short term effects on these habitat types, resulting in short term increases in younger age classes, but with little change in the total acreage in these habitat types.

As this alternative would neither create, nor remove any of the habitat type, the amount of habitat within proposed treatment areas is small (8-11 acres), and the action alternatives would improve oak vigor in these area. No adverse cumulative effect would result from implementation of and of the action alternatives.

Direct and Indirect Effects to Habitat – Alternative 2

Under Alternative 2, the No Action alternative, the risk of a large wildfire in the project area would be greater than under Alternative 1. As a general rule oak habitat types respond favorably to a reduction in conifer competition after wildfire, but often there is also a reduction in mature oak which produce mast for mule deer, depending on the severity of the fire and associated oak tree mortality. Increased stump sprouting, and increases in age class of oak trees are a common response to wildfire. The timing, severity and extent of such effects from large wildfires are highly variable and depend on many factors.

Cumulative Effects to Habitat - Alternative 2

The cumulative effects for Alternative 2 are retention at present levels for these habitat types, with no beneficial effects for conifer canopy closure reductions, unless a large scale wildfire occurred in this area. Without a large wildfire, no net increase or decline in habitat acres would occur.

This alternative would neither create, nor remove any of the habitat type, and the amount of habitat within proposed treatment areas is small (11 acres), no measurable adverse cumulative effect should result from implementation of the no action.

Early and Mid Seral Coniferous Forest Habitat (Mountain quail)

Direct and Indirect Effects to Habitat – Alternative 1

There would be an approximately 8 acre conversion of present mid seral quail habitat to non-quail habitat within the aspen treatment stands which would move to an aspen type post project and no longer meet the habitat types described for mountain quail. Elsewhere in the project, where early and mid seral habitat exists now, it would persist after project implementation.

The project would not initially change size class or development of early to mid seral conifer habitat classes. The understory shrub canopy closure would be reduced to a much

larger extent than the projected 10-15% overstory canopy closure reduction in the thin and burn units. The units would regain shrub canopy in a relatively short period (1-5 years) without further treatment. Increased vigor within treated acres would produce longer term (+5 years) favorable effects for mountain quail.

The reduction in tree densities associated with thinning and burning would increase the rate of growth of remaining trees, and shorten the timeframe for these habitat types to mature from early to mid, and mid to late seral stages. The extents to which this effect would be realized, and the timing of these transitions, are difficult to quantify.

Cumulative Effects to Habitat – Alternative 1

Past management, and naturally occurring events within the project area include, grazing, wildfire, timber harvest, highway corridor use and maintenance, roads created for timber harvest, dispersed camping, fire suppression, and off-highway vehicle use. Appendix A lists past, present and future projects. As a general rule, these past and present activities have had and will have short term effects on the shrub component of these habitat types, resulting in short term increases in younger age classes, but with little change in the total acreage in these habitat types.

As this alternative would only remove 8 acres of the existing 1,365 acres of mid seral habitat, and would not remove or create any of the early seral habitat type, only short term adverse cumulative effects would result from the proposed action. The extent to which this action moves these habitat types out of the early and moderate seral stages over time would contribute to longer term adverse cumulative effect to quantities of early/mid seral habitat types. These effects are being offset to some degree by wildfire elsewhere in the Sierra Nevada.

Direct and Indirect Effects to Habitat – Alternative 2

Under Alternative 2, the No Action Alternative, the risk of a large wildfire in the project area would be greater than under Alternative 1. As a general rule these habitat types respond favorably to wildfire, with a short 1-2 year reduction in structure utilized for nesting and hiding cover immediately following the fire. The potential effects of a large wildfire could include a short-term (generally <10 years) increase in shrub vigor and overall decrease in age of plants occupying the habitat in the project area. The severity and extent of such effects from large wildfires are highly variable.

Cumulative Effects to Habitat - Alternative 2

The unpredictable nature of wildfire makes the cumulative effects for Alternative 2 difficult to assess for these habitat types. Without a wildfire in the same time frame (next 1-5 years) there would be no net habitat increase, and the current slow decline in habitat acres would continue.

As this alternative would neither create, nor remove any of the habitat type, the ongoing long term trends toward late seral habitats would continue, reducing habitat for this species over time. These effects are being offset to some degree by wildfire elsewhere in the Sierra Nevada.

Direct and Indirect Effects to Habitat – Alternatives 3 and 4

The effects of Alternatives 3 and 4 are similar to those discussed for Alternative 1, with the main exception of aspen stands treated under this alternative would be expected to remain mid-seral quail habitat, post implementation, as the larger tree conifer component would remain in these stands (retaining the total 1,365 acres of habitat). Elsewhere the retention of the larger trees would be expected to have a negligible affect on habitat quality and quantity from Alternative 1.

Cumulative Effects to Habitat - Alternatives 3 and 4

Cumulative effects are anticipated to be the same for these habitat types as Alternative 1. As this alternative would neither create, nor remove any of these habitat types, no short term adverse cumulative effects would be expected from Alternatives 3 or 4. The extent to which these alternatives move these habitat types out of the early and moderate seral stages over time would contribute to longer term adverse cumulative effect to quantities of early/mid seral habitat types. These are being offset to some degree by wildfire elsewhere in the Sierra Nevada.

Late Seral Open Canopy Coniferous Forest Habitat [Sooty (blue) grouse]

Direct and Indirect Effects to Habitat – Alternative 1

Approximately 3 acres of this habitat may be gained, as there treatments may enlarge some existing small pockets to the point at which canopy closure would be low enough to meet habitat characteristics of sparse or poor in late seral stands. In general would likely be little change in the existing habitat, as they are presently in a condition which meets the purpose and need, and as such would see little alteration in the existing large tree and canopy components. Where late seral open habitat exists now, it would persist after project implementation. Where understory trees are removed by either thinning or prescribed burning, this MIS species may be benefited as these small changes would prolong the time that these open canopied stands would remain open canopied.

Cumulative Effects to Habitat – Alternative 1

Past management, and naturally occurring events within the project area include, grazing, wildfire, timber harvest, highway corridor use and maintenance, roads created for timber harvest, dispersed camping, fire suppression, and off-highway vehicle use. Appendix A lists past, present and future projects. Past and present activities have had and will have short term effects on these habitat types, usually resulting in short term increases in younger understory shrub age classes, and sparser overstory conifer canopy closure but with little change in the total acreage in these habitat types.

The Proposed Action would only affect 177 acres of these habitat types, and would neither create nor remove any of the habitat type. Alternative 1 would remove understory and thin trees while retaining many of the large trees, which may prolong the time that these habitat types persist. There would be no long term adverse cumulative effects to late seral open canopied habitat from implementation of the Proposed Action.

Direct and Indirect Effects to Habitat – Alternative 2

Under Alternative 2, the No Action alternative, the risk of a large wildfire in the project area would be greater than under Alternative 1. As a general rule, if these habitat types are in large enough blocks, they respond favorably to wildfire because the low canopy closure, height, and size of the trees allow fire to pass through mature open canopied

stands without crown fire. In this project area, the patches of these habitat types are too small and scattered to exert more than a small influence to change fire behavior from a crown fire. The no action alternative would be expected to result in more active crown fire, and would likely result in losses of this habitat type in the event of a wildfire in the project area. The severity and extent of effects from large wildfires is highly variable.

Cumulative Effects to Habitat - Alternative 2

The unpredictable nature of wildfire makes the cumulative effects for Alternative 2 difficult to assess for these habitat types in the project area. Without a wildfire in the same time frame as the project (next 1-5 years), there would be no net decrease, and the current slow decline in habitat acres, as canopy closure increases, would occur.

As this alternative would neither create, nor remove any of the habitat type, the ongoing long term trends toward late seral, closed canopied habitats would continue, reducing habitat for sooty (blue) grouse over time.

Direct and Indirect Effects to Habitat – Alternatives 3 and 4

Direct and indirect effects of Alternatives 3 and 4 are anticipated to be similar for these habitat types as Alternative 1, the slightly higher canopy retained through retention of more trees over 16 or 10 inch DBH, would not appreciably affect the existing 153 acres, and would not result in either creation or loss of late seral sparse canopied conifer habitat.

Cumulative Effects to Habitat - Alternatives 3 and 4

Cumulative effects are anticipated to be essentially the same for these habitat types as described for Alternative 1. As this alternative would neither create, nor remove any of the habitat type, the ongoing long term trends toward late seral, closed canopied habitats would continue, reducing habitat for this species over time.

Late Seral Closed Canopy Coniferous Forest Habitat (California spotted owl, American marten, and northern flying squirrel)

Direct and Indirect Effects to Habitat – Alternative 1

These habitat types would see very little change in habitat quantity, approximately 3 acres associated with the edges of plantation treatment stands would no long retain canopy closure sufficient to be habitat for these species. Outside of these areas, the thinning and burning are expected to retain canopy closure above 50% canopy closure, where it currently exists. There would be little change in tree size class, but canopy closures would be reduced by 10-15% on average. Retention of all trees over 30 inches DBH in size class 5 moderate and dense canopied portions of units 1 and 5 (a total of 35 acres), would retain the large tree component, and lessen canopy closure reductions in these areas. Effects on all of the 150 acres of dense canopied habitat would be movement from dense canopy closure (60-100% canopy closure), to moderate canopy closure (40-59%). This would reduce habitat quality for spotted owl nesting, marten denning, and flying squirrel habitat. However, habitat capability is presently low due to the high level of disturbance related to the Highway 88 corridor. The existing habitat would be expected retain its existing capability for foraging for all these species.

Cumulative Effects to Habitat – Alternative 1

Past management, and naturally occurring events within the project area include, grazing, wildfire, timber harvest, highway corridor use and maintenance, roads created for timber harvest, dispersed camping, fire suppression, and off-highway vehicle use. Appendix A lists past, present and future projects. As a general rule, these past and present activities have had and will have short term effects on these habitat types, usually resulting in short term increases in younger age classes, and sparser canopy closure but with little change in the total acreage in these habitat types. These past and future actions typically reduce nesting/denning habitat capability for these species.

The lack of change in existing habitat capability due to highway disturbance, on 150 of the present 153 acres affected by the Proposed Action alternative, will not alter existing trend in habitat for this habitat type, or associated species.

Direct and Indirect Effects to Habitat – Alternative 2

Under Alternative 2, the No Action alternative, the risk of a large wildfire in the project area would be greater than under Alternative 1. The No Action alternative would be expected to result in more extensive active crown fire, when compared to the proposed action, or alternatives 3 and 4, and would likely result in losses of this habitat type in the event of a wildfire. As a general rule, these habitat types experience varying degrees of high mortality from wildfire, resulting in lower canopy closure, and reduced numbers of large trees. They are also more likely to be converted to early seral or open canopied late seral habitat types by wildfire. The severity and extent of such effects from large wildfires is highly variable.

Cumulative Effects to Habitat - Alternative 2

The unpredictable nature of wildfire makes the cumulative effects for Alternative 2 difficult to assess for these habitat types. Without a wildfire in the same time frame as the project (next 1-5 years) there would be no net decrease, and the existing habitat acres would be maintained. As canopy closure increases and tree associated tree density increases, these stands would become more susceptible to insect and disease mortality.

The lack of change, on the present 153 acres, of habitat affected by the No Action alternative, will not alter existing trend in habitat for this habitat type, or associated species.

Direct and Indirect Effects to Habitat – Alternatives 3 and 4

Direct and indirect effects of Alternative 3 and 4 are anticipated to be similar for these habitat types as Alternative 1, the retention of the smaller trees 10-16 inch dbh, and associated canopy closure retention would not increase vulnerability of the stands to fire, and would retain slightly higher habitat capability than under the proposed action. The same 3 acres of habitat that would change to non-habitat under Alternative 1, would also change to non-habitat under this alternative.

