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Panther Fuels Reduction and Forest Health Project

Environmental Assessment

Amador Ranger District, Eldorado National Forest
Amador County, California



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Common Abbreviations

ACCG	Amador-Calaveras Consensus Group
BA	Biological Assessment (resource effects) Basal Area (silviculture)
BE/BA	Biological Evaluation and Assessment
BMP	Best Management Practices
cc	Canopy cover (% canopy cover)
CH/H	Chains per hour
CSO	California spotted owl
CWE	Cumulative Watershed Effects
CWHR	California Wildlife Habitat Relationships
dbh	Diameter at breast height
EA	Environmental Assessment
EIS	Environmental Impact Statement
ENF	Eldorado National Forest
EPA	Environmental Protection Agency
ERA	Equivalent roaded acre
FONSI	Finding of No Significant Impact
FSH	Forest Service Handbook
FVS	Forest Vegetation Simulator
FWS	Fish and Wildlife Service
FYLF	Foothill yellow-legged frog
GTR	General Technical Report
HRCA	Home range core area
IR	Interim Recommendations
LOP	Limited operation period
LRMP	Land and Resource Management Plan
MIS	Management indicator species
NFMA	National Forest Management Act
NFS	National Forest System
PAC	Protected activity center
PSW	Pacific Southwest
RCA	Riparian conservation area
ROD	Record of Decision
SDI	Stand density index

SNFPA	Sierra Nevada Forest Plan Amendment
SNYLF	Sierra Nevada Yellow-legged Frog
SPLATS	Strategically Placed Area Treatments
T/A	Trees per acre
TES	Threatened and Endangered Species
TPA	Trees per acre
USDA	U.S. Department of Agriculture
USDI	U.S. Department of the Interior
USFS	USDA Forest Service
VES	Visual encounter surveys
WPT	Western pond turtle
WUI	Wildland Urban Intermix (or Interface)

Background

The Amador Ranger District of the Eldorado National Forest proposes to conduct a fuels reduction and forest health improvement project on approximately 3,350 acres of National Forest System (NFS) lands. Project objectives are to reduce unnaturally high fuel loadings, decrease the likelihood of future large scale catastrophic wildfire, improve forest health, and maintain / improve roads to their planned maintenance level. The total project area, including proposed treated and untreated areas, is approximately 5,400 acres.

The Panther Fuels Reduction and Forest Health (Panther) Project area is located between Panther Creek Road and Ellis Road, south of highway 88 and north of the 2004 Power Fire footprint in Amador County, CA. Elevations of the project area ranges from approximately 4,200 to 6,675 feet. The area is in the mixed conifer forest community (sugar pine, ponderosa pine, incense cedar, white fir, Douglas fir and associated species). The legal description is T8N, R15E, Sections 15,16,17, 18, 19, 20, 21, 22, 27, 28, 29, 30 and 31 (Fig. 1).

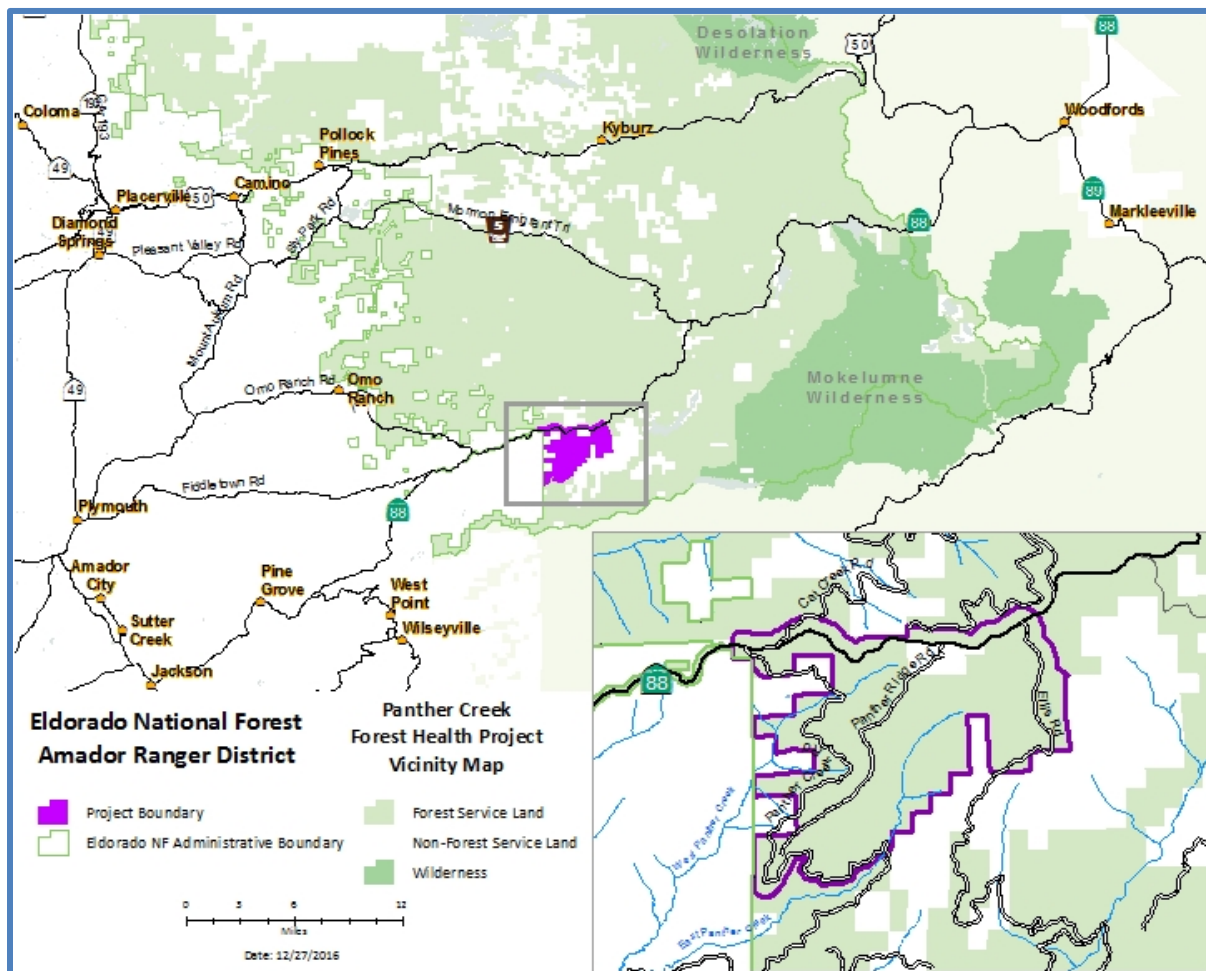


Figure 1. Location of the Panther project area.

The Panther Project was designed to implement management direction provided by the Eldorado National Forest Land and Resource Management Plan (LRMP) (USDA Forest Service, 1989), as amended by the Sierra Nevada Forest Plan Amendment (SNFPA) (USDA Forest Service, 2004). This project was also designed to incorporate management actions consistent with the USDA Forest Service Region 5 Ecological Restoration Leadership Intent and the Pacific Southwest Research Station General Technical Report 220 “An Ecosystem Management Strategy for Sierran Mixed-Conifer Forests” (PSW-GTR-220) (North et al. 2009) as best available science to guide project analysis and implementation.

The proposed action was developed in collaboration with the Amador-Calaveras Consensus Group (ACCG), which is a local collaborative that works to create healthy forests and watersheds, fire-safe communities, and sustainable local economies. ACCG fosters partnerships among private, nonprofit, state, and federal entities with a common interest in the health and well-being of the landscape and communities in the Mokelumne and Calaveras watersheds. The group is advancing an All-Lands strategy to create a heightened degree of environmental stewardship, local jobs, greater local economic stability, and healthy forests and communities. ACCG principles reflect the group’s emphasis on its triple bottom line for balancing environmental, social and economic goals.

Need for the Proposal

The Panther Project is strategically located along the western edge of the Amador Ranger District / Eldorado National Forest boundary. The Panther Project area contains mixed conifer forest stands that are densely stocked with small to medium sized trees which are contributing to both an unnaturally high vegetation fuels and forest health concern. This condition is due in part to fire exclusion as well as a lack of other vegetation treatments to remove suppressed or intermediate sized trees. Due to their density and location, these trees are providing a vegetation “ladder” for fire to move from the ground into the crowns of larger trees, thereby increasing the risk of tree mortality and difficulty of fire suppression. Existing levels of both live and dead fuel in the project area would produce flame lengths over 4 feet. Flame lengths over 4 feet are too intense to for direct attack with hand tools. This often results in larger fires that burn for multiple days and increased tree mortality, associated loss of plant and wildlife habitat, and impacts to soil and water resources.

In addition, the dense forest stands are at a higher risk of competition-induced moisture stress, making trees more susceptible to insects and diseases. Beginning in 2016, the forests in and around the Panther project area have displayed an increase in tree mortality consistent with the recent historic drought and outbreak of western pine beetle in the region (<http://www.fs.usda.gov/CATreeMortality>). Within the project boundary several patches of dead trees, mostly over-story pines, have developed ranging from a few trees to several acres in size. The tree mortality, while difficult to predict due to the complex interaction with weather and

stand health, is expected to continue at least for the immediate future. Depending on the location (near roads or in potential fuel breaks) or structure of stands (density of surviving understory trees) displaying mortality, it may be desirable to remove the standing dead trees as part of the Panther project in order to manage fuel loading, mitigate risks to infrastructure, or increase structural heterogeneity as a gap in the stand.

The project area also contains areas previously treated to improve forest health and reduce fuels, but are in need of maintenance. Areas along major ridgelines and roadways, including California State Route 88 (highway 88), have been identified as strategic locations for fire suppression and public evacuation. Despite thinning and prescribed burning in the past, re-growth of vegetation and surface fuel accumulations require continued maintenance to provide for manageable fire behavior.

The project area also contains several pre-commercial and commercial size plantations, many of which currently exhibit high levels of competing woody brush species. Some of the plantations are also experiencing inter-tree competition, delaying the development of old-forest characteristics. Inter-tree competition also increases the risk of plantation loss due to insects, diseases and wildfire.

Given the proximity of key transportation routes (i.e., highway 88, Ellis and Panther Creek roads), private lands and timber inholdings, and important natural resources (including California spotted owl and Sierra Nevada yellow-legged frog habitat, plus watershed, rangeland, and archaeological resources), there is a need to reduce the potential wildfire intensity and rate of spread in the project area. There is also a need to minimize the adverse effects of wildfire on natural resources and socio-economic conditions. In addition, there is a need to provide wood fiber for purposes of job creation and public consumption, thereby contributing towards a landscape capable of producing a sustainable supply of natural resource materials. The purpose of the Panther Project is to address these needs in an effective and efficient manner.