Cumulative Effects to Habitat - Alternatives 3 and 4

Cumulative effects are anticipated to be similar for these habitat types as Alternative 1, with similar fire resilience, and slightly higher habitat capability than Alternative 1. The

lack of change, on 150 of the present 153 acres, of habitat affected by these alternatives, will not alter existing trend in habitat for this habitat type, or associated species.

Snags in Green Forest Ecosystem Component (Hairy woodpecker)

Direct and Indirect Effects to Habitat – Alternative 1

Within the aspen treatment units, and proposed plantation units there would be a total loss of habitat of 68 acres (total of 1,585 acres of habitat remaining post implementation). The aspen treatment units would no longer be characterized as conifer stands, and the plantations would no longer have sufficient canopy closure to meet habitat description standards. Outside of these areas, there would be little effect to snag habitat on the interior of commercial thin units, as snags would be retained unless they pose a human health and safety hazard. There would be a reduction in snags adjacent to roads and landings, 1-1 ½ tree heights distance from these features. Due to the narrow swath ¼ mile either side of the highway of the project area, and existing road systems outside of the highway which would be used to implement the proposed action, these interior areas are not expected to be very large or continuous. Removal of hazard trees would further reduce snag habitat to a limited degree in these areas, because removal of hazard trees and snags is an ongoing effect on this habitat near roads. The limited removal of larger trees would slightly reduce the future potential numbers of larger snags in these stands. Habitat that is presently suitable for hairy woodpecker would remain suitable, but capability may be reduced primarily due to changes in snag quantities in roadside areas.

Cumulative Effects to Habitat – Alternative 1

Past management, and naturally occurring events within the project area include, grazing, wildfire, timber harvest, highway corridor use and maintenance, roads created for timber harvest, dispersed camping, fire suppression, and off-highway vehicle use. Appendix A lists past, present and future projects. The past and present activities have had, and will have effects on these habitat types, by reducing snags and trees for future recruitment as snags. This has had, and will likely continue to have lower densities of snags than areas outside of the highway corridor.

The proposed action would continue the relatively low densities of snags within this area, but will not affect snag densities outside of the project area. The continued affects on these acres of habitat are not substantial, when compared to the large amount of habitat elsewhere for this species, and will not alter existing trend in habitat for this habitat type, or associated species.

Direct and Indirect Effects to Habitat – Alternative 2

Under Alternative 2, the No Action alternative, the risk of a large wildfire in the project area would be greater than under Alternative 1. The no action alternative would be expected to result in more active crown fire, when compared to the proposed action and alternatives 3 and 4, and could result in losses of this habitat type in the event of a wildfire. As a general rule this habitat type experiences varying degrees of high mortality fire, resulting in lower canopy closure, and reduced numbers of large trees, snags, and down logs, at least initially, and may be converted to early seral or open canopied late seral habitat types. Where fire does not burn at high severity and result in high mortality rates, snag reductions would be offset by snag recruitment. The severity and extent of effects from large wildfires is highly variable.

Cumulative Effects to Habitat - Alternative 2

The unpredictable nature of wildfire makes the cumulative effects for Alternative 2 difficult to assess for these habitat types. Without a wildfire in the project time frame (next 1-5 years) there would be no net decrease, and existing habitat acres would be maintained. As canopy closure increases and tree associated tree density increases, these stands may become more susceptible to insect and disease mortality, which is likely to result in the recruitment of medium to large snags into these stands.

The no action alternative will continue the removal of snags, at a slower rate than the proposed action, resulting in relatively low densities of snags within this area, but will not affect snag densities outside of the project area. The continued effects on these acres of habitat are not substantial when compared to the large amount of habitat elsewhere for this species, and will not alter existing trends in habitat for this habitat type, or associated species.

Direct and Indirect Effects to Habitat – Alternatives 3 and 4

Direct and indirect effects of Alternatives 3 and 4 are anticipated to be essentially the same as for the proposed action; the dropping of seven units (as compared to the proposed actions) would retain 1,593 acres of habitat for this species. This is an eight acre increase in the suitable habitat retained for this species. The change of diameter harvested for these two alternatives would not be expected to affect habitat quality or quantity.

Cumulative Effects to Habitat - Alternatives 3 and 4

Cumulative effects are anticipated to be very similar for these habitat types as Alternative 1, with the only difference being the slight increase in acres of retained habitat (8 acres) when compared to Alternative 1.

Alternatives 3 and 4 would continue the relatively low densities of snags within this area, but would not affect snag densities outside of the project area. The continued effects on these acres of habitat are not substantial, when compared to the large amount of habitat elsewhere for this species, and will not alter existing trend in habitat for this habitat type, or associated species.

Economic Viability

The direct, indirect and cumulative effects to economics are summarized from the Economic Viability Analysis (Sweetman & Carroll, 2011).

Direct, Indirect, and Cumulative Effects - Alternative 1

Forest vegetation simulation (FVS) model estimates of merchantable biomass that would be removed are 1,240 cubic feet per acre (5,600 board foot per acre). Timber products from the project area under Alternative 1 include saw-logs for the manufacture of lumber; wood chips for particle board construction and cogeneration of power; commercial firewood and public firewood use.

A preliminary appraisal of the View 88 project proposed action estimates the value of the timber products on this project to be approximately $310,000. These generated funds would be available toward completion of fuel treatments (sub-merchantable tree removal,

and post-harvest piling and burning), precommercial thinning, and noncommercial tree stand improvement along non-commercial unit portions of Highway 88. These funds would also provide funding for road maintenance and reconstruction costs.

Local sub-contractors would be hired by the Purchaser of the contract to perform road reconstruction work, road maintenance work and stewardship projects (grapple piling & tractor piling, etc.). This project would help to sustain approximately 350 jobs in Amador, Eldorado and Placer counties.

In response to public comments, an economic analysis with updated costs and revenues displays the following for the Proposed Action, Alternative 1:

The cost of sale preparation includes performing unit layout, including the flagging, GPS data collection and boundary posting of all treatment units and costs are relatively constant. It is further estimated that the costs of sale or project administration would remain largely constant on an acreage basis. The following costs are considered to be reasonable estimates for this project.

Table 13 Estimated planning, sale prep, contract administration, piling, burning costs:

Activity	Estimated Cost/acre
Initial Project Field Layout [1]	$10
NEPA Analysis [1,2]	$185
Timber marking, sale appraisal & contract[1]	$48
Contract administration [1]	$38
Tractor piling3	$250-300
Grapple piling3	$400-500
Pile burning	$50
[1] Source – Big Grizzly Forest Health and Fuels Reduction Project FEIS [2]Includes time from initial scoping thru likely appeal resolution process, including field surveys, specialist reports, documentation, IDT meeting time, draft and final NEPA documents, appeal resolution. [3]Forest historic cost estimates.	

The total timber volume of the timber sale (in board feet of sawtimber, as well as tons of biomass) is estimated to be 10.8 MMBF sawtimber, 75,166 tons of biomass.

In response to comments a second preliminary appraisal was run. The projected timber sales receipts to the USFS estimated from the second appraisal indicate timber sales receipts of $800,000-$900,000. Stumpage values change frequently. For example, estimated timber receipts have increased substantially since estimated in the PEA. Final timber sale receipts would be unknown until an acceptable bid is received by the Forest Service.

Direct, Indirect, and Cumulative Effects - Alternative 2

Alternative #2 (No Action) would not generate a value for timber products and would not finance stewardship projects for fuels reduction. No timber would be harvested. No funds would be generated.

Direct, Indirect, and Cumulative Effects - Alternative 3

Estimates of merchantable biomass (suppressed, intermediate, and codominant trees) removed are 525 cubic feet per acre (1,800 board foot per acre). Timber products from the project area would include small saw-logs for the manufacture of lumber; wood chips for particle board construction and cogeneration of power; commercial firewood and public firewood use.

A preliminary appraisal of Alternative 3 indicates that the value of the timber products harvested under Alternative 3 would be approximately $82,000. This amount would fund approximately 25% of the fuel management stewardship work (sub-merchantable tree removal, and post-harvest piling and burning), precommercial thinning, and noncommercial tree stand improvement along non-unit portions of Highway 88 under this alternative. Other sources funding would be necessary to complete activities.

Local sub-contractors would be hired by the Purchaser of the stewardship contract to perform road reconstruction work, road maintenance work and stewardship projects (grapple piling & tractor piling, etc.). This project would help to sustain approximately 90 jobs in Amador, Eldorado and Placer counties unless other sources of funding could be found to complete the project activities.

Direct, Indirect, and Cumulative Effects - Alternative 4

Estimates of merchantable biomass removed are 110 cubic feet per acre (0 board foot per acre). This would generate very few funds toward completion of fuel treatments (sub-merchantable tree removal, and post-harvest piling and burning), precommercial thinning, and noncommercial tree stand improvement along non-unit portions of Highway 88. Other sources of funding would be necessary to complete activities.

A preliminary appraisal of Alternative #4 (10-inch DBH) indicates that the value of the timber products harvested on this project would be approximately $9,000.00. This amount would pay for less than 5% of the fuels management stewardship projects in the Environmental Analysis. It is unlikely that the View 88 project would be able to proceed at that level of cost recovery.

Climate Change

The direct, indirect and cumulative effects to climate change are summarized from the Climate Change Analysis for the project (Rodman & Markman, 2011).

Quantifiable information about project effects on global climate change is not currently possible and is not essential to a reasoned choice among alternatives. There is no certainty about the actual intensity of individual project indirect effects on global climate change. Uncertainty in climate change effects is expected because it is not possible to meaningfully link individual project actions to quantitative effects on climatic patterns.

Because is not currently feasible to quantify the indirect effects of individual or multiple projects on global climate change, determining the magnitude of effects of View 88 project alternatives on global climate change cannot be made at any scale.

However, based on climate change science and local data trends, we can recognize the relative potential of some types of proposals and alternatives to affect or influence climate change factors, and therefore provide qualitative analysis to help inform project decisions. Qualitative effects disclosure for the View 88 project's impacts on green house gas emissions and carbon sequestration are based on the ecosystem's role in the carbon cycle. In this context, descriptions of qualitative impacts disclose the nature and direction of the impact as opposed to the specific magnitude of the impact. The project alternatives do present qualitative choices for differences in carbon storage and green house gas emissions between alternatives. The project alternatives also present qualitative choices for forest resilience to predicted effects from global climate change on the forest and resources in the project area.

Direct and Indirect Effects – Alternative 1

Alternative 1 would provide the greatest resilience for individual stands and the landscape to climate change by increasing forest health and reducing the risk of loss of the forest and its resources to high intensity wildfire. Direct release CO_2 during the prescribed burning operations on 1900 acres would contribute to increasing the atmospheric greenhouse gas concentration. However, research indicates that fuel reduction for the View 88 project would result in a lower risk of severe wildfire for the treated acres. This reduced risk has a several effects on green house gas emissions or the carbon cycle:

- There is a direct beneficial effect on climate change with decreased risk of acres burned by severe wildfires resulting in high levels of green house gas emissions from these acres.
- There is an indirect beneficial effect from treating these acres because remaining live stands of trees would have a higher capacity to sequester carbon compared to overcrowded stands or stands killed by severe wildfires.

Treatment of fuels under Alternative 1 would result in decreased production of smoke and associated greenhouse gas and CO_2 emissions in the event of a wildfire. Fuel reduction treatments would result in more manageable wildfires; associated smoke would be less intense and would produce lower amounts of CO_2, greenhouse gasses, and particulate emissions in shorter durations compared to the larger and more intense fires that would occur under No Action/current conditions.

If a wildfire event occurs after project implementation of the Proposed Action, the combination of reduced fuels and higher residual tree survival would also reduce the release of greenhouse gasses and CO_2 as well as preserve greater amounts of carbon sequestration in the surviving trees compared to the No Action alternative.

Vegetation management treatments provide the opportunity on a long-term basis to reduce the magnitude of air quality effects from wildfire, including greenhouse gasses and CO_2. Examining four of the largest wildfires in the US in 2002, Hurteau et al (2008) found that, for forest land that experienced high intensity stand-replacing fire, prior thinning would have reduced CO_2 release from live tree biomass by as much as 98%.

Mechanical equipment used for road maintenance and reconstruction, water trucks for dust abatement and trucks that transport biomass in any form would produce exhaust

containing greenhouse gases, including CO_2 and NO_X. Mechanical equipment used in thinning would also produce similar greenhouse gases from engine exhaust.

Cumulative Effects – Alternative 1

Because greenhouse gases mix readily into the global pool of greenhouse gases, it is not currently possible to ascertain the cumulative effects of emissions from a single project. Effects to air quality would too small under the Proposed Action alternative to be measurable by models used to predict global warming or climate changes.

Direct and Indirect Effects – Alternative 2

Uncontrolled wildfires contribute relatively large amounts of greenhouse gasses, including carbon dioxide (CO2) to the atmosphere. Wildfires present a risk for high levels of emissions and associated negative effects to air quality, in part due to the release of carbon that was sequestered in the forest biomass prior to the wildfire. Although the No Action alternative has the greatest potential for negative effects to air quality of the alternatives analyzed, timing of those effects are not predictable, and would not be measurable at the scale used for modeling climate change.

Overall, No Action would result in reduced rates of growth and carbon sequestration coupled with higher mortality rates, greater release of CO2 through the decay process, and increased risk of release of carbon that was sequestered in the forest biomass by high-intensity wildfire.

Cumulative Effects – Alternative 2

Because there would be no prescribed burning under the No Action alternative, there would be no direct effects from smoke in the project area under this alternative. While the risk for wildfire effects would increase, and therefore the risk for impacts to air quality from smoke, greenhouse gasses and CO_2 would also increase, an actual wildfire occurrence is not a reasonably foreseeable or predictable event. Therefore no cumulative effects are predictable under the No Action.

Direct, Indirect, and Cumulative Effects – Alternative 3

Alternative 3 would also increase resilience to climate change for individual stands and the forest landscape in the project area, but for a shorter duration. Because of the 16 inch DBH limit, some stands would continue to be at higher than optimal densities, which would have slower growth rates and higher mortality rates. The result would likely be lower carbon sequestration rates coupled with higher CO_2 release through decay. With current methodology, these differences are probably not measurable. Alternative 3 would be effective in reducing the risk of wildfire impacts to air quality from smoke, greenhouse gasses and CO_2, as with Alternative 1. Other direct and indirect effects would be the same as the Proposed Action, because the same prescribed burning activities would occur and the same types of equipment would be used.

Cumulative effects for Alternative 3 would not be measurable, the same as the Proposed Action.

Direct, Indirect, and Cumulative Effects – Alternative 4

Alternative 4 would marginally increase resilience to climate change for individual stands and the forest landscape in the project area for a short duration. Because of the 10 inch DBH limit, many stands would continue to be overcrowded, with high densities, which would have markedly slower growth rates and higher mortality rates. Except for the removal of very small ladder fuels and ground fuel loads, the resulting stands would approach the existing overly dense conditions. The result would be lower carbon sequestration rates coupled with higher CO_2 release through decay. Alternative 4 would be effective in reducing the risk of impacts to air quality from smoke, greenhouse gasses and CO_2 only for the short term. Other direct and indirect effects from equipment and prescribed burning activities would be the same as the Proposed Action.

Cumulative effects for Alternative 4 would not be measurable, the same as the Proposed Action

Appendix A

Relevant Past, Present and Reasonably Foreseeable Actions

Past Actions
- Forest Service: Timber harvest/Stewardship Projects and Prescribed Burning Du Bear Co-Bear Hamms Sopiago Cat Lynch Cat Ridge Middle Middle Fork Prospect Rock Goldfingers Scott Creek Power Fire Salvage (multiple sales) - Road construction and Maintenance - Recreation, including OHV use
Present Actions
- Forest Service: Timber harvest/Stewardship Projects and Prescribed burning Mokey Bear Lost Horse Oski Bear - Road construction and Maintenance - Recreation, including OHV use

Foreseeable Future Actions

- Forest Service: Timber harvest/Stewardship Projects and Prescribed burning

  Callecat
  Foster Firs

- Road construction and Maintenance

- Recreation, including OHV use

- Kirkwood Municipal Utility District powerline from Salt Springs to Kirkwood, overhead from Salt Springs Reservoir to Bear River Reservoir, underground along Bear River Road, then underground along Highway 88 to Kirkwood Valley.

- CA State Timber Harvest Plans
  No proposed timber harvest plans adjacent to project boundary or analysis area (note: but three THPs within the same 7th field watersheds as View 88 Project)
  Website accessed February 10, 2011, last date updated February 10, 2011
  http://www.fire.ca.gov/ResourceManagement/THPStatusUpload/THPStatusTable.html

The information above is based upon the forest's existing vegetation data (20008), and the USDA Forest Service FACTS database which records spatial and disturbance type data for activities on the Eldorado National Forest, and the Calfire (formerly California Department of Forestry) Timber Harvest Plan GIS database located at http://www.fire.ca.gov/resource_mgt/resource_mgt_forestpractice_gis.php.

Appendix B. Protection Measures for Aquatic Features[1,2,3,4]

(Note: the location of aquatic features and Units are shown in Appendix A of the Hydrology Report.)

Unit(s) and Aquatic Feature(s)	Protection Measures	Rationale for Protection Measures
Riparian Conservation Areas (RCAs) of all Units	▪ Reach-in of approximately 25 feet from equipment exclusion zones to remove vegetation is allowed, unless stated otherwise. ▪ No end-lining of trees out of equipment exclusion zones, unless stated otherwise. ▪ Inner gorges: no ground disturbing activities and no removal of vegetation, unless approved by project hydrologist and/or fisheries biologist. ▪ No removal of woody debris within stream channels or embedded in streambanks. ▪ For meadows, see individual unit design criteria below. ▪ Construction of new landings, as well as use and modification of existing landings, would be approved by at least one of the following resource specialists: Soil Scientist, Fisheries Biologist, Hydrologist. ▪ Existing roads would be used to cross stream channels, with no more than one crossing per stream, unless approved by one of the following resource specialists: Soil Scientist, Fisheries Biologist, Hydrologist. ▪ No construction of roads, including temporary roads, unless approved by at least one of the following resource specialists: Soil Scientist, Fisheries Biologist, Hydrologist. ▪ Hand treatment to remove fuels and ignition for prescribed fire is allowed in RCAs, and is described in detail in the *Environmental Assessment*, *Proposed Action*, *Fuels*.	▪ Allows for fuel reduction activities near the majority of the aquatic features in the project area, which in turn reduces the risk of a high-severity wildfire in and near these features. ▪ Limits the amount of ground disturbance immediately adjacent to these aquatic features, which in turn minimizes the amount of sediment delivered to these features as a result of the View 88 Project. ▪ Protects inner gorges, where the risk of slope failures is often high and the removal of vegetation and/or ground disturbance greatly increases this risk.
<u>All Units</u> Ephemeral streams and channels	▪ No ground-based equipment within 50 feet of the edge of the channel. ▪ Equipment is allowed to reach into the 50 ft. equipment exclusion zone (typically up to 25 feet) to remove non-riparian vegetation. ▪ Removal of vegetation by hand (living or dead) is allowed up to the edge of the channel. Hand piling and prescribed fire ignition is described in detail in the *Environmental Assessment*, *Proposed Action*, *Fuels*. ▪ Equipment crossings would be approved by the Timber Sale Administrator, unless specified otherwise for an individual Unit.	
<u>All Units</u> Springs	▪ No ground-based equipment within 50 feet of the edge of the wet area of the spring. ▪ Equipment is allowed to reach into the 50 ft. equipment exclusion zone (typically up to 25 feet) to remove non-riparian vegetation. ▪ Hand treatment to remove fuels and ignition for prescribed fire is allowed in the equipment exclusion zone. This does not apply to Unit 59, which is described below.	

Unit(s) and Aquatic Feature(s)	Protection Measures	Rationale for Protection Measures
83, 84, 51, 58	There would be a limited operating period (LOP). Operations would be confined to the months of September and October. Operations would be confined to the months of September and October unless modified by the soil scientist based on conditions on the ground just prior to the beginning of operations.	These Units contain wet areas. The intent is to conduct operations when the ground surface is as dry as possible so as to reduce ground disturbance. In most years, this time period is in September and October.
55	<u>Meadow adjacent to intermittent stream (northern part of Unit).</u> ▪ No ground-based equipment and no skid trails within 50 feet of edge of the meadow. ▪ No landings within 100 feet of the meadow. <u>Channels that originate from road 09N14 (south side of intermittent stream).</u> ▪ One equipment exclusion zone that includes all of the channels would be flagged on-the-ground. (The equipment exclusion zone is approximately 4 - 5 acres in size, and includes four channels). ▪ No skid trails within 50 feet of the equipment exclusion zone. <u>Intermittent stream (northern part of Unit).</u> ▪ A variable-width equipment exclusion zone has been flagged-on-the ground. ▪ No landings within 100 feet of the stream.	Minimizes the amount of sediment delivered to these aquatic features as a result of the View 88 Project, yet still allows fuel reduction activities that are expected to reduce the risk of a high-severity wildfire near these aquatic features.
63	No ground-based equipment or commercial tree removal below the lower skid road along the stream channel (approximately 85 ft.)	Limits the ground disturbance on the steep slope below the lower skid trail to reduce sediment delivery to the stream channel.
72, 73	No ground-based equipment within 75 ft. of the intermittent channel between these two Units. No removal of woody debris within 25 of the edge of the channel.	Minimizes sediment delivery to this eroded channel as a result of the project.
84	<u>Meadow areas with aspen.</u> ▪ Feller bunchers can operate up to the edge of the meadow, and are allowed to reach-in to the meadow (approx. 25 feet) to remove vegetation.[5] ▪ No ground-based equipment (with the exception of feller-bunchers) and no skid trails within 50 feet of the edge of the meadow. ▪ No end-lining of trees out of the meadow or within equipment exclusion zones. <u>Road 09N6C and adjacent denuded area on south side of road.</u> ▪ Waterbars would be repaired/constructed on road 09N6C. ▪ Boulders would be placed around denuded area to block vehicle access.	▪ Minimizes the amount of sediment delivered to these aquatic features as a result of the View 88 Project, yet still allows fuel reduction activities that are expected to reduce the risk of a high-severity wildfire near these aquatic features. ▪ Encourages the growth of aspen in meadow areas that contain aspen.

Unit(s) and Aquatic Feature(s)	Protection Measures	Rationale for Protection Measures
83	<u>Meadow areas with aspen (east side of Unit).</u> ▪ Ground-based equipment can operate up to the edge of the meadow, and are allowed to reach-in to the meadow (approx. 25 feet) to remove vegetation.[5] ▪ No skid trails within 50 feet of the edge of the meadow. ▪ No end-lining of trees out of the meadow.	
51, 58	<u>Meadow areas with aspen release</u> ▪ Feller bunchers can operate up to the edge of meadows, and are allowed to reach-in to the meadow (approx. 25 feet) to remove vegetation. [5] ▪ No ground-based equipment (with the exception of feller-bunchers) and no skid trails within 50 feet of the edge of the meadow. ▪ One equipment crossing of each stream channel. Additional equipment crossings would be approved by the project Hydrologist and/or Fisheries Biologist. ▪ Preliminary layout design (on paper) has been completed. The layout design shows landings, skid trails, and stream crossings.	
	<u>Meadow areas *without* aspen release</u> No ground-based equipment and no skid trails within 50 feet of the edge of meadows.	
59	<u>Wetland area</u> ▪ West side of wetland: No ground-based equipment within 100 feet of the edge of the wetland. ▪ East side of wetland and uphill of wetland: No ground-based equipment and no commercial harvest in a 4-acre area that extends from the eastern edge of the wetland to road 8N32A (150-300 ft. wide buffer). Up to 25 ft. reach-in from road 8N32A is allowed to remove fuels with equipment.	▪ Minimizes the amount of sediment delivered to these aquatic features as a result of the View 88 Project, yet still allows fuel reduction activities that are expected to reduce the risk of a high-severity wildfire near these aquatic features. ▪ May allow the growth of more riparian vegetation near the stream.
	<u>Stream downhill of wetland</u> ▪ No ground-based equipment within 100 feet from the edge of stream. ▪ Hand treatment of fuels is allowed in the equipment exclusion zone up to within 25 feet of the edge of the channel. (No hand treatment is allowed within 25 feet of the channel.) ▪ No landings within 150 feet of the edge of the stream channel. Removal of trees between the landing and the stream would be confined to those necessary to construct the temporary road to the landing. ▪ There would be one temporary road crossing across the stream.	