To address these needs, the Panther Project proposes a combination of strategic fuel treatment areas and commercial harvest units. Vegetation treatments will be guided by PSW-GTR-220 with the goal of creating fuel conditions resembling those created under historic fire return intervals. This reduced fuel loading will reduce fire intensity and increase firefighter safety and fire suppression effectiveness under 90th percentile weather conditions. Treatments will differ across the project area based on factors such as slope, aspect and proximity to private land. Actions are proposed to establish, create, and maintain key fuel break areas along important ridges and roads within the project area.

To accomplish project goals, an additional need of the Panther Project is to improve and maintain existing roads within the project boundary. The intent is to improve access for

vegetation treatments, enhance firefighter access for fire suppression purposes, and protect the existing investment made in the Forest road transportation system. Roads will be maintained or reconstructed to the objective maintenance level approved in existing travel management decisions. No new permanent roads are proposed, and no existing roads are nominated to be decommissioned.

In the Panther Project area:

1. There is a need to reduce surface and ladder fuels, thus creating stands less susceptible to adverse wildfire effects. In addition there is a need to remove dead trees that threaten the short and long term goals of managing fuel loadings, and reducing adverse wildfire effects.
2. There is a need to promote healthy forest stands that are resistant to drought, insects and disease, and to protect and provide habitat for plant and wildlife species through time.
3. There is a need to maintain strategically-placed fuel treatments in a manner that significantly reduces wildland fire intensity and rate of spread, thereby promoting safe fire suppression, protection of human life and property, and protecting/retaining resource and socio-economic values within and adjacent to the project area.
4. There is a need to conduct road maintenance and reconstruction in order to provide safe access for fire suppression and access for vegetation treatments.

Forest Plan Direction

The Sierra Nevada Forest Plan Amendment (SNFPA) Record of Decision (USDA Forest Service, 2004) amended the Eldorado National Forest LRMP and provided management direction for designing vegetation management treatments to reduce the risk of wildfire to communities in the wildland-urban interface while modifying fire behavior over the broader landscape (SNFPA ROD 2004, pages 3 and 17). The Panther Project incorporates the SNFPA Forest-wide Standards and Guidelines by planning strategically placed area fuels treatments (SPLATS) across the landscape to “interrupt fire spread and achieve conditions that (1) reduce the size and intensity of wildfire and (2) result in stand densities necessary for healthy forests during drought conditions” (SNFPA ROD, page 49). This direction applies to all land allocations in the project area with the exception of Protected Activity Centers (PACs) which are to be avoided for fuels and vegetation treatments to the greatest extent possible.

Decision to be Made

The Forest Supervisor will decide whether to implement the proposed action, an alternative to the proposed action, or to take no action at all.

Public Involvement

A brief description of the location and type of project was listed in the Schedule of Proposed Actions for the Eldorado National Forest starting April 1, 2013. Scoping for the Panther project was initiated on February 10, 2016 for a targeted 30 day time period. A legal notice was published in the Mountain Democrat on February 10, 2016 and the Amador Ledger Dispatch on February 12, 2016. Approximately 71 scoping letters were mailed out to adjacent property owners, federal, state and local agencies, Native American tribes and interested individuals. The forest received ten scoping comment letters on the proposed action by either mail or email. The summary of scoping comments are available in the project record.

As part of the collaboration process, the USFS hosted members of the Amador-Calaveras Consensus Group (ACCG) on field trips to the project area on June 10, 2015 and November 9, 2016.

A preliminary EA was prepared for public review and was posted on the project website with a letter notifying the public of the opportunity to comment on the project. The legal notice of the opportunity to comment on the preliminary EA was published in the Mountain Democrat and in the Amador Ledger-Dispatch on February 17, 2017. In addition, letters notifying of the comment period were sent to 51 interested and potentially affected parties on February 17, 2017. A public meeting was held for individuals to discuss the project and environmental analyses with Forest Service staff on March 8, 2017. Eleven (11) letters were received during the 30-day comment period to the EA.

Issues

Based on the scoping comments received the following substantial issues were identified. A summary of all scoping comments received is located in project record. Indicator measures are given that will be used to compare the effects of the different alternatives.

No Herbicide Application

Issue: The use of herbicide (glyphosate) may have an adverse effect on human health.

Indicator measures: Total acres treated or acres affected; human health risk.

The No Herbicide alternative is described and analyzed as Alternative 3.

California Spotted Owl Draft Interim Recommendations

Issue: Mechanical treatment and commercial harvest may adversely affect the California spotted owl. In addition, the Region 5 California Spotted Owl Draft Interim Recommendations (Draft IR's) require that, until the Conservation Strategy is finalized, all projects being analyzed with an EA or Environmental Impact Statement (EIS) analyze an alternative based on the treatment guidelines within the recommendations.

Indicator measure: Acres of habitat protected or retained.

The CSO Draft IR's alternative is described and analyzed in Alternative 4.

No alternatives were considered but eliminated from analysis.

Proposed Action and Alternatives

The proposed action and following alternatives were considered:

Proposed Action (Alternative 1)

1. Strategic Fuel Break Treatment Area

Approximately 3,000 acres of fuel break treatments are proposed in strategic locations within the Panther project area (Fig. 2). Three spatial designs are proposed for the fuel breaks: 2,000 feet wide fuel breaks along main ridgelines (1,000 feet on each side), 600 feet fuel breaks along key roads (300 feet on each side) and 200 feet fuel breaks from selected private property lines.

Fuel breaks are strategically located along ridgelines and key roads. Dense, flammable ladder fuels vegetation (e.g., shrubs and small trees) would be replaced with a vegetation type of lower fuel volume, height, and flammability (e.g., grasses and forbs). Once treated, the fuel break would consist of larger trees with a high canopy cover without less brush and dead vegetative fuels than currently exists. The majority of the fuel break treatment will focus on removing small trees and brush while leaving the overstory canopy cover intact. Plantations contained within and adjacent to the above-described fuel break would be treated as part of the fuel break design.

The strategic intent of the 2,000 feet fuel breaks is to provide an effective control point for fire suppression in the event of a large wildfire.

The strategic intent of the 600 feet fuel breaks is to provide a prepared point to quickly and safely conduct fire suppression activities, such as back burning, that would preclude the use of heavy equipment to cut fire lines. These fire breaks would provide vegetation changes in the landscape to stop smaller fires, and to slow down larger ones before reaching main ridges. The roads identified for the 600 feet fuel break are Panther Creek Rd (08N05), 08N33, and 08N71.

The strategic intent of the 200 feet fuel breaks adjacent to private property is to minimize the movement of a wildfire from National Forest System lands to private property, and vice-versa. The selected property boundaries are those with closest proximity to private residences and structures.

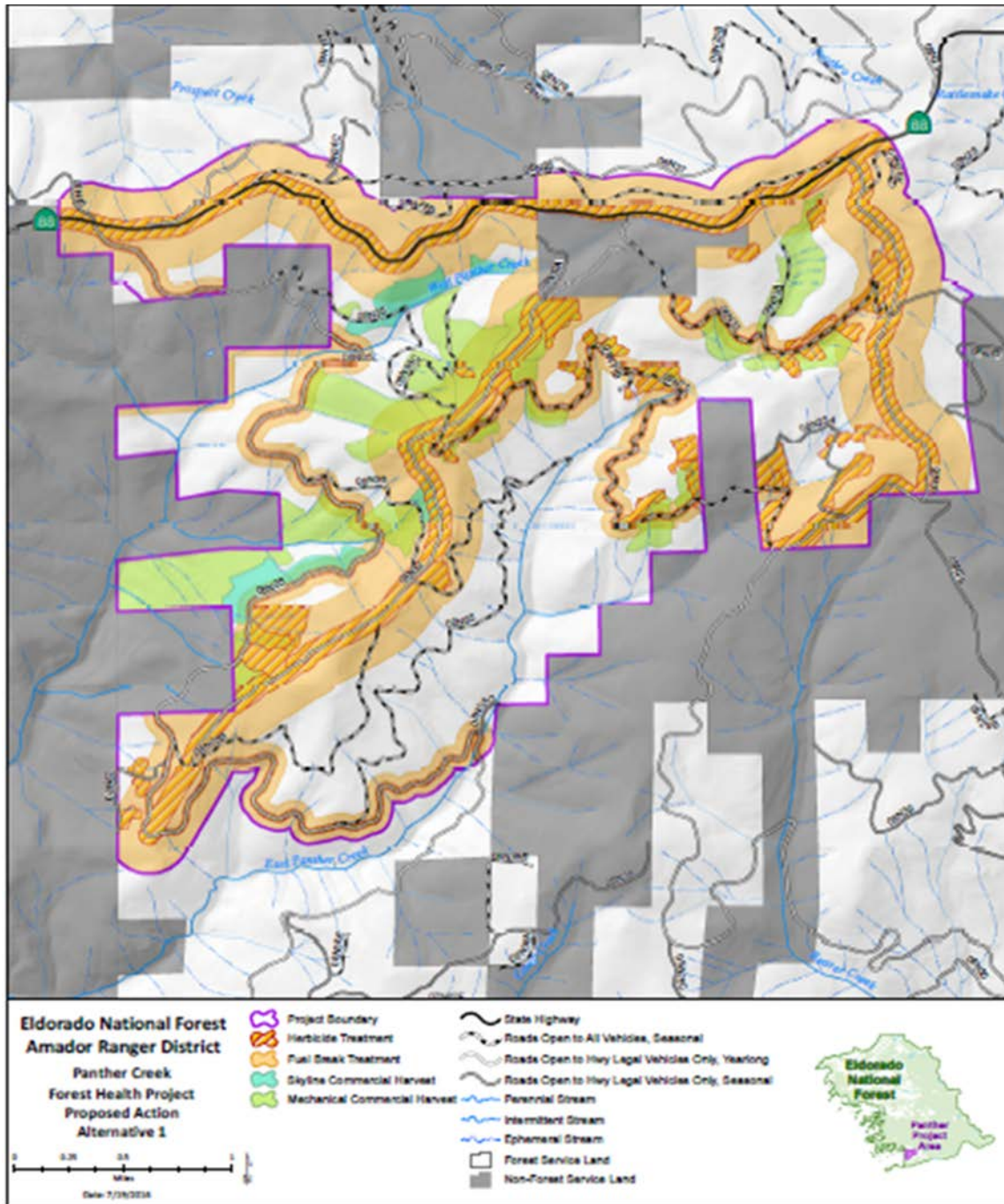


Figure 2. Location of proposed activities under Alternative 1 - Proposed Action

Fuel break treatments may include the following:

- Thin live conifers less than or equal to 10 inches diameter breast height (dbh), and fell dead trees less than or equal to 15 inches dbh, using hand tools or mechanical methods. Fell other trees – live or dead – which pose a safety hazard or directly threaten fire control lines. Forest managers may identify “leave trees” which will remain on the landscape on approximately 20-25’ spacing to create an approximate 50% canopy cover.
- Cut and remove concentrations of recently killed trees (snags) within the fuel break treatment areas without restriction on dbh. Snags would be retained consistent with forest LRMP standards. Generally the 4 largest snags will be retained per acre, averaged over the entire project area. Snags will not be evenly spaced across the landscape, but would vary by land allocation, such as fuel break or PAC, and landscape position, such as near roads, ridgetops and streams. Snag positions may be based on desired future conditions. Any snag posing a hazard to life, injury, or property may be removed.
- No snags would be removed in PACs or known den sites outside of WUI defense zones, unless they pose an imminent human health hazard. An exception may be made where a biological evaluation determines that the areas proposed for harvest are rendered unsuitable for the purpose they were intended (i.e. wildlife habitat) by a catastrophic stand-replacing event.
- Prune live conifers using hand tools. Pruned height will depend on fuels objectives, tree height, and tools used. A maximum 50% of the total height of the tree would be removed.
- Treat both existing and treatment generated (activity) fuels with a combination of chipping, piling, “lop & scatter” methods and prescribed burning. Prescribed fire may include broadcast burning and lighting of piles. Typical prescribed fire intervals would be twice in a ten year time period. To facilitate prescribed burning, fire lines would be constructed using mechanical equipment and/or hand tools.
- Remove vegetation material to landings using ground based or cable yarding systems.
- Treat woody brush initially with a combination of prescribed fire, hand and mechanical methods.
- Follow-up fuel break maintenance treatments may include: targeted grazing (goats or sheep), prescribed fire, removal by mechanical or hand tools, and herbicide application.
 - Herbicide treatments would be limited to 250 feet areas from the center of major ridgelines, for a total width of 500 feet; 75 feet areas from the center of selected roads, for a total width of 150 feet; and in plantations contained within and adjacent to fuel break treatment areas (see Fig. 2) A total of 1027 acres is being analyzed and proposed for herbicide use.
 - Herbicide treatments would consist hand application of glyphosate herbicide to resprouting brush species, typically manzanita, deerbrush, whitethorn, cherry, chinquapin, and huckleberry oak. These species are problematic because they

create a high volume of surface and ladder fuels, and they resprout vigorously when treated by hand tools, machine or grazing, quickly negating the effectiveness of the initial treatment. Glyphosate will be applied at a 3-5% solution rate along with a surfactant (nonylphenol polyethoxylate based (NPE), methylated seed oil (MSO) based, or a silicone/modified vegetable oil blend), and a colorant or dye.

- Herbicide treatment may also be applied to new growth (seed generated) of manzanita, deerbrush, whitethorn, cherry, chinquapin, and huckleberry oak within fuel breaks as needed. seed generated brush may be treated over the life of the project when it reaches a height of 12 inches or density that it will become a fuel problem. This could take several years after initial brush cutting.
- Targeted grazing operations would utilize goats or sheep. Operations would be managed with an on-site herder, guard dogs and fencing. The number of animals and length of time on a site would vary depending upon the type of animals utilized and vegetation conditions. Animals would be removed from a treatment area when vegetation has been consumed to less than an average of one foot in height with most new leaf growth on brush species consumed, but prior to exposing bare ground. More than one treatment could be completed in a season, such as a spring treatment, followed by a late season treatment. Follow up treatments could be every one to two years to keep vegetation at a height and tenderness optimum for targeted grazing, but could be spaced multiple years apart. Other fuel break maintenance treatments could be used in combination with targeted grazing if needed to return vegetation to preferable condition to utilize grazing.
- Follow up treatments may occur any of the methods listed (targeted grazing, prescribed fire, herbicides). In general herbicide should only need an initial and one follow up application, (2 total).

2. Commercial Harvest Units (Mechanical and Skyline)

Commercial harvest units were identified to treat areas with the existing condition of high stand densities and presence of ladder fuels. Silvicultural prescriptions will incorporate recommendations from PSW-GTR-220, and meet Forest Plan direction (LRMP 1989, SNFPA 2004). (See Fig. 3.) Prescriptions will be designed to meet the following GTR-220 goals:

- Reduce shading around oaks to improve growing conditions.
- Increase the percentage of shade-intolerant pine and hardwoods.
- Retain clumps of large trees. Clumps may vary in shape and size and range from a group of 4-5 trees up to a quarter of an acre in size. In general, clumps would be located in the mid to lower slope positions.
- Retain large trees with defects such as rot, cavities, and multiple tops.

- Improve forest resiliency by reducing stand densities by thinning. In general, lowest residual stand densities would occur on upper slopes, ridges and southern and western aspects. Targeted residual density would range from 100-140 square feet/acre basal area or approximately 25-30 feet tree spacing. Although canopy cover would average 50% over treatment units, lower canopy cover would exist in these less dense areas. On lower slopes and transitioning into Riparian Conservation Areas (RCA), residual stand densities may be higher with a corresponding increase in canopy cover. Targeted residual density would range from 140-180 square feet/acre basal area or 20-25 feet tree spacing. Canopy Cover in RCAs of perennial and intermittent streams would see the least overall reduction and would likely average closer to 60%.
- Manage the intermediate size class (20 to 30 inch dbh), thinning this class primarily by species (shade tolerant) and growth form (those acting as ladder fuels).
- Increase stand variability. Target stand structure would consist of a mixture of clumps, gaps and a matrix of variably spaced trees. Small (0.25 acre or less) gaps will be created or enlarged in low productivity sites and where natural openings in the canopy exist. These small gaps will not be evaluated for regeneration.

Commercial harvest treatments may include the following:

- Treat approximately 783 acres of natural stands and commercial sized plantations by cutting and removing trees between 10 inches and 30 inches dbh, using ground-based commercial logging methods including whole tree yarding (679 acres) and skyline logging systems (104 acres). Recently killed trees (snags) within commercial harvest units would be cut and removed concurrently with logging operations without restriction on dbh. Feller bunchers or equivalent type of ground based equipment may be used for cutting and pre-bunching of logs that would be removed using a skyline logging system. Use of equipment in skyline units would be limited to 45% slope.
- Snags would be retained consistent with forest LRMP standards. Generally the 4 largest snags will be retained per acre, averaged over the entire project area. Snags will not be evenly spaced across the landscape, but would vary by land allocation, such as fuel break or PAC, and landscape position, such as near roads, ridgetops and streams. Snag positions may be based on desired future conditions. Any snag posing a hazard to life, injury, or property may be removed.
- Remove small trees (4 inches to 10 inches dbh) to landings, or other designated disposal sites, on the mechanically thinned acres.
- Pile tree tops and small trees (biomass) at landings to be made available for either biomass power generation or public fire wood cutting. Material remaining at landings (if not removed by previous methods) would be burned.
- Conduct post-harvest treatments, including grapple or tractor piling of existing and activity fuels, followed by prescribed fire, including both broadcast burning and lighting of piles.

- Create small openings (1 to 2 acres in size) by removing conifer species to promote pine regeneration. Areas would be located in and adjacent to areas with symptoms of annosus root rot infection, in areas currently dominated by white fir, and where concentrations of recent mortality has occurred. Individual openings where mortality has occurred may be greater than 2 acres in size. Regeneration will occur through natural seeding as well as planting. For annosus areas, treat stumps of surrounding area with borax fungicide (Sporax or equivalent formulation). The total area treated in these openings would be approximately 75 acres. Reforest openings with a mix of pine species: ponderosa pine, Jeffrey pine, sugar pine. Conduct one to two release treatments using manual methods. Evaluate seedling survival and interplant if necessary in order to achieve desired level of stocking in pine species. In 5-7 years post-harvest, conduct pre-commercial thinning in order to achieve desired level of stocking in pine species.

3. Road Maintenance and Reconstruction

Roads and trails within the project area will be managed consistent with the 2008 Eldorado National Forest Public Wheeled Motorized Travel Management Environmental Impact Statement (Travel Management EIS) and compliant with applicable standards. Roads not identified as open to public use may be blocked by gates, barricades, rocks, other barriers or by signage. 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 or during logging operations to protect reconstruction investments and for public safety.

There are approximately 25 miles of road maintenance, 24 miles of road reconstruction, and 1.5 miles of new temporary road construction within the project boundary area. Temporary roads will be obliterated upon project completion. Road maintenance and reconstruction will provide safe access for project activities as well as for fire suppression purposes. No changes to the Motor Vehicle Use Map are proposed and no roads are proposed to be decommissioned. Table 1 (below) identifies the treatment proposed for each road within the project area.

General road maintenance activities may include:

- Removal of roadside vegetation,
- Repair of the road running surface and shoulder,
- Drainage structure maintenance,
- Removal of hazard trees,
- Sign repair or replacement,
- Maintenance or replacement traffic gates and barriers, and
- Other similar activities.

General road reconstruction activities may include:

- Replacement of inadequate drainage crossings,

- Installation of water bars and dips on roads with inadequate runoff control,
- Out sloping the road where possible,
- Slope stabilization,
- Widening of traveled way,
- Gate installation to control seasonal use, and
- Other similar activities.

Drainage structures will be designed for 100-year storm events. Water will be used to abate dust during maintenance and reconstruction and from logging traffic with water selected from water drafting sites that have suitable stream flow and access. There are two water holes within the project area which will also be maintained as part of the project. In the event water holes are not suitable for drafting, magnesium chloride will be used for dust abatement.

Table 1: Roads within the project area and respective proposed treatment.