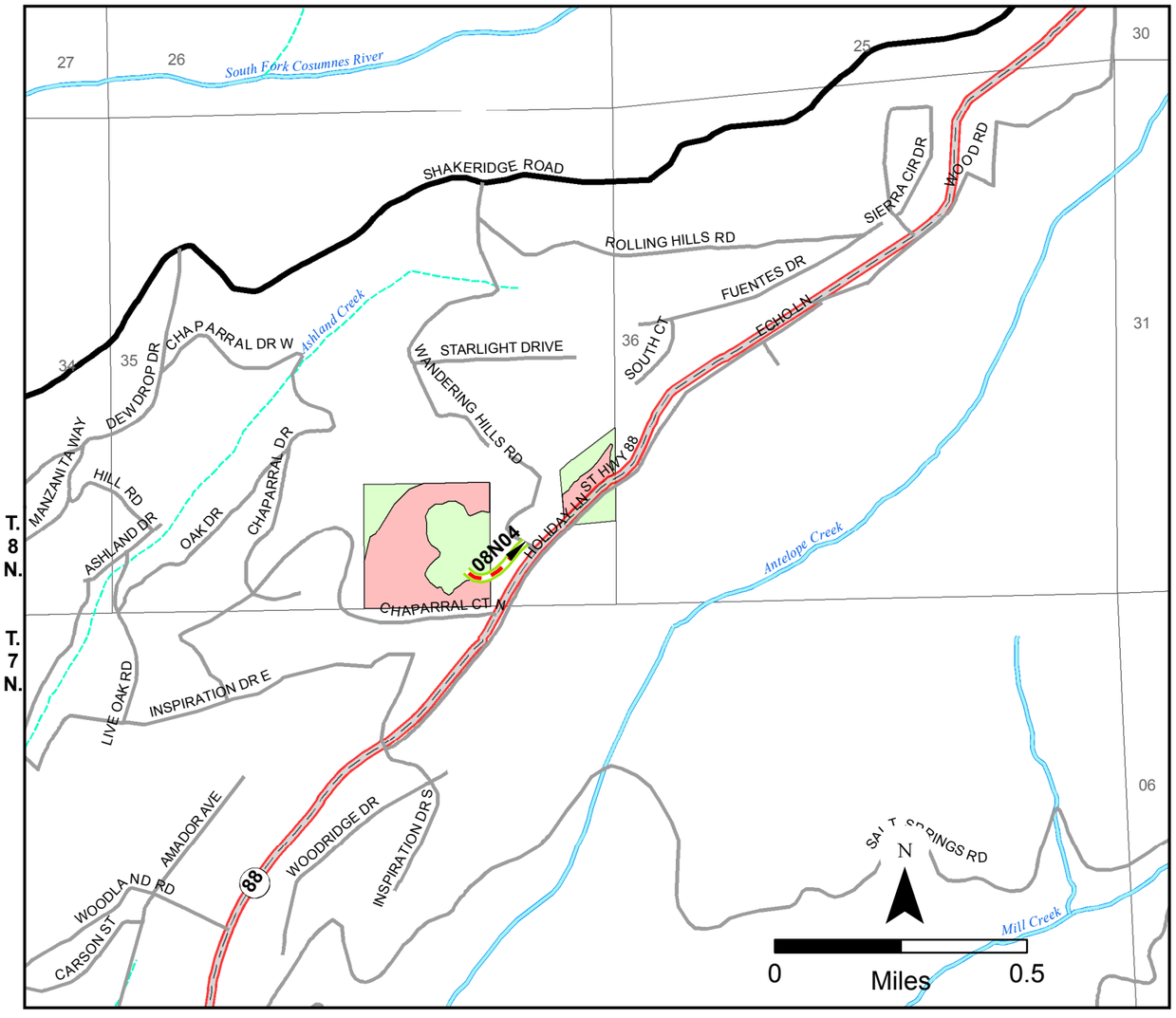
Unit(s) and Aquatic Feature(s)	Protection Measures	Rationale for Protection Measures
1	Channel on east side of the Unit. ▪ No ground-based equipment within 50 feet of the edge of the channel where the ground surface slopes towards the channel. ▪ No skid trails within 25 feet from the edge of the equipment exclusion zone.	Minimizes the amount of sediment delivered to these aquatic features as a result of the View 88 Project, yet still allows fuel reduction activities that are expected to reduce the risk of a high-severity wildfire near these aquatic features.
81	All channels (4) within the Unit. ▪ No ground-based equipment within 25 feet of the edge of the channel.	
87	Wetland next to highway 88 ▪ No ground-based equipment within 25 of the edge of the wetland. The area would be flagged by a resource specialist(s).	
89, 90	Approaches to the channel crossings in these units would be covered with rock.	Rocking avoids rilling that would otherwise be likely to occur at these crossings.
West Panther Creek watershed	The View 88 Project would be implemented over the course of a minimum of two years - approximately half of the total acres would be implemented in any one year. This would involve Units 76, 59, 77, 79, 63, 73, and 104.	The West Panther Creek watershed is currently at a *high* risk of Cumulative Watershed Effects (CWE), bordering on *very high* risk. Implementation of the View 88 Project over the course of two or more years would ensure that the West Panther Creek watershed does not reach a *very high* risk of CWE.

[1] Riparian Conservation Areas (RCAs) are 300 feet on each side of perennial streams and 150 feet on each side of intermittent and ephemeral streams (SNFPAROD 2004).
[2] Protection measures can only be altered on-the-ground on a case-by-case basis by one or more of the following: Soil Scientist, Fisheries Biologist, Hydrologist.
[3] Draws have poorly defined channels or no visible channel.
[4] Inner gorges are defined as areas with slopes greater than 70 percent adjacent to aquatic features.
[5] Minimize changing the direction of the tracks of the feller buncher within 25-50 feet the edge of the meadow (e.g. drive in a straight line up to the meadow, cut vegetation, rotate the cab and arm without changing the track placement, and return to the skid trail or back out).

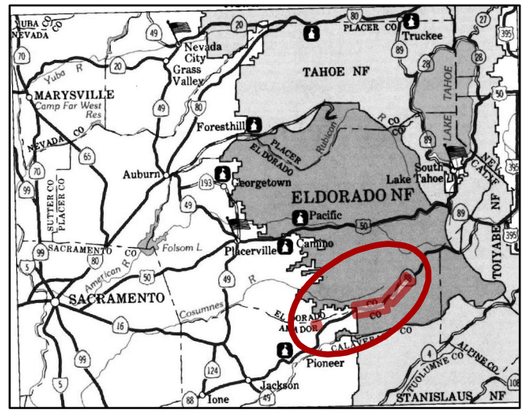
Appendix C

Transportation

VIEW 88 FUELS REDUCTION STEWARDSHIP PROJECT ROADS SUMMARY MAP 1



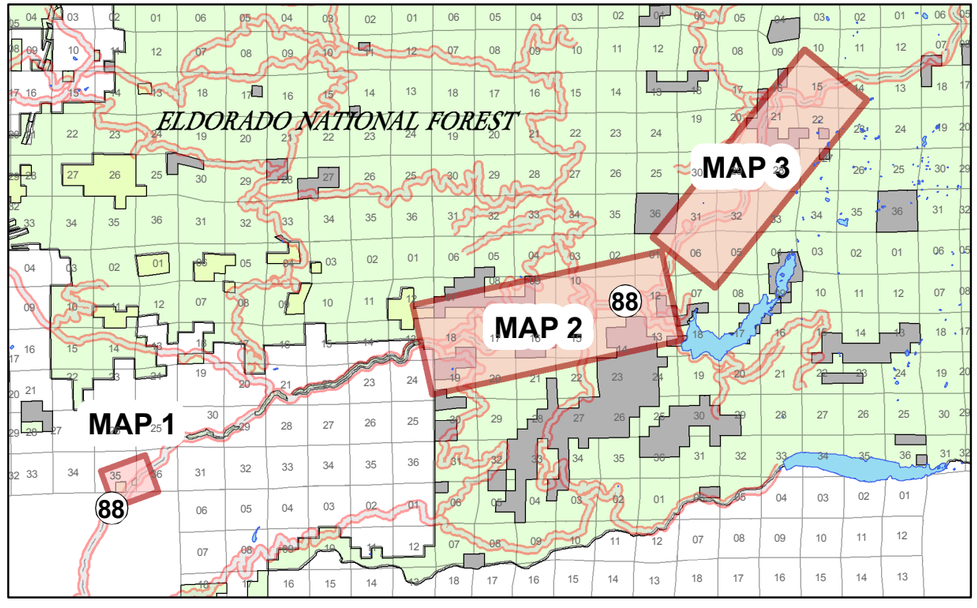
LOCATION MAP



VIEW 88 ROAD SUMMARY

RD_NO	CONST TYPE	LENGTH MILES	MAP INDEX
08N05	MAINT	1.06	MAP 2
08N18	MAINT	3.23	MAP 3
08N30	MAINT	0.14	MAP 2
08N37	MAINT	0.26	MAP 2
09N17	MAINT	0.65	MAP 2
09N24A	MAINT	0.35	MAP 3
09N81	MAINT	1.15	MAP 3
MAINTENANCE TOTAL		**6.83**	
08N04	RECONST	0.15	MAP 1
08N05A	RECONST	0.35	MAP 2
08N05K	RECONST	0.57	MAP 2
08N07	RECONST	0.37	MAP 3
08N18B	RECONST	0.03	MAP 3
08N26	RECONST	2.92	MAP 2
08N26B	RECONST	0.55	MAP 2
08N30B	RECONST	0.67	MAP 2
08N31	RECONST	0.66	MAP 2
08N32	RECONST	0.68	MAP 2
08N32A	RECONST	0.82	MAP 2
08N32A.1	RECONST	0.32	MAP 2
08N35	RECONST	0.32	MAP 2
08N35A	RECONST	0.41	MAP 2
09N13	RECONST	2.88	MAP 3
09N14	RECONST	1.04	MAP 3
09N14H	RECONST	1.02	MAP 3
09N14Z	RECONST	0.39	MAP 3
09N24	RECONST	0.64	MAP 3
09N24B	RECONST	0.16	MAP 3
09N24C	RECONST	0.36	MAP 3
09N96	RECONST	2.95	MAP 3
10N50VA	RECONST	0.61	MAP 3
RECONST TOTAL		**18.84**	
T_08N05K	TEMP RD	0.18	MAP 2
T61	TEMP RD	0.30	MAP 3
T89	TEMP RD	0.10	MAP 3
T90	TEMP RD	0.42	MAP 3
TEMP RD TOTAL		**1.00**	
GRAND TOTAL		**26.67**	