ROAD NUMBER	NAME	MTCE. LEVEL¹	SURFACING	EST. MILES	TREATMENT
08N05	PANTHER CREEK	3	BITUMINOUS SURFACE TREATMENT	11.00	MAINTAIN
08N05A	PANTHER CREEK SPUR	2	NATIVE MATERIAL	0.35	RECONSTRUCT
08N05B	EAST PANTHER	2	NATIVE MATERIAL	1.87	RECONSTRUCT
08N05G	EAST PANTHER 36	2	NATIVE MATERIAL	0.20	MAINTAIN
08N05J	EAST PANTHER OVERVIEW	1	NATIVE MATERIAL	0.60	MAINTAIN
08N05K	CAT'S PAW	1	NATIVE MATERIAL	0.74	MAINTAIN
08N05L	WET CAT	2	NATIVE MATERIAL	0.02	MAINTAIN
08N25	ELLIS ROAD	4	BITUMINOUS SURFACE TREATMENT	8.55	MAINTAIN
08N25A	BRUSHY POINT	2	NATIVE MATERIAL	1.10	RECONSTRUCT
08N25K	BRUSHY ELLIS SPUR	2	NATIVE MATERIAL	0.49	MAINTAIN
08N26	OLD LUMBERYARD	2	NATIVE MATERIAL	2.97	MAINTAIN
08N26A	LUMBERYARD	3	BITUMINOUS SURFACE TREATMENT	0.10	MAINTAIN
08N26B	MUD SOUTH	2	NATIVE MATERIAL	0.50	RECONSTRUCT
08N26C	PROSPECT ROCK	2	NATIVE MATERIAL	0.11	RECONSTRUCT
08N32	PANTHER RIDGE	3	NATIVE MATERIAL	3.82	RECONSTRUCT
08N32A	PANTHER RIDGE N.	2	NATIVE MATERIAL	0.40	MAINTAIN
08N33	HENLEY ROAD	2	NATIVE MATERIAL	1.96	RECONSTRUCT
08N33A	BEAR BEAVER SPUR	2	NATIVE MATERIAL	0.47	MAINTAIN
08N33B	EAST PANTHER SPUR	1	NATIVE MATERIAL	0.13	MAINTAIN
08N33C	HENLEY CEE	1	NATIVE MATERIAL	0.60	RECONSTRUCT
08N35	UPPER WEST PANTHER	2	NATIVE MATERIAL	1.80	RECONSTRUCT

ROAD NUMBER	NAME	MTCE. LEVEL¹	SURFACING	EST. MILES	TREATMENT
08N35A	TOP CAT	1	NATIVE MATERIAL	0.41	MAINTAIN
08N35B	WILD CAT	1	NATIVE MATERIAL	0.50	RECONSTRUCT
08N35C	ROBINSONS ROAD	2	NATIVE MATERIAL	0.83	MAINTAIN
08N36	INTERMEDIATE	2	NATIVE MATERIAL	2.40	RECONSTRUCT
08N45	ARMSTRONG FIVE	2	NATIVE MATERIAL	0.23	RECONSTRUCT
08N63	LUMBERYARD CAMPGROUND	3	BITUMINOUS SURFACE TREATMENT	0.07	MAINTAIN
08N65	SECTION 29	2	NATIVE MATERIAL	2.70	RECONSTRUCT
08N65A	ANTLER SPUR	1	NATIVE MATERIAL	0.60	MAINTAIN
08N65B	PANTHER CREEK CABLE	1	NATIVE MATERIAL	0.60	MAINTAIN
08N70	HENLEY CANYON	3	NATIVE MATERIAL	1.47	MAINTAIN
08N71	STATION TIE	2	NATIVE MATERIAL	4.00	RECONSTRUCT
08N71B	STATION CABLE	2	NATIVE MATERIAL	0.19	RECONSTRUCT
08N75	DOAKS TIE	2	NATIVE MATERIAL	2.50	RECONSTRUCT
08N75A	DUTCH HENERYS	2	NATIVE MATERIAL	0.80	MAINTAIN
08N75AW	HAMMS BEAR	1	NATIVE MATERIAL	0.50	MAINTAIN
08N75B	FEEDERS SPRINGS	1	NATIVE MATERIAL	0.30	RECONSTRUCT
08N75C	DOAK'S SPRING	1	NATIVE MATERIAL	0.07	RECONSTRUCT
08N82	QUAIL	3	NATIVE MATERIAL	0.59	MAINTAIN
08N82A	MTN. QUAIL	1	NATIVE MATERIAL	0.29	MAINTAIN
09N17	CAT CREEK	5	BITUMINOUS SURFACE TREATMENT	0.86	MAINTAIN

¹ Maintenance Level:

- 1 - BASIC CUSTODIAL CARE (CLOSED)
- 2 - HIGH CLEARANCE VEHICLES
- 3 - SUITABLE FOR PASSENGER CARS
- 4 - MODERATE DEGREE OF USER COMFORT
- 5 - HIGH DEGREE OF USER COMFORT

Design Criteria

Fuels/Prescribed Fire

Fire line construction would follow established guidelines for water bar construction as outlined in the Best Management Practices (BMP's). Upon completion of prescribed burning activities, the visible character of the fire lines would be hidden by spreading woody debris where they intersect existing roads and trails to limit unauthorized vehicle use.

Fire lines will be constructed by hand or dozer; however roads would be used where feasible. Exact locations of fire lines will be determined by the onsite fire crew. During burning operations, fire would be allowed to creep between piles or fuel concentrations and back into RCAs.

Treatment of fuels using hand tools and piling would occur in specified areas within the project area. The 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.

Air Quality:

Pile burning and prescribed understory burning would be implemented under a Smoke Management Plan, issued by the Amador County Air Pollution Control District, and a Burn Plan that adheres to Federal and Regional standards. To reduce air quality impacts, emission reduction strategies would be used. For prescribed burning, desirable meteorological and fuel moisture conditions would be defined in the project's smoke management plan and required to implement burning, in order to facilitate venting and dispersion of smoke from the project area.

Aquatic and Terrestrial Wildlife

Existing waterholes and other aquatic sites including ponds, lakes and streams used for water drafting would be surveyed for Aquatic threatened, endangered and sensitive (TES) species and flow levels taken prior to use. In the event TES species are found to occur at drafting sites; sites will not be used and future surveys would be conducted by an aquatic specialist to determine presence of potential populations.

The use of low velocity water pumps and screening devices will be utilized during drafting for project treatments to prevent mortality of all life stages of potential amphibian and fish species present. Refer to BMP 2.5 (Table 2).

All in-stream culvert work (culvert replacements, etc.) will be completed under low flow conditions (consult with aquatic biologist or hydrologist before construction) in reference to BMP

2.8 (Table 2). A qualified aquatic biologist will survey the culvert site within 24 hours prior to construction activities.

Should Sierra Nevada yellow-legged frogs (SNYLF) be located before or during implementation, their safety shall be assessed by a qualified biologist and dealt with according to the Terms and Conditions described in the Programmatic Biological Opinion (“Programmatic Biological Opinion on Nine Forest Programs on Nine National Forests in the Sierra Nevada of California for the Endangered Sierra Nevada Yellow-legged frog, Endangered Northern Distinct Population Segment of the Mountain Yellow-legged Frog, and Threatened Yosemite Toad”, USDI, FWS 2014.)

Additional aquatic wildlife design features have been incorporated in the Soil, Water, Riparian and Aquatic Resources section, below.

Mechanical and fuels prescriptions are designed to be consistent with Forest-wide management standards and guidelines (SNFPA, USDA Forest Service, 2004, pages A-49 to A-59), as well as land allocation standards and guidelines for California spotted owl and northern goshawk Protected Activity Centers (SNFPA, USDA Forest Service, 2004, pages A-59 to A-61), and Riparian Conservation Areas and Critical Aquatic Refuges (SNFPA, USDA Forest Service, 2004, pages A-62 to A-66).

The proposed action was developed to minimize impact to the California spotted owl habitat in the project area, and thus reduce impact to associated species (such as the northern goshawk), while meeting the project needs. As part of this process, Protected Activity Centers (PACs), and associated Home Range Core Areas (HRCAs) were evaluated for existing habitat quality, and quantity and for potential cumulative effects of the project design. This evaluation informed decisions on location and intensity of treatments included in the proposed action. In some cases, this resulted in removing commercial thinning units from the project, or changing the proposed treatment to reduce or remove impacts to California spotted owl habitat.

Commercial Harvest/Plantation Treatments:

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, or portions of units, that are located within ¼ mile of spotted owl or goshawk nests, unless surveys confirm that owls or goshawks are not nesting. In the absence of recent nest location data, units, or portions of units, or within ¼ mile from PAC boundaries have been covered by the LOPs. LOPs would be implemented to remove or reduce the potential for nesting disturbance to owl and goshawk PACs by activities in units adjacent to the PACs.

Dispersed pockets of small trees and understory brush would be retained during mechanical treatments to provide for wildlife habitat. Preference for location of these pockets will be given to California Wildlife Habitat Relations tree size class 5 stands (24" dbh and greater), and stands located in existing spotted owl HRCAs.

Thinning and fuels treatment in the buffer along the northern private property line, in PAC AMA0021, will conform to the 2004 SNFPA, specifically focusing on treating surface and ladder fuels and removing only material necessary to meet project fuels objectives. Thinning within this California spotted owl PAC will be designed to facilitate fire suppression, and reduce residual fire size and spread, and minimize stand mortality from potential wildfire. Thinning within this PAC would be limited to small tree removal (15" dbh and smaller), and be dependent on stand characteristics for the upper diameter limit (15" would be the maximum, smaller treed stands may have lower maximum diameters).

In all treatment areas, silvicultural prescriptions would be designed to maintain and/or enhance hardwoods where they presently exist; priority may be given to areas important to early seral species such as deer. Conifers encroaching on individual oak canopies would be targeted for removal, resulting in small ¼ acre or less openings in the canopy surrounding some oaks.

Prescribed Burning In California Spotted Owl and Northern Goshawk PACs:

Prescribed burning in PACs will be designed to result in a 5% reduction or less in canopy cover, averaged over the treatment unit. Snags (15" dbh and greater) would not be targeted for active lighting. Prior to ignition, current fuel conditions surrounding trees > 30" dbh would be assessed to determine need. Raking would occur if mortality of trees greater than 30" is expected to exceed 5%. If prescribed burning within spotted owl and goshawk PAC boundaries is planned for the nesting season, an attempt will be made to ascertain nesting status pre-lighting,. Based on nesting status, additional mitigation measures, such as exclusion of portions of the proposed burn/PAC, additional fire lines, and different lighting techniques, may be implemented to reduce potential effects to nesting spotted owls and goshawks.

The district wildlife biologist would be notified prior to implementation of the prescribed burn in PACs and when possible, would be onsite to take part in, and/or monitor burning and associated effects.

Additional hand treatments, including handline construction, tree pruning, and cutting of small trees (less than 6 inches dbh), may be conducted within a 1 to 2 acre area surrounding known nest trees, to the extent necessary, to protect nest trees and trees in their immediate vicinity.