LOCATION MAP INDEX



LEGEND

VIEW_88_RDS
CONST_TYPE
- RECONST

AMADOR COUNTY RDS
STATUS
- COUNTY ROADS
- PRIVATE ROADS
- HIGHWAY

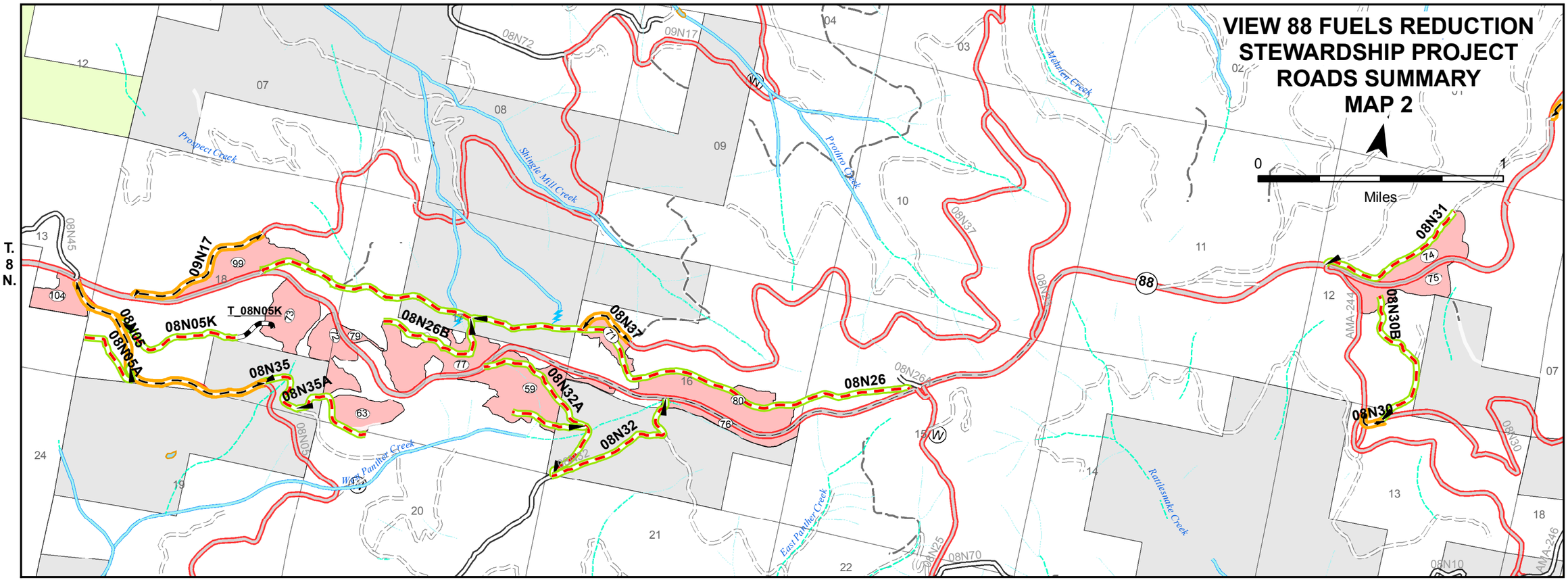
HYDROLOGY
STREAM TYPE
- PERENNIAL
- INTERMITTENT
- EPHEMERAL

OWNERSHIP
DESCRIPTION
- Eldorado National Forest
- Private Property

VIEW 88 UNITS
TREATMENT
- COMMERCIAL

Prepared By: Billy Ellis
Printing Date: 1/27/2011 9:42 AM

VIEW 88 FUELS REDUCTION STEWARDSHIP PROJECT ROADS SUMMARY MAP 2



LEGEND

VIEW_88_RDS

CONST_TYPE

- RECONST
- MAINTENANCE
- TEMP RD

SYSTEM RD STATUS

OPER_MAINT

- MAINT LVL 1
- MAINT LVL 2
- MAINT LVL 3
- MAINT LVL 4
- MAINT LVL 5
- HIGHWAY

HYDROLOGY

STREAM TYPE

- PERENNIAL
- INTERMITTENT
- EPHEMERAL
- SPRING
- WATERHOLE
- LAKES

OWNERSHIP

DESCRIPTION

- Eldorado National Forest
- Inholding Inside Proclaimed Boundary
- Inholding Outside Proclaimed Boundary
- State Inholding Inside Proclaimed Boundary

VIEW 88 UNITS

TREATMENT

- COMMERCIAL

VIEW 88 ROAD SUMMARY

RD_NO	CONST TYPE	LENGTH MILES	MAP INDEX
08N05	MAINT	1.06	MAP 2
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08N30	MAINT	0.14	MAP 2
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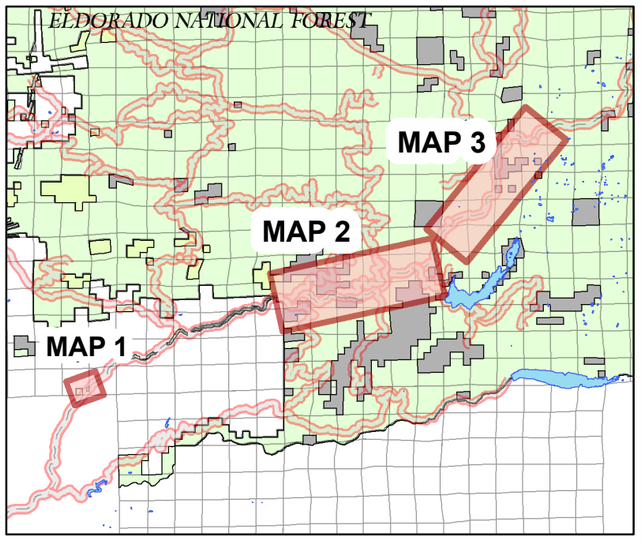
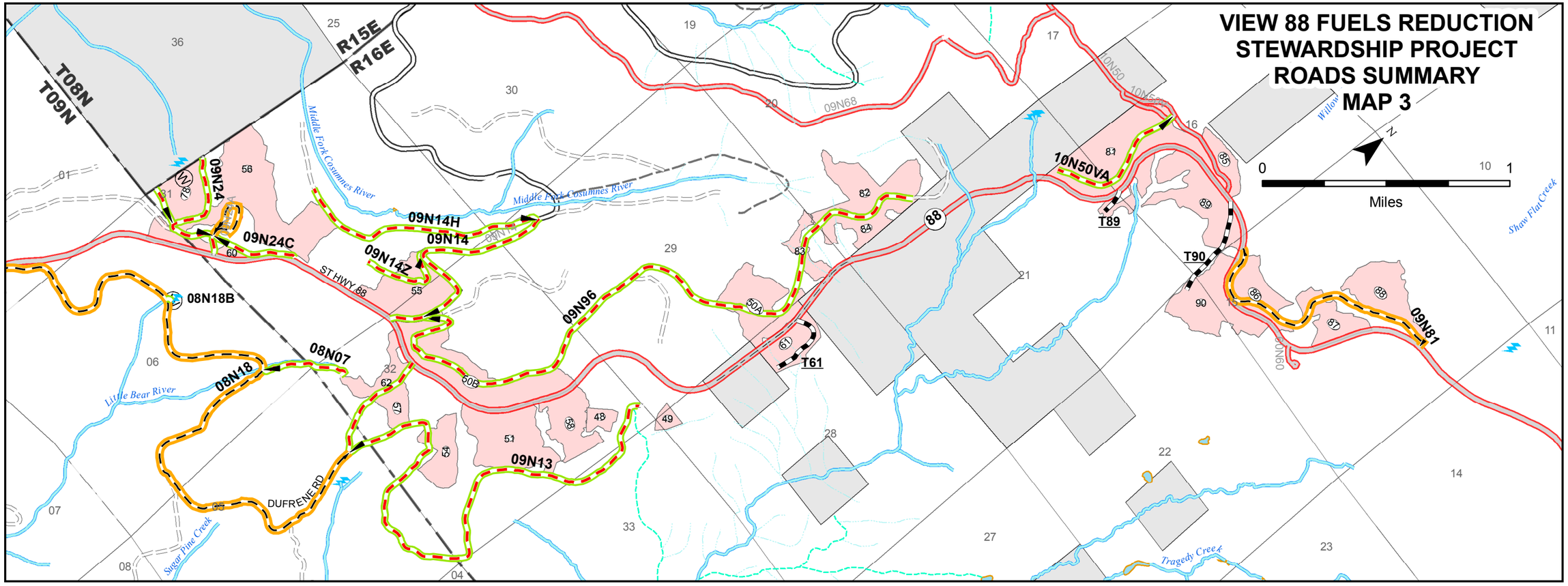
08N07	RECONST	0.37	MAP 3
08N18B	RECONST	0.03	MAP 3
08N26	RECONST	2.92	MAP 2
08N26B	RECONST	0.55	MAP 2
08N30B	RECONST	0.67	MAP 2
08N31	RECONST	0.66	MAP 2
08N32	RECONST	0.68	MAP 2
08N32A	RECONST	0.82	MAP 2
08N32A.1	RECONST	0.32	MAP 2
08N35	RECONST	0.32	MAP 2
08N35A	RECONST	0.41	MAP 2
09N13	RECONST	2.88	MAP 3
09N14	RECONST	1.04	MAP 3
09N14H	RECONST	1.02	MAP 3
09N14Z	RECONST	0.39	MAP 3
09N24	RECONST	0.64	MAP 3
09N24B	RECONST	0.16	MAP 3
09N24C	RECONST	0.36	MAP 3
09N96	RECONST	2.95	MAP 3
10N50VA	RECONST	0.61	MAP 3
RECONST TOTAL		**18.84**	
T_08N05K	TEMP RD	0.18	MAP 2
T61	TEMP RD	0.30	MAP 3
T89	TEMP RD	0.10	MAP 3
T90	TEMP RD	0.42	MAP 3
TEMP RD TOTAL		**1.00**	
GRAND TOTAL		**26.67**	

LOCATION MAP INDEX



Prepared By: Billy Ellis
Printing Date: 1/27/2011 9:44 AM

VIEW 88 FUELS REDUCTION STEWARDSHIP PROJECT ROADS SUMMARY MAP 3



LEGEND

VIEW_88_RDS

CONST_TYPE
- RECONST
- MAINTENANCE
- TEMP RD

SYSTEM RD STATUS

OPER_MAINT
- MAINT LVL 1
- MAINT LVL 2
- MAINT LVL 3
- MAINT LVL 4
- MAINT LVL 5
- HIGHWAY

HYDROLOGY

STREAM TYPE
- PERENNIAL
- INTERMITTENT
- EPHEMERAL
- SPRING
- WATERHOLE
- LAKES

OWNERSHIP

DESCRIPTION
- Eldorado National Forest
- Inholding Inside Proclaimed Boundary
- Inholding Outside Proclaimed Boundary
- State Inholding Inside Proclaimed Boundary