Downed logs greater than 30" diameter, will not be actively lit during implementation of the burn. Snags will be retained during burn preparation, except where they pose a threat to human health and safety, or perimeter control risk for containment of the fire.

Botany

Sensitive plant species

Pleasant Valley Mariposa lily (*Calochortus clavatus* var. *avius*) and Hutchison's Lewisia (*Lewisia kelloggii* ssp. *hutchisonii*) populations within the project area would be flagged for avoidance. All ground disturbing activities, burn piles, hazard tree removal, roadside brushing, mechanical equipment, line construction, herbicide application and spring burning would be excluded from sensitive plant protection areas. Where it is necessary to remove trees from within site boundaries, the project botanist would be consulted to mitigate impacts. All thinning of trees adjacent to site boundaries would be directionally felled away from the site. Hand thinning and prescribed fire within sensitive plant protection areas may occur at the recommendation of the project botanist. The project botanist would be notified prior to implementation of the prescribed burn in sensitive plant populations and if available would be onsite to take part in, and/or monitor burning and associated effects. At a minimum, a post burn visit would be conducted by the botanist. If new sensitive plant occurrences are discovered during project implementation the project botanist would be notified to develop necessary protection measures.

Potential habitat for Sensitive plant species within the project area will be flagged for avoidance within the proposed fuelbreak unit unless properly timed surveys are completed documenting the absence of Sensitive plant species.

Application of Magnesium Chloride for dust abatement will not occur within 100 feet of roadside occurrences of Sensitive plant or watch-list species.

Aquatic veined lichen (*Peltigera hydrothyria*), occurs within the proposed project area. To maintain current stream shading, the overstory canopy within 100 feet of the occurrence will not be altered by project activities with exception of handfelling trees to facilitate implementation of skyline units. Project botanist will be consulted prior to initiation of road maintenance within 100 feet of drainages with aquatic veined lichen. Aquatic veined lichen occurring in West Panther Creek at the crossing of Panther Creek Road would be salvaged prior to culvert reconstruction and relocated to suitable sites within the creek.

Should any new threatened, endangered, or sensitive (TES) species be located during the proposed project, available steps will be taken to evaluate and mitigate effects.

Motorized equipment, vehicles, thinning activities, and herbicide application would be excluded from lava cap plant communities. Site specific exemptions may occur with input from project

botanist and soil scientist. Line construction through lava cap communities would be avoided when feasible. If necessary, line construction would be completed with hand tools only.

Grazing

Targeted grazing would be excluded from sensitive and special interest plant sites unless approved in advance by a Forest Service Botanist. Grazing would not occur within 100 feet of stream reaches occupied by veined aquatic lichen.

Livestock used for grazing would be quarantined for three days and fed granary bought feed prior to arriving to the Forest. Livestock would be inspected to insure that coats are free of weed seeds.

Grazing may occur within known invasive plant infestations if grazing is expected to control the species. If targeted grazing is expected to spread infestations these areas would be excluded from grazing until the infestation is first eradicated.

All off-road equipment, stock trucks and trailers would be cleaned prior to entering the Forest to insure they are free of soil, seeds, vegetative matter, plant propagules or other debris if they have recently operated in an area potentially infested with invasive plant species, or if recent operating locations are uncertain.

Prescribed burn units

Ongoing fuel break maintenance and follow-up burning in harvest units could occur several years after completion of thinning or other treatments. The project leader or burn boss would notify the forest botanist prior to initiating fuel break treatments, line construction, or prescribed burning in order to re-flag occurrences within the project area.

Herbicide Application

Bear Clover (*Chamaebatia foliolosa*) would not be targeted during herbicide treatments.

Invasive species

Eldorado National Forest Priority 1 and 2 invasive plant infestations within the project area would be flagged for avoidance and treated using integrated pest management techniques as a part of the Panther project. Treatments under the project will tier to the Forest invasive plant treatment EA and may include a combination of techniques including tarping, manual removal, string trimming, and targeted herbicide application. Currently known high priority infestations within the project area include medusahead grass, barbed goatgrass and scotch broom. If new infestations develop as a result of project activities (i.e. within landings, areas of road reconstruction, fuel break development, within harvest units) treatment strategies would be developed under the Eldorado National Forest Invasive plant EA and would be implemented as part of the Panther project.

Invasive plant surveys would occur within fuel break for five years following project implementation. If found, newly detected invasive plant species would be treated using methods covered by the Eldorado NF Forest-wide invasive plant management EA.

All off-road equipment, including trailers or water trucks used in targeted grazing operations, would be cleaned to insure they are free of soil, seeds, vegetative matter, or other debris prior to entering National Forest System land. Equipment would also be cleaned prior to moving from infested to uninfested areas within the project area. Native seed mixes and/or certified weed free straw will be used when needed for erosion control purposes. Sand, gravel and fill material would come from weed-free sources. Consult with the Forests Botanist for sources of weed-free material. Straw or mulch used for erosion control or targeted grazing operations would be certified weed-free. A certificate from the county of origin stating the material was inspected is required.

Broadcast seeding of native grass and forb species would be considered three years after initial herbicide release if the cover of native grasses and forbs are < 40 percent within the fuel break area. Broadcast seeding would adhere to Forest Service native material policy which requires the use of a mix of genetically appropriate native materials.

Heritage

The Panther Project will comply with Section 106 of the National Historic Preservation Act of 1966, as amended in accordance with provisions of the “Programmatic Agreement among the U.S.D.A. Forest Service, Pacific Southwest Region (Region 5), the California State Historic Preservation Officer, the Nevada State Historic Preservation Officer, and the Advisory Council on Historic Preservation Regarding Processes for Compliance with Section 106 of the National Historic Preservation Act for Management of Historic Properties by the National Forest of the Pacific Southwest Region” (Regional PA 2013).

Fuel reduction using hand tools and other activities may be permitted within the boundaries of known Historic Properties, if approved by the District Archaeologist. Sites that are at risk from fire will be flagged and avoided during prescribed understory burning. Sites that are not considered at risk or have previously burned at moderate or high intensity may be included in the prescribed burn at the discretion of the District Archeologist. Construction of fire lines will occur outside of the cultural resource site boundaries unless directed by the District Archaeologist. All machine and hand piles will be placed away from site boundaries at a distance such that site features will not be affected by flames and heat. Hazard tree removal on or in the vicinity of cultural resource sites will be coordinated with the District Archaeologist.

Targeted Grazing for fuel reduction will be treated as mechanical vegetation treatment until the effects are better known. Sites will be flagged and avoided using fencing or other methods,

unless otherwise instructed by the HPM. Grazing may be allowed within sites if they are not considered resources at risk for the activity.

Sites within harvest units or near road maintenance/reconstruction projects will be identified with flagging and avoided during ground disturbing project activities. All thinning of trees adjacent to site boundaries will be directionally felled away from the site. Non-merchantable trees and brush may be removed by hand, within site boundaries, at the direction of the District Archaeologist. Road reconstruction may require the use of Standard Protection Measures or mitigation as per the *Regional PA 2013*.

Should any previously unrecorded cultural resources be encountered during implementation of this project, all work should immediately cease in that area and the District Archaeologist be notified immediately. Work may resume after approval by the District Archaeologist; provided any recommended Standard Protection Measures are implemented. Should any cultural resources become damaged in unanticipated ways by activities proposed in this project; the steps described in the *Regional PA 2013* for inadvertent effects will be followed.

The District Archaeologist will be kept informed of the status of various stages of the project, so that subsequent field work can proceed in a timely fashion. Monitoring of the area may occur after the project has been completed. This work will be documented in amendments to this report, as appropriate.

Rangeland Resources

Coordinate with the Rangeland Manager prior to project implementation to identify the location of rangeland improvements and current season cattle grazing operations under Bear River Allotment term grazing permit. Protect improvements such as fences by restricting equipment from driving across or logs and slash from being dragged across barbed wire fences that have been lowered to the ground for the off season. Debris would be kept a sufficient distance back from fences to allow permittees to walk fence lines for maintenance. Burn piles would be located at least 20 feet from fences.

During periods when livestock are present on the allotment, all gates would be kept closed and any damage to fences immediately repaired. If range improvements cannot be protected during implementation, they would be replaced to equal or better condition as an expense of the project.

Targeted grazing with goats or sheep would be accomplished by vegetation management contract, and would not be included in a term grazing permit.

Soil, Water, Riparian and Aquatic Resources

Best management practices (BMP) will be implemented to avoid, minimize, or mitigate adverse effects to soil, water quality, riparian and aquatic resources and will be provided through two USFS Forest Service Guidance documents - the National Core BMP Technical Guide, and the

Region 5 Water Quality Management Handbook (Table 2). Detailed BMP protection measures used during project implementation will be provided in the Environmental Assessment and specialist reports.

Equipment operation and use of chemicals within RCAs would be limited by exclusion zones around waterbodies and other protection measures (Tables 2, 3 and 4). Protection measures may be altered on-the-ground for a specific site based on recommendations by a Resource Specialist (Soil Scientist, Fisheries Biologist, Botanist, and Hydrologist).

Table 3 provides additional detail regarding equipment exclusion buffers relevant to the following BMPs: Plan-3, Veg-3, and Chem-3.

Table 2: Applicable USFS BMPs for Panther Fuels Reduction and Forest Health Project

USFS BMP Identifier	Title
(N) Plan-3	Aquatic Management Zone Planning
(N) Veg-1	Vegetation Management Planning
(N) Veg-2	Erosion Prevent and Control
(N) Veg-3	Aquatic Management Zones
(N) Veg-4	Ground-Based Skidding and Yarding Operations
(N) Veg-5	Cable and Aerial Yarding Operations
(N) Veg-6	Landings
(N) Veg-8	Mechanical Site Treatment (i.e. Masticators, Chippers)
(N) Fire-2	Use of Prescribed Fire
(N) Chem-1	Chemical Use Planning
(N) Chem-2	Follow Label Direction.
(N) Chem-3	Chemical Use near Waterbodies
(N) Chem-5	Chemical Handling and Disposal
(N) Chem-6	Chemical Application Monitoring and Evaluation.
(N) Road-5	Temporary Roads
(R) BMP 2.8	Stream Crossings
(R) BMP 2.3	Road Construction and Reconstruction
(R) BMP 2.4	Road Maintenance and Operations
(R) BMP 2.5	Water Source Development and Utilization
(R) BMP 2.10	Parking and Staging Areas.
(R) BMP 2.11	Equipment Refueling and Servicing
(R) BMP 2.13	Erosion Control Plan

(N) - Guidance provided in USDA Forest Service National Best Management Practices for Water Quality Management on National Forest Lands, Volume 1: National Core BMP Technical Guide. FS-990a. April 2012.

(R) - Guidance provided in USDA Forest Service Region 5, Water Quality Management Handbook. R5 FSH 2509.22, Chapter 10, Amendment 2509.22-2011-01. December 2011.

Table 3. Equipment exclusion buffers around waterbodies for mechanical ground based equipment (with greater than 13 PSI tire or tractor pressure), for protection of soil and water and aquatic resources. Includes skid trails, roads and landings.

Aquatic Feature	Ground-based equipment exclusion zone (feet)	
	< 30 % slope	30 – 50 % slope
Perennial stream	82	100
Intermittent stream	82	82
Ephemeral stream	25	25
Draws	10	25
Special aquatic features	82	100

Table 4. Design criteria for work conducted near water bodies, by treatment or activity.

Unit(s) or Treatment Type	Water Body Buffers Narrative
Mechanical Treatment Units	<ul style="list-style-type: none"> ▪ Felling and removal of hazard trees next to haul routes would be allowed within waterbody buffers zone with the following restrictions: a) hazard trees with commercial value that can be reached with skidding equipment would be targeted for removal - there will be no endlining to remove trees, b) should a felled hazard tree enter a stream course, the Sale Administrator and Resource Specialist would determine the fate of the tree (e.g. repositioning of the tree, leaving a portion of the tree as felled, etc.), c.) Hazard trees with no commercial value and those outside the reach of skidding equipment would be 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. ▪ Reach-in to remove non-riparian vegetation (typically 25 feet) would be allowed from 25 feet of the edge of the equipment exclusion zone on perennial and intermittent channels, and up to the edge of ephemeral channels and draws so long as the vegetation is not embedded into the ground or substrate.
Prescribed Fire Areas	<ul style="list-style-type: none"> ▪ Ignition of fire would not occur within 50 feet of the edge of the channel of perennial streams and special aquatic features or 50 feet from the edge of riparian vegetation, whichever is greater. Ignition would be limited to non-riparian vegetation. Fire creep will be allowed all the way to edge of streams. ▪ Ignition of fire would not occur within 25 feet of the edge of the channel of intermittent streams and ephemeral streams or within 25 feet of riparian vegetation, whichever is greater. Fire creep will be allowed to the edge of stream channels. ▪ Existing down logs which lie in or across all stream channel types would not be intentionally ignited. ▪ No hand piles within 82 feet of any perennial or intermittent stream, or 10 feet from edge of ephemeral channels.
Herbicide Application	<ul style="list-style-type: none"> ▪ Glyphosate would not be sprayed within 100 feet of the edge of perennial or intermittent streams. ▪ Glyphosate would not be sprayed within 100 feet of the edge of special aquatic features (springs, wetlands, meadows, etc.). ▪ Glyphosate would not be sprayed within 25 feet of any ephemeral channel or draw when the feature contains surface water. ▪ Ephemeral streams or draws that do not contain surface water will not be subject to the herbicide application buffer.
Units for temporary roads, skid trails, and landings proposed within 82 feet of intermittent channels.	<p>Consult with U.S. Fish and Wildlife Service for proposed action in these units, with mitigations described below.</p> <ul style="list-style-type: none"> ▪ Utilize water body buffer of 50 (< 30% slope). ▪ Mitigations to restore soil disturbance caused by skid trails and temporary roads will be implemented to fully restore soil infiltration capacity and soil cover to pre-project condition. ▪ Mitigation actions may include practices such as, reshaping to restore natural surface flow patterns, installation of drainage control features, subsoiling compacted soils, placement of organic material and seeding on disturbed soil surfaces. If machine

Unit(s) or Treatment Type	Water Body Buffers Narrative
	piles are left in landings, mitigations will be designed to ensure adequate controls drainage controls are in place to prevent transport of ash or sediment from burn scar surfaces, before piles are burned.
Unit Cable-Operating Units	<p>Consult with U.S. Fish and Wildlife Service on proposed action, with mitigations as described below.</p> <ul style="list-style-type: none"> ▪ For cable yarding operations, subtract 50 feet on perennial and 25 feet on intermittent channels (from values in table above). No buffer on ephemeral channels for cable yarding. The above buffer restrictions generally follow 2013 California Forest Practice Rules, California Code of Regulation Title 14, section 916. 5. ▪ Trees may be hand-felled away from the channel within these buffers to abate hazards, but will be left in place to avoid further distance. ▪ Mitigations to restore soil disturbance caused by log removal to cable suspension may be implemented if needed to eliminate creation of preferential flow paths. Mitigations may include practices such as placement of organic material, and reshaping soil surfaces with hand tools to break up preferential flow paths.
Units with dust abatement use along roads	<ul style="list-style-type: none"> ▪ Dust abatement palliative, Magnesium Chloride, would not be used within 100 feet of perennial and intermittent stream crossings.
Targeted Grazing Operations	<ul style="list-style-type: none"> ▪ Targeted grazing or associated activities would not be allowed within 82 feet of edge of channel of perennial or intermittent streams, or within 82 feet of special aquatic features as measured from edge of wet area or riparian vegetation, whichever is greater. Areas would be protected by excluding from animal enclosure fencing.

Alternative 2- No Action

Only current management practices such as grazing, fire suppression, and public firewood cutting would take place in the project area at this time. None of the fuels management, forest health, watershed improvement or road maintenance objectives would be accomplished with this alternative.

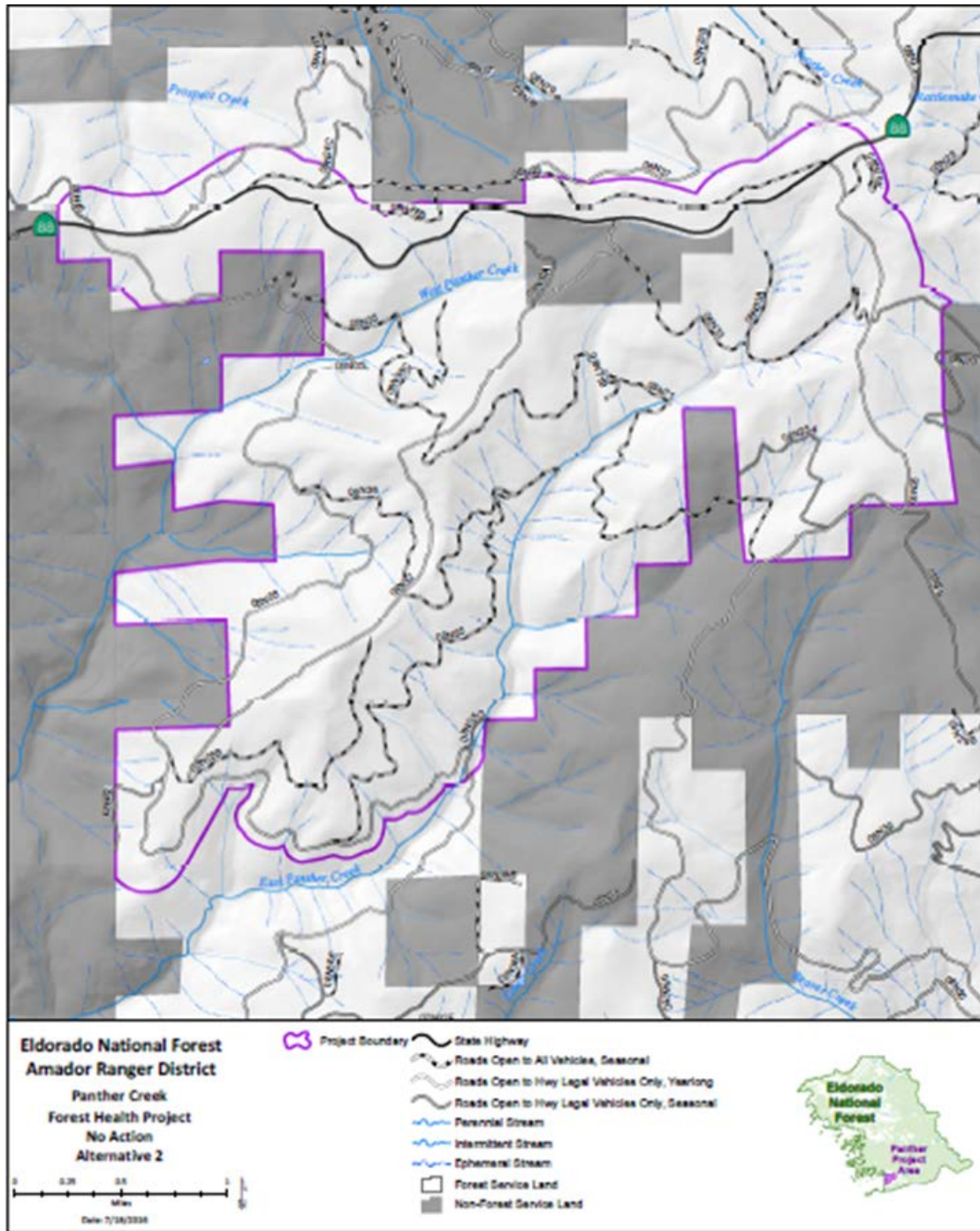


Figure 3. Project location and activities proposed under Alternative 2 - No Action

Alternative 3- No Herbicide

The No Herbicide alternative will include all the actions/activities in the proposed action except the use of herbicides.