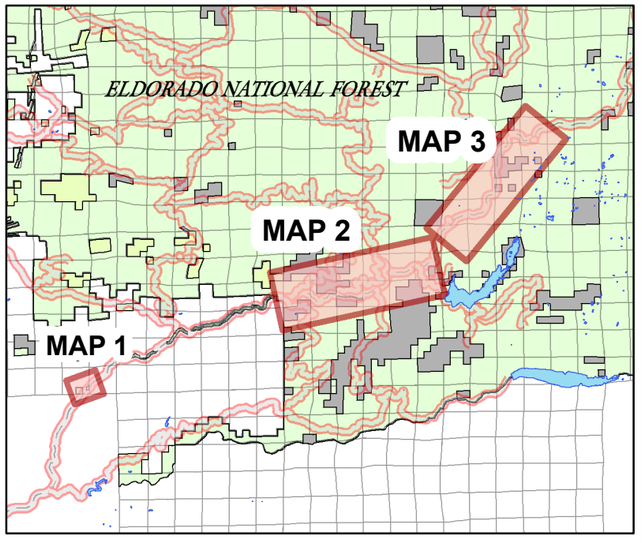
VIEW 88 UNITS

TREATMENT
- COMMERCIAL

VIEW 88 ROAD SUMMARY

RD_NO	CONST TYPE	LENGTH MILES	MAP INDEX
08N05	MAINT	1.06	MAP 2
08N18	MAINT	3.23	MAP 3
08N30	MAINT	0.14	MAP 2
08N37	MAINT	0.26	MAP 2
09N17	MAINT	0.65	MAP 2
09N24A	MAINT	0.35	MAP 3
09N81	MAINT	1.15	MAP 3
MAINTENANCE TOTAL		**6.83**	
08N04	RECONST	0.15	MAP 1
08N05A	RECONST	0.35	MAP 2
08N05K	RECONST	0.57	MAP 2
08N07	RECONST	0.37	MAP 3
08N18B	RECONST	0.03	MAP 3
08N26	RECONST	2.92	MAP 2
08N26B	RECONST	0.55	MAP 2
08N30B	RECONST	0.67	MAP 2
08N31	RECONST	0.66	MAP 2
08N32	RECONST	0.68	MAP 2
08N32A	RECONST	0.82	MAP 2
08N32A_1	RECONST	0.32	MAP 2
08N35	RECONST	0.32	MAP 2
08N35A	RECONST	0.41	MAP 2
09N13	RECONST	2.88	MAP 3
09N14	RECONST	1.04	MAP 3
09N14H	RECONST	1.02	MAP 3
09N14Z	RECONST	0.39	MAP 3
09N24	RECONST	0.64	MAP 3
09N24B	RECONST	0.16	MAP 3
09N24C	RECONST	0.36	MAP 3
09N96	RECONST	2.95	MAP 3
10N50VA	RECONST	0.61	MAP 3
RECONST TOTAL		**18.84**	
T_08N05K	TEMP RD	0.18	MAP 2
T61	TEMP RD	0.30	MAP 3
T89	TEMP RD	0.10	MAP 3
T90	TEMP RD	0.42	MAP 3
TEMP RD TOTAL		**1.00**	
GRAND TOTAL		**26.67**	

LOCATION MAP INDEX



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Appendix D:

Comparison of Alternatives for Fire Behavior

Unit Number	Total Unit Acres	Existing Conditions/ No Action Alternative			Post Treatment All Action Alternatives		
		Rate Of Spread (Ch/Hr)	Flame length (Feet)	Fire Type	Rate Of Spread (Ch/Hr)	Flame length (Feet)	Fire Type
1	19	10	6	Passive Crown	6	3	Surface
2	15	10	6	Passive Crown	6	3	Surface
3	8	10	6	Passive Crown	6	3	Surface
4	7	10	6	Passive Crown	6	3	Surface
5	27	10	6	Passive Crown	6	3	Surface
6	7	10	6	Passive Crown	6	3	Surface
7	37	10	6	Passive Crown	6	3	Surface
8	5	10	6	Passive Crown	6	3	Surface
9	9	10	6	Passive Crown	6	3	Surface
10	6	10	6	Passive Crown	6	3	Surface
11	37	10	6	Passive Crown	6	3	Surface
12	6	10	6	Passive Crown	6	3	Surface
13	25	10	6	Passive Crown	6	3	Surface
14	12	10	6	Passive Crown	6	3	Surface
15	5	10	6	Passive Crown	6	3	Surface
16A	10	10	6	Passive Crown	6	3	Surface
16B	13	10	6	Passive Crown	6	3	Surface
17A	70	10	6	Passive Crown	6	3	Surface
17B	9	10	6	Passive Crown	6	3	Surface
17C	41	10	6	Passive Crown	6	3	Surface
50A	38A	7	5	Torching	2	1	Surface
50B	36B	7	5	Torching	2	1	Surface
51	48	7	5	Torching	2	1	Surface
54	21	7	5	Torching	2	1	Surface
55	40	7	5	Torching	2	1	Surface
56	86	7	5	Torching	2	1	Surface
57	11	7	5	Torching	2	1	Surface
58	26	7	5	Torching	2	1	Surface
59	52	7	5	Torching	2	1	Surface
60	4	7	5	Torching	2	1	Surface
61	20	7	5	Torching	2	1	Surface
62	14	7	5	Torching	2	1	Surface

Unit Number	Total Unit Acres	Existing Conditions/ No Action Alternative			Post Treatment All Action Alternatives		
		Rate Of Spread (Ch/Hr)	Flame length (Feet)	Fire Type	Rate Of Spread (Ch/Hr)	Flame length (Feet)	Fire Type
63	19	10	6	Passive Crown	6	3	Surface
71	12	10	6	Passive Crown	6	3	Surface
72	22	10	6	Passive Crown	6	3	Surface
73	27	10	6	Passive Crown	6	3	Surface
74	29	7	5	Torching	2	1	Surface
75	22	7	5	Torching	2	1	Surface
76	15	7	5	Torching	2	1	Surface
77	42	10	6	Passive Crown	6	3	Surface
78	22	7	5	Torching	2	1	Surface
79	4	10	6	Passive Crown	6	3	Surface
80	47	10	6	Passive Crown	6	3	Surface
81	72	10	6	Passive Crown	6	3	Surface
82	36	7	5	Torching	2	1	Surface
83	10	7	5	Torching	2	1	Surface
84	20	7	5	Torching	2	1	Surface
85	11	7	5	Torching	2	1	Surface
86	23	7	5	Torching	2	1	Surface
87	20	7	5	Torching	2	1	Surface
88	32	7	5	Torching	2	1	Surface
89	55	7	5	Torching	2	1	Surface
90	41	7	5	Torching	2	1	Surface
99	31	7	5	Torching	2	1	Surface
104	16	10	6	Passive Crown	6	3	Surface

Appendix E
View 88 Hazard Tree Identification*

The intent of hazard tree removal for the View 88 project is to remove trees that are dead or likely to die and which trees pose a potential risk to improvements or human activities. Most people realize that dead trees are or will become unstable and offer some degree of risk if adjacent to public use areas or areas containing valuable improvements. For a tree to be hazardous it has to have: (1) defects, (2) a target to hit and (3) a potential to cause serious damage if the target is impacted. Therefore, the amount of hazard that an individual tree might represent depends on the probability that a tree will fail and the probability that it will strike something. If there is not likely to be any human activity around a tree or if the tree is not within falling distance of any important improvements, or roads used by the project, the tree by definition would not be considered to be a hazard tree.

The most important factors contributing to conifer tree mortality are bark beetles. However other predisposing factors may contribute to their poor health and instability. These factors include, drought, decay (decay may occur in the butt, root, bole), cankers, mechanical damage, defoliators, lightening strikes, and tree lean. Decay may be visible or it may be hidden within the tree with external indicators, such as conks, being the visible indicator of hidden defect or decay. The degree to which one or more of these factors are present in a particular tree would be used to determine if a tree would be designated for removal.

1. The first task in identifying hazard trees is to look for trees that have been fatally attacked by insects and are likely to die. As a starting point, the salvage marking guidelines prepared by Forest Health Protection experts would be used to identify trees that are likely to die within 6 months due to insect activity. Insect activity can often times be associated with other indicators such as basal scars from fire or butt rot, mechanical damage or from damage caused by recreation users. Even when coupled with these other indicators, insect activity must meet the 6-month criteria if tree is to be marked on the basis of imminent mortality from insects. For insect mortality criteria, see the Six Month Insect Mortality Hazard Tree Determination Guidelines, below.

In addition to the insect mortality marking guidelines, the following criteria should be considered in identifying hazard trees:

2. <u>Older top kill, no other defect associations:</u>

Along the roads to be used by the View 88 project, trees with old top kill or old spike tops would be reviewed by the vegetation management staff. Before tops break out they often rot in place and are held by little or no sound wood. Trees with dead or highly defective tops may be jarred by people or vehicles which would be in the impact zone immediately after the jarring. Dead tops in true firs, Douglas-firs and hardwoods are highly susceptible to attack by decay fungi and their failure potential is high. Older, dead tops without bark are less likely to fail than newly killed tops. This is because of the added weight of limbs on recently killed tops, and the fact that older tops have likely experienced severe storms and have remained intact. A tree with a dead top would not be considered a hazard unless the length of dead top itself could reach a road that is used by the public or personnel working on the project.

Older dead tops, located on trees that are otherwise sound and located within a roadside hazard tree zone would be considered for removal only if the dead top itself would pose a risk should it snap out. For example a dead top that is 30 feet long would not be marked if the tree upon which it is located is over 30 feet from the road. For the roadside zone, small dead tops would not be marked. A general criteria that would be applied to dead tops along roads is that unless the dead top is at least 10 inches in large-end diameter it would not be considered a hazard. Tree lean must also be considered in the selection of marking dead top trees along roads. Trees that clearly lean away from areas of human activity should not be marked under any of the hazard tree criteria

3. Trees with basal rot associated with fire scars, mechanical damage, root decay and trees with fungi fruiting bodies (conks) showing on their boles, and open cankers with evidence of rot:

Trees exhibiting any of the above characteristics are susceptible to being blown down or broken off at the point where rot is most extensive. Identifying and determining degree of risk for trees with these types of defects are by far the most difficult. Use the following criteria in judging the risk of a particular tree:

a. Any number of visible conks in all tree species. Conks indicate the presence of dead wood or decaying wood. The quantity of dead wood may be estimated based upon the size, number and species of conk(s) present; however in a standing tree there is no method of estimating the quantity of decayed wood in any given situation with a high degree of confidence. In addition, conks may be consumed by insects and birds, thus it may not be possible at any given time to observe all the conks that may have been present on a particular tree. Therefore, because of the problem of hidden defect, if the risk of tree failure is significant in terms of human safety or target value, the presence of one or more conks must be viewed as a very serious situation.

b. Open cankers that are affecting at least 25% of any portion of a tree's circumference, with rot extending into the heartwood.

c. Basal fire scar, mechanical damage, butt rot affecting 30% or more of a tree's basal area and extending vertically beyond three feet. Definite rot has to be evident into the heartwood before these trees are considered.

d. Trees leaning 30 degrees or more without basal rot. Trees which may be leaning less (approximately 15 degrees) may be considered hazard trees if there is evidence of butt rot or other rot within the bole of the tree that is likely to cause premature failure or collapse of the tree. In trees that have substantial lean, look for cracks in the bole of trees or cracks in the soil adjacent to leaning trees (on the side away from the lean). Oftentimes cracks in the bole would appear a few years before a tree would actually collapse. If open cracks are present and extend for distances of 6 or more feet, the tree is a hazard and should be immediately removed. Longstanding leaning trees (longstanding leaning trees are evidenced by the re-growth of a vertical top) have a low likelihood of failure, provided no rot in the roots or bole is evident.

e. Within heavily used areas, such as campgrounds and administrative sites, there is the ever-present concern that compaction of the ground is causing damage to the root systems of the trees that are present. This problem can affect very large, old trees as well as young trees. The damage to the root systems would be revealed by a general lack of vigor and low needle complement. Loss of roots may affect the stability of a tree, but normally if the problem is serious, there would be evidence of the problem within the crown of the tree before sufficient roots are killed to actually cause a stability problem.

4. Trees exhibiting a combination of any of the elements in items a-e, above, would be considered as hazard trees. Trees are often encountered with multiple defects. The potential for tree failure increases dramatically with the combined effects of multiple defects. Therefore, trees exhibiting various combinations of the above characteristics may be considered for marking, even though the tree is not a hazard tree candidate based on a single criterion, if the various problems when considered together culminate into a serious risk of tree failure.

The above guidelines were written to assist the more experienced field personnel. The intent is to identify and eliminate a true hazard. All resource values must be taken into account when making judgments. Qualify your decisions using a sensible, prudent thought process.

. Six Month Insect Mortality Hazard Tree Determination Guidelines [1]

Insect mortality as defined in this section is any dead tree or a tree that will be dead within 6 months because of significant insect attack or other serious injury, such as being girdled by lightning, uprooted, etc. A tree that will be dead within 6 months may possess one or more of the following symptoms, as appropriate for each species:

Trees meeting one or more of the following guidelines are expected to die within 6 months and can be marked for removal.

(A) Pine. (Ponderosa, Sugar and Jeffrey pines)

(1) Trees with at least 50% of the live crown exhibiting current, active, contiguous crown fade or dieback from the top. Specifically excludes older top-kill with very few or no needles remaining.

(2) Trees with less than 50% of the live crown exhibiting current, active, contiguous, crown fade or dieback from the top and with one of more of the following:

(a) Pitch tubes: Pink to reddish pitch tubes are numerous (>10), and are found over at least 50% of the circumference of the bole, at or above 5 feet, and extending at least 10 to 15 additional feet up the bole. Specifically excludes whitish pitch tubes that do not have pink or reddish boring dust associated with them. Because of drought stress, pitch tubes may or may not be present on trees currently infested with bark beetles.

(b) Boring dust or frass: Pink to reddish, fine granular to dust-like, boring dust or frass in bark crevices, webbing along the bole, or that accumulates at the base of the trees, present over at least 1/2 of the bole circumference. Specifically excludes boring dust or frass associated only with wounds, fire scars, etc.

Criteria 2a and 2b specifically exclude basal attacks by the red turpentine beetle which is characterized by very large pitch tubes, associated with coarse bring

[1] Forest Health Protection (Forest Pest Management) Staff, R5 State & Private Forestry. Six Month Salvage Marking Guidelines for Use in Areas with Management Responsibilities for The California Spotted Owl. June 25, 1992.

dust, generally restricted to the lower 2 to 3 feet of the bole. During periods of stress, as during the current drought, red turpentine beetle attacks may extend above the 2 to 3 foot level along the bole but are not to be considered valid marking criteria under the 6 month marking guidelines.

(B) True Fir. (White and Red Fir)

(1) Trees with at least 50% of the live crown exhibiting current, active, contiguous, crown fade or dieback from the top. Specifically excludes older top-kill with very few or no needles remaining.

(2) Trees with less than 50% of the live crown exhibiting current, active, contiguous, crown fade or dieback from the top and with the following:

Boring dust or frass. Whitish, fibrous or very fine, boring dust or frass found in the bark crevices and/or found in webbing along the bole, at DBH or higher and around at least 75% of the bole circumference.

These guidelines for true fir specifically exclude pitch streaming as a valid 6-month hazard marking criteria.

The following additional information should also be considered in the identification of hazard trees.

True Firs

Clear pitch or sap streaming on the bole are not reliable indication of successful attack by the fir engraver (the pitch streamers may indicate unsuccessful attacks) and should not be used as a salvage marking criteria. Oftentimes, trees that have been heavily attacked by fir engraver beetles will lose many of their needles while the needles are still green. Look for heavy accumulations of freshly fallen, green needles on the ground at the base of the trees. This loss of needles can be most readily seen when it occurs on snow. Needle loss may or may not occur, but in any case, the presence of the fir engraver must be verified or other marking criteria must be met for the tree to be marked for removal.

Abiotic factors such as air pollution, high temperature, and winter injury will also cause discoloration in the true firs. This discoloration does not necessarily imply imminent mortality.

All Species

Dead Cambium

In addition to the above criteria, for any species a potential hazard or dead tree is one in which at least 75 percent of the cambium is dead at stump level or within the lower to mid bole area. Dead cambium should be determined by the fact that the bark is loose or being shed. Usually there is clear evidence in terms of crown fade if the cambium is dead or dying, but sometimes fading is not clearly evident even though the cambium is dead. This seems to occur primarily during those periods when the tree is not actively transpiring, such as during winter dormancy.

Discoloration and Defoliation in Tree Crowns:

Do not designate a tree that is somewhat off-color because of the normal loss of older needles. Discoloration of needles refers to a general loss of needle color throughout all or a significant portion of the crown. Normal needle die back is common in the pines, particularly in the fall. However, do not discount insect attack if a tree looks highly suspect or has other than normal needle cast; other problems may be present. Use binoculars to further investigate. Most conifers depend upon a 2 to 11 year complement of needles for maximum growth and development. Bark beetles are not the only biotic factor that causes needle discoloration. There are many other agents responsible for needle death. These include insects such as mites, scale, aphids, and defoliators such as the Douglas fir tussock moth (which also feed on true firs). Note: Insect-related needle injury and/or defoliation do not necessarily result in tree mortality or the creation of hazardous conditions. Trees with foliage injury and/or defoliation must still meet the marking guidelines.

Additionally, there are a number of fungus infecting agents that cause defoliation. Each of these on there own will not cause mortality, however over a long period fungi may inhibit growth and vigor thus predisposing a tree to other fatal agents, notably bark beetles. This is especially true during long drought periods extending more than two years.

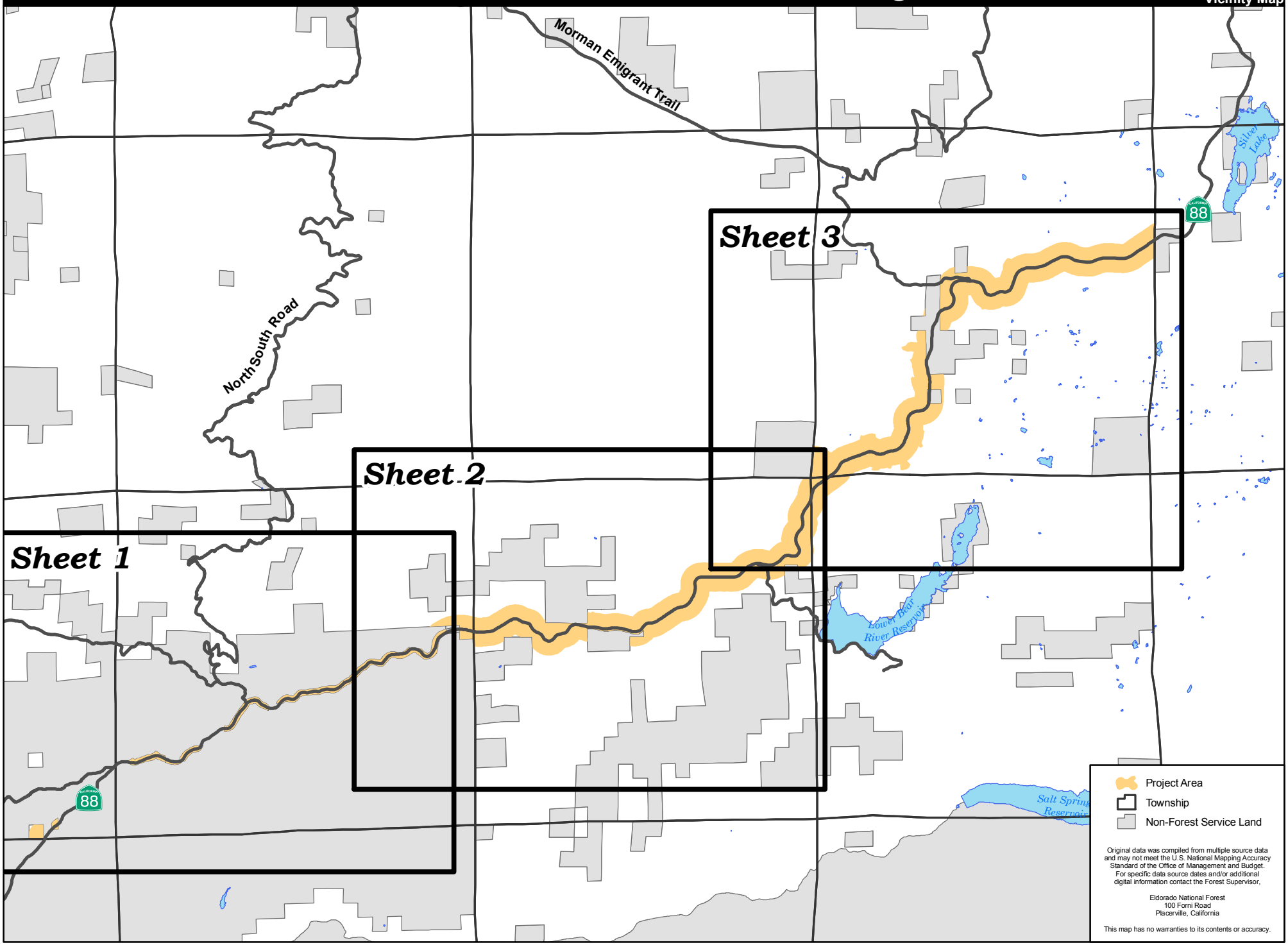
Red fir trees commonly have a fair amount of branch flagging associated with dwarf mistletoe and Cytospora canker. During certain periods of time, perhaps associated with droughts, the branch mortality may become severe enough to cause tree mortality. If the branch mortality from Cytospora/dwarf mistletoe infections results in 50% or more live crown killing and the remaining live crown is less than 30%, the tree is very likely to die. The determination of whether or not mortality is occurring from the combination of mistletoe and Cytospora infections needs to be made by observing the general mortality conditions within the stand. If numerous recently killed or obviously dying trees are present and these trees display the 50% and 30% branch mortality criterion, it is likely that an infection-mortality cycle is present in the stand.

* Adapted from: PACIFIC RANGER DISTRICT HAZARD TREE AND SALVAGE TREE MARKING GUIDELINES, prepared by Don Errington, Reviewed by John Wenz (Forest Entomologist) 12/2004 and John Pronos (Forest Pathologist) 1/2005, updated by Don Errington 2007