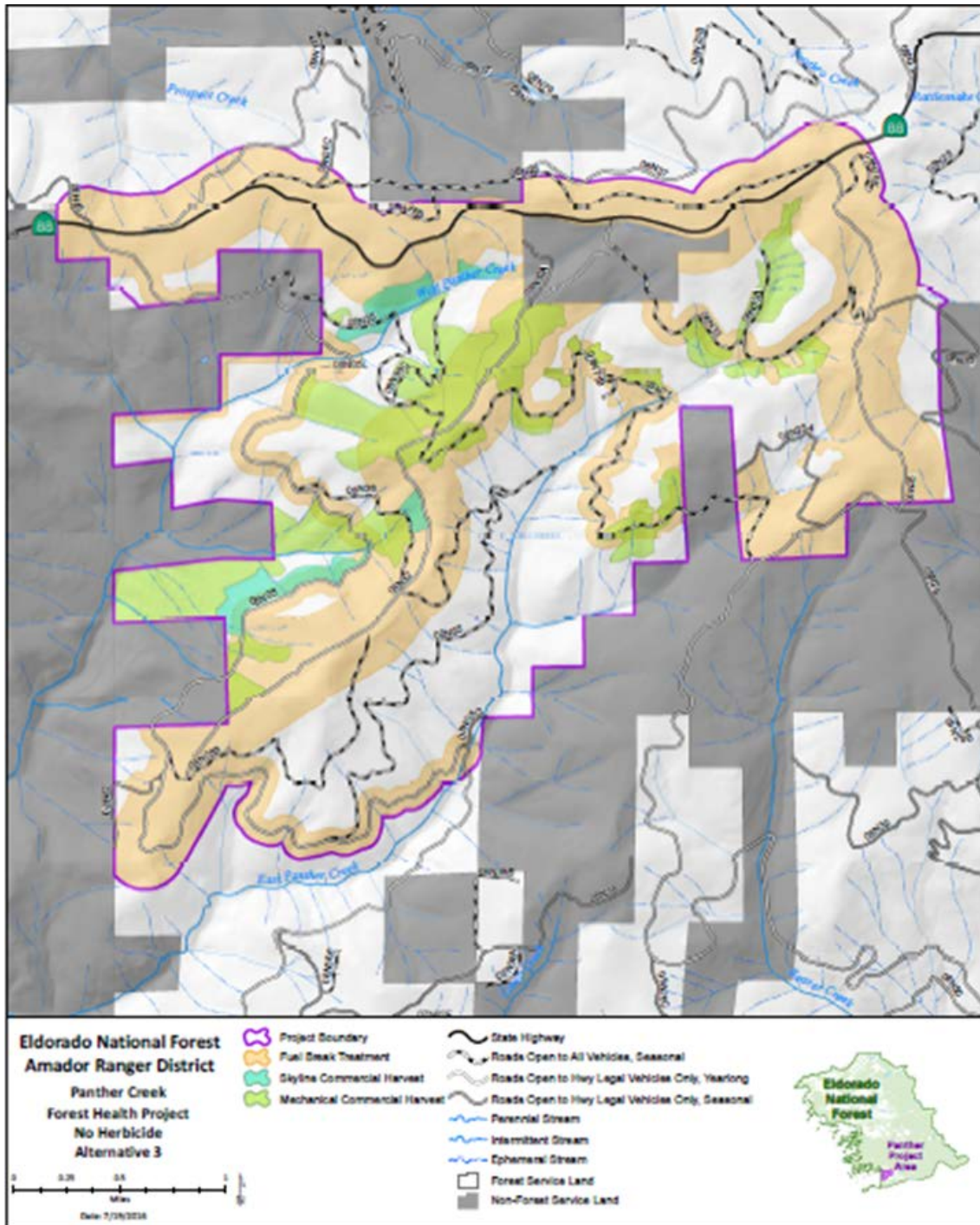


Figure 4. Location of activities proposed under Alternative 3 - No Herbicide

Alternative 4- California Spotted Owl Interim Recommendations

On August 20, 2015, the Eldorado National Forest, and all other Sierra Nevada National Forests were directed by the Regional Forester, Pacific Southwest Region, to include and analyze an alternative consistent with the *Draft Interim Recommendations for the Management of California Spotted Owl Habitat on National Forest System Lands, May 29, 2015* (Draft IR, 2015), for any vegetation management projects scoped after the date of the Regional Forester's letter. This alternative was designed to comply with the recommendations, and retain, maintain or improve habitat conditions for California Spotted owl.

1. Strategic Fuel Break Treatment Areas

The strategic fuel break treatments would be the same as those described for the proposed action, and are consistent with the Draft IR (2015) for the following reasons: The treatments would maintain key features of forest structure where it currently exists, including multi-layered structure, diversity of diameter classes, and moderate to high tree canopy cover. No overstory trees would be removed within areas of the strategic fuel treatments that overlap California Spotted owl protected activity centers (PACs), or designated habitat. Snags 15 inch dbh and above would be retained within the treatment areas, unless they pose a safety hazard. The use of mechanical equipment would be allowed within designated habitat where the treatment is intended to maintain or enhance habitat conditions, which is the intent of these treatments. These treatments would maintain existing habitat conditions, and improve the likely retention of high quality habitat in both the short and long term by improving fire suppression efficiency (reducing potential fire size) and wildfire severity when fire does occur within spotted owl habitat. This treatment is consistent with the Draft IR (2015), specifically conservation measures 2b, and 6a-e.

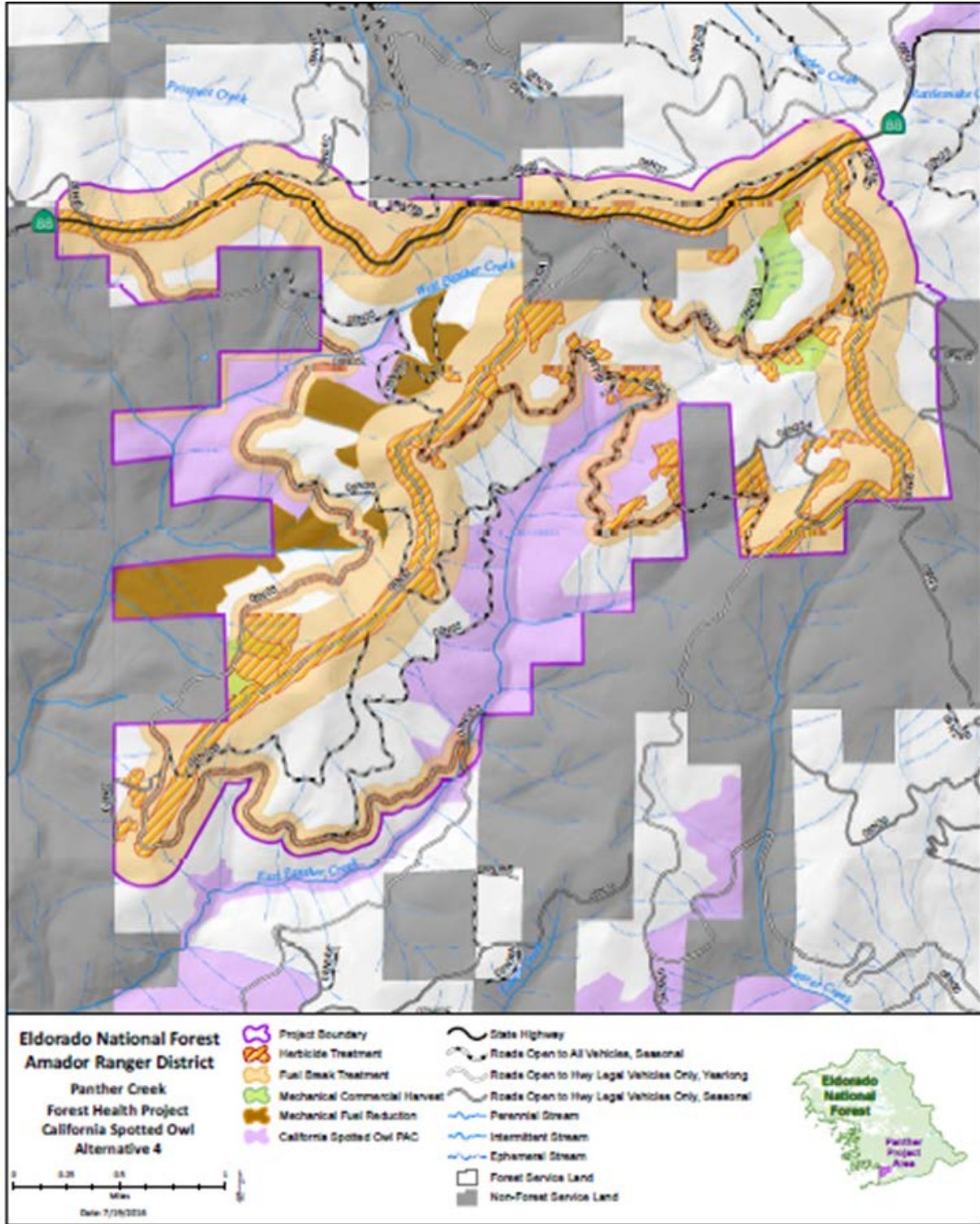


Figure 5. Location of activities proposed under Alternative 4 - California Spotted Owl Draft Interim Recommendations.

2. Mechanical Fuels Reduction Treatment Units (outside of Strategic Fuel Breaks)

Fuel reduction treatment units were identified to treat areas of high stand densities and presence of ladder fuels, and would increase the effectiveness of the strategic fuel break areas. These treatment areas are within the spotted owl designated habitat, and have treatments which conform to the Draft IR (2015). The treatments would maintain key features of forest structure where it currently exists, including: multi-layered structure, diversity of diameter classes, moderate to high tree canopy cover. No overstory trees would be removed within areas of the strategic fuel treatments that overlap PACs or designated habitat. Snags greater than 14 inch dbh would be retained within the treatment areas, unless they pose a safety hazard. The use of mechanical equipment is allowed within designated habitat where the treatment is intended to maintain or enhance habitat conditions, which is the intent of these treatments. Treatments would maintain existing habitat conditions, and improve the likely retention of high quality habitat in both the short and long term by improving fire suppression efficiency (reducing potential fire size) and wildfire severity when fire does occur within spotted owl habitat. This treatment is consistent with the Draft IR, 2015 document, specifically conservation measures 2b, and 6a-e.

Fuel Reduction Treatments may include the following:

- Treat approximately 240 acres of natural stands.
- Treat woody brush with a combination of prescribed fire, hand and mechanical methods.
- Thin live conifers less than or equal to 10 inches dbh, and fell dead trees less than or equal to 14 inches dbh, using hand tools or mechanical methods. Fell other trees – live or dead – which pose a safety hazard or directly threaten control lines.
- Prune live conifers using hand tools. Pruned height will depend on fuels objectives, tree height, and tools used. A maximum 50% of the total height of the tree would be removed.
- Treat both existing and treatment generated (activity) fuels with a combination of chipping, piling, “lop & scatter” methods and prescribed burning. Prescribed fire may include broadcast burning and lighting of piles. To facilitate prescribed burning, fire lines would be constructed using mechanical equipment and/or hand tools.
- Remove vegetation material to landings using ground based systems.