View 88 Amador Ranger District, Eldorado National Forest

4 Miles

Vicinity Map



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Placerville, California

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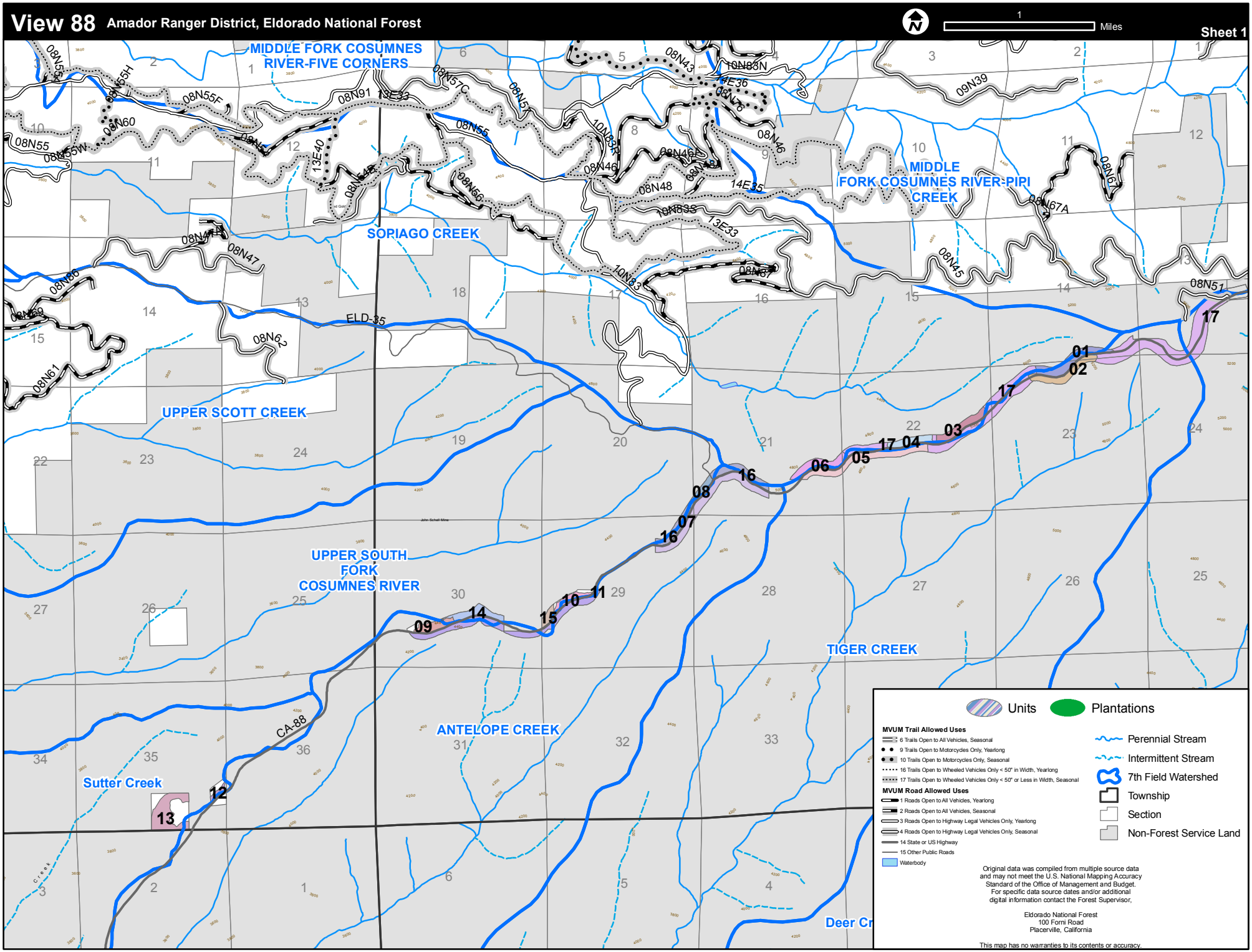
View 88
Amador Ranger District, Eldorado National Forest
1
Miles
Sheet 1
MIDDLE FORK COSUMNES RIVER-FIVE CORNERS
SOPIAGO CREEK
MIDDLE FORK COSUMNES RIVER-PIPI CREEK
UPPER SCOTT CREEK
UPPER SOUTH FORK COSUMNES RIVER
TIGER CREEK
ANTELOPE CREEK
Sutter Creek
Deer Cr
08N55
08N55F
08N55H
08N55N
08N60
08N91
13E33
08N57C
08N57
08N55
08N45
10N83N
14E36
08N76
09N39
08N46
08N46A
08N48
14E35
10N83S
13E33
08N67
08N67A
08N51
08N45
08N44
08N47
08N66
08N69
08N62
ELD-35
08N61
10N83
13E40
08N56
08N48
10N83R
08N46
CA-88
01
02
03
04
05
06
07
08
09
10
11
12
13
14
15
16
17
Units
Plantations
MVUM Trail Allowed Uses
6 Trails Open to All Vehicles, Seasonal
9 Trails Open to Motorcycles Only, Yearlong
10 Trails Open to Motorcycles Only, Seasonal
16 Trails Open to Wheeled Vehicles Only < 50" in Width, Yearlong
17 Trails Open to Wheeled Vehicles Only < 50" or Less in Width, Seasonal
MVUM Road Allowed Uses
1 Roads Open to All Vehicles, Yearlong
2 Roads Open to All Vehicles, Seasonal
3 Roads Open to Highway Legal Vehicles Only, Yearlong
4 Roads Open to Highway Legal Vehicles Only, Seasonal
14 State or US Highway
15 Other Public Roads
Waterbody
Perennial Stream
Intermittent Stream
7th Field Watershed
Township
Section
Non-Forest Service Land
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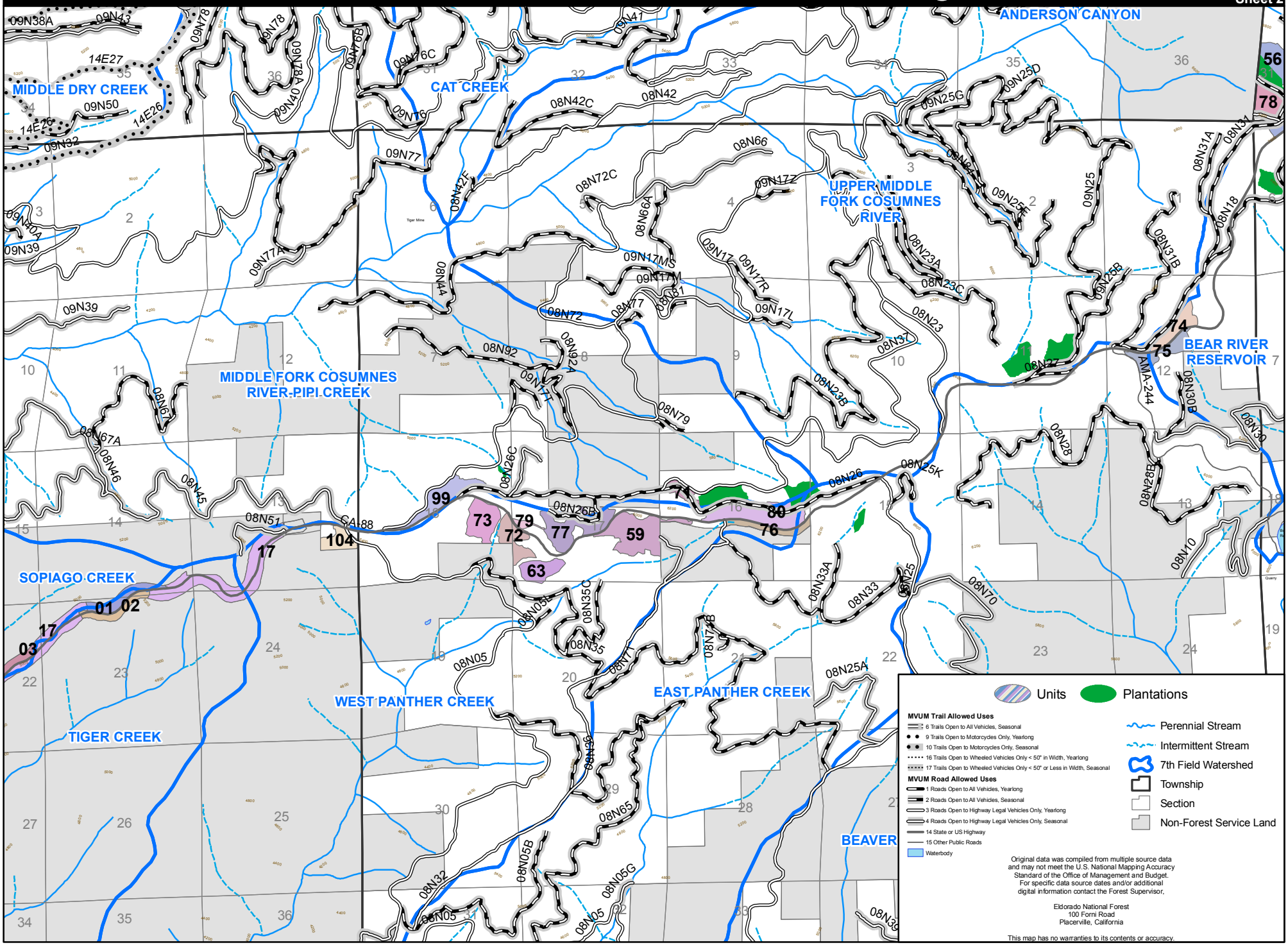
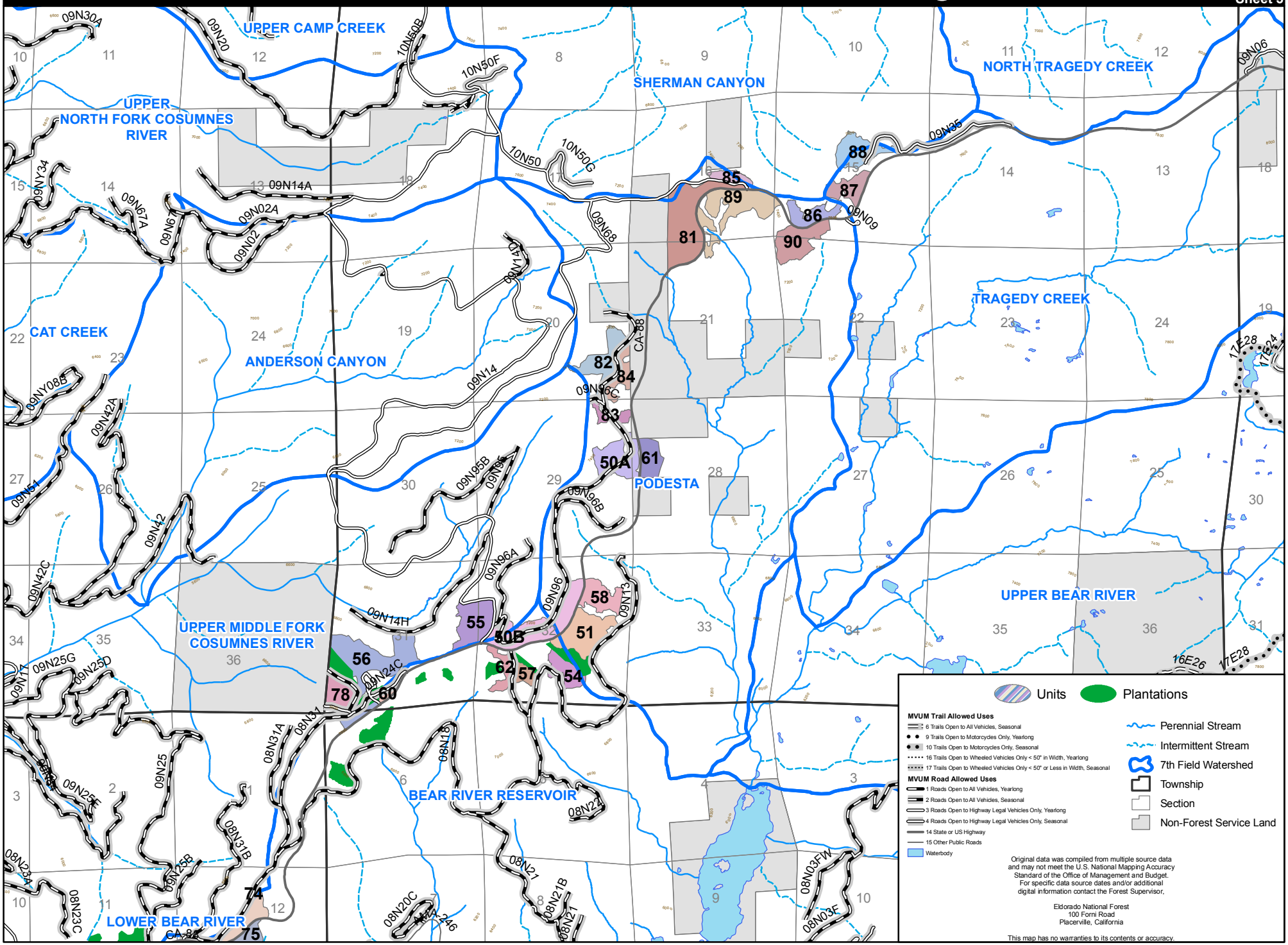
Sheet 2



View 88 Amador Ranger District, Eldorado National Forest

Sheet 3



Units

Plantations

MVUM Trail Allowed Uses

- 6 Trails Open to All Vehicles, Seasonal
- 9 Trails Open to Motorcycles Only, Yearlong
- 10 Trails Open to Motorcycles Only, Seasonal
- 16 Trails Open to Wheeled Vehicles Only < 50" in Width, Yearlong
- 17 Trails Open to Wheeled Vehicles Only < 50" or Less in Width, Seasonal

MVUM Road Allowed Uses

- 1 Roads Open to All Vehicles, Yearlong
- 2 Roads Open to All Vehicles, Seasonal
- 3 Roads Open to Highway Legal Vehicles Only, Yearlong
- 4 Roads Open to Highway Legal Vehicles Only, Seasonal
- 14 State or US Highway
- 15 Other Public Roads
- Waterbody

Perennial Stream

Intermittent Stream

7th Field Watershed

Township

Section

Non-Forest Service Land

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