3. Commercial Harvest Units

No commercial harvest would take place within the designated spotted owl habitat (PAC, Territory, or Home Range Scales), under this alternative. As with the proposed action, commercial harvest units were identified to treat areas with the existing condition of high stand densities and presence of ladder fuels. Silvicultural prescriptions will incorporate

recommendations from PSW-GTR-220, and meet Forest Plan direction (USDA Forest Service 1989, 2004). Prescriptions will be designed to meet the following GTR-220 goals:

- Reduce shading around oaks to improve growing conditions.
- Increase the percentage of shade intolerant pine and hardwoods.
- Retain clumps of large trees. Clumps may vary in shape and size and range from a group of 4-5 trees up to a quarter of an acre in size. In general, clumps would be located in the mid to lower slope positions.
- Retain large trees with defects such as rot, cavities, and multiple tops.
- Improve forest resiliency by reducing stand densities by thinning. In general, lowest residual stand densities would occur on upper slopes, ridges and southern and western aspects. Targeted residual density would range from 100-140 square feet/acre basal area or approximately 25-30 feet tree spacing. Although canopy cover would average 50% over treatment units, lower canopy cover would exist in these less dense areas. On lower slopes and transitioning into Riparian Conservation Areas (RCA), residual stand densities may be higher with a corresponding increase in canopy cover. Targeted residual density would range from 140-180 square feet/acre basal area or 20-25 feet tree spacing. Canopy Cover in RCAs of perennial and intermittent streams would see the least overall reduction and would likely average closer to 60%.
- Manage the intermediate size class (20 to 30 inch dbh), thinning this class primarily by species (shade tolerant) and growth form (those acting as ladder fuels).
- Increase stand variability. Target stand structure would consist of a mixture of clumps, gaps and a matrix of variably spaced trees. Small (0.25 acre or less) gaps will be created or enlarged in low productivity sites and where natural openings in the canopy exist. These small gaps will not be evaluated for regeneration.

Commercial harvest treatments may include the following:

- Treat approximately 105 acres of natural stands and commercial sized plantations by cutting and removing trees between 10 inches and 30 inches dbh, using ground-based commercial logging method, whole tree yarding on all 105 acres.
- Remove small trees (4 inches to 10 inches dbh) to landings, or other designated disposal sites, on the mechanically thinned acres
- Pile tree tops and small trees (biomass) at landings to be made available for either biomass power generation or public fire wood cutting. Material remaining at landings (if not removed by previous methods) would be burned.
- Conduct post-harvest treatments, including grapple or tractor piling of existing and activity fuels, followed by prescribed fire, including both broadcast burning and lighting of piles.
- Within commercial harvest units create small openings (1 to 2 acres in size) by removing conifer species to promote pine regeneration. Areas would be located in and

adjacent to areas with symptoms of annosus root rot infection, and in areas currently dominated by white fir. Regeneration will occur through natural seeding as well as planting. For annosus areas, treat stumps of surrounding area with borax fungicide (Sporax or equivalent formulation). The total area treated in these openings would be approximately 15 acres. Reforest openings with a mix of pine species: ponderosa pine, Jeffrey pine, sugar pine. Conduct one to two release treatments using manual methods. Evaluate seedling survival and interplant if necessary in order to achieve desired level of stocking in pine species. In 5-7 years post-harvest, conduct pre-commercial thinning in order to achieve desired level of stocking in pine species.

4. Road Maintenance and Reconstruction

Road maintenance and reconstruction treatments under Alternative 4 would be the same as described for the proposed action (Alternative 1), except that ½ mile of temporary road construction would be required to facilitate implementation (compared to 1.5 miles in the proposed action).

Alternative 4-Specific Design Criteria

Design criteria for this alternative are the same, with one exception for the following terrestrial wildlife additions, as what was described for the proposed action alternative. All other design criteria from the proposed action apply to this alternative.

The following design criteria are added to the list in the proposed action to fully comply with the Draft IR (2015):

Fire/Prescribed Fire

Within the PACs fire lines will be constructed by hand; however roads would be used where feasible. Outside of PACs, fire lines will be constructed by hand or dozer; however roads would be used where feasible. Exact locations of fire lines will be determined by the onsite fire crew.

Terrestrial Wildlife

Where treatments occur within designated California spotted owl territory habitat, owl occupancy has been and will be monitored pre-project and post-treatment consistent with Draft IR (2015), page 17, 6e.

Pre-project and Post-treatment canopy closures will be measured where treatments overlap designated habitats consistent with Draft IR (2015), page 17, 6e.

Incorporation by Reference

In order to eliminate repetitive discussion and documentation, the following documents prepared for this analysis are incorporated by reference:

- Brimhall, B. Panther Fuels Reduction and Forest Health Project Fuels Specialist Report. April 27, 2017.
- Brown, M. Biological Assessment / Evaluation for Botanical Species: Panther Fuel Reduction and Forest Health Project. February 8, 2017.
- Carroll, R. Site Specific Human Health Risk Assessment for Panther Fuels Reduction and Forest Health Project. August 24, 2016.
- Chow, J. Aquatic Biological Assessment and Evaluation, Panther Fuels Reduction and Forest Health Project. February 16, 2017. Reviewed by T. Allen.
- Ernsberger, T.L. and M. Gavalis. Cultural Resource Management Report, Panther Fuels Reduction and Forest Health Project (R2016-05-03-10003). September 19, 2016. Reviewed by B. Guisto. February 14, 2017.
- Espinoza, R. Panther Fuels Reduction and Forest Health Project, Amador Ranger District, Transportation Specialist Report. October, 2016.
- Garcia, K. Panther Fuel Reduction and Forest Health Project Rangeland Resources. July 29, 2016.
- Loffland, C. Bald Eagle and Golden Eagle NEPA Input / Report for Panther Fuels Reduction and Forest Health Project, Amador Ranger District, Eldorado National Forest. January 26, 2017.
- Loffland, C. Biological Evaluation and Assessment for Terrestrial Threatened, Endangered, and Sensitive Wildlife Species for the Panther Fuels Reduction and Forest Health Project. February 16, 2017.
- Loffland, C. Management Indicator Species Report. Panther Fuels Reduction and Forest Health Project, Amador Ranger District, Eldorado National Forest. February 14, 2017.
- Loffland, C. Migratory Landbird Conservation on the Eldorado National Forest. January 26, 2017.
- Norman, S. and S.G. Markman. Panther Forest Health and Fuels Reduction Project Soil and Water Resource Specialist Report. January 20, 2017.
- Norman, S., Chow J., and Brown, M. Final Riparian Conservation Objective Analysis for the Panther Forest Health Project. September, 2016.
- Young, M. Silvicultural Evaluation and Prescription for the Panther Fuels and Forest Health Project. Reviewed by R. Carroll. May 25, 2017.

Comparison of Alternatives

As stated in the introduction, the primary purpose and need for this project is focused on fuels reduction and forest/stand health. For that reason they will be used for a general comparison of alternatives. Other resource areas are discussed under the environmental consequences section as well as in specialist reports in the project record.

Additional information about the projected economic costs of each alternative is provided here in response to enquiries received in comments to the preliminary EA. An economic analysis was conducted for the areas of commercial harvest using a combination of The Region 5 Transaction Evidence Appraisal System as well as the Quicksilver program. Species compositions were taken from the existing stand condition as reported in FSveg. Separate economic analyses were conducted for the fuel break treatment area (with and without the use of herbicide in follow up treatments) and for the mechanical fuel reduction units under Alternative 4. For Alternative 1, the value of the sawtimber was estimated to be \$352,440.00, with projected costs of associated treatments of the commercial units \$(372,989.00), resulting in a Net Present Value of \$(47,139.00) for the commercial units. The estimated cost of treating and maintaining the fuel break treatments was \$(5,493,261.00). For Alternative 3, the cost of the commercial units would be the same as in Alternative 1, and the cost of maintaining the fuel break without the use of herbicide would rise to \$(6,373,348.00). For Alternative 4, the cost of the fuel break would be the same as Alternative 1, the reduced commercial units were estimated to produce \$43,691.00 in sawtimber, and the follow up treatments and mechanical fuel reduction treatments were estimated to cost \$(258,773.00), resulting in a Net Present Value of \$(215,082.00).

Table 5. Comparison of Alternatives. The four alternatives differ in how they would meet the purpose and needs, and how they address substantial issues (as quantified by indicator measures) identified during public scoping.

PURPOSE OR NEED	TREATMENT/INDICATOR	ALTERNATIVES			
		1. Proposed Action	2. No Action	3. No Herbicide	4. CSO IR's
Reduce surface and ladder fuels	Total acres proposed for treatment	3,347	0	3,347	3,263
	Fuel break treatment (acres)	3,000	0	3,000	3,000
	Max. acres herbicide application	1027	0	0	1027
	Commercial thin (up to 30" dbh, mechanical and skyline) (acres)	783	0	783	105
	Mechanical fuel reduction tmt (up to 10" dbh) (acres)	0	0	0	240
	Tons per acre (T/A; highest model result reported)	Fuel Breaks: 4.93 T/A Commercial Units ² : 27.61 T/A	53.93 T/A	Fuel Breaks (w/o Herb.): 6.23 TPA	Fuel Breaks: 4.93 T/A Mech. Fuel Reduction ² : 27.61 TPA
	Flame length (feet); highest model result reported	Fuel Breaks: 3.1 ft. Commercial Units: 4.8 ft.	14.11 ft.	Fuel Breaks (w/o Herb.): 30 ft.	Fuel Breaks: 3.1 ft. Mech. Fuel Reduction: 4.8 ft.

	Rate of spread (chains per hour, CH/H); all model results reported	Fuel Breaks: 54.2/3.6 CH/H Commercial Units: 54.2/3.6/17.9 CH/H	17.9/22.5 CH/H	Fuel Breaks (w/o Herb.): 162/54.2/3.6 CH/H	Fuel Breaks: 54.2/3.6 CH/H Mech. Fuel Reduction: 3.6/17.9 CH/H
Promote forest health and protect wildlife habitat	Total acres suitable CSO habitat ¹ to be treated	2980	0	2980	2565
	Treated acres remaining >70% canopy cover (cc)	940	1505	940	1175
	Treated acres remaining 50-69% cc	1690	1475	1690	1390
	Treated acres changed from >70% to 50-69% cc	565 (19% of suitable habitat; 10% of total project area)	0	565 (19% of treated suitable habitat; 10% of total project area)	67 (2.6% of treated suitable habitat; 1.2% of total project area)
	Stand Density Index (SDI)	Post treatment SDI=265; SDI will be kept at an acceptable level for first 20 years post treatment. It will then increase without follow-up treatments	Current Condition SDI=547; SDI will decrease over time due to competition induced mortality	Post treatment SDI=265; Results will be similar to Alternative 1 with the difference being slower conversion to desired conditions due to competition with brush	Post treatment SDI=381; This alternative will not meet the target SDI stated in the objectives for the project
	Trees per Acre (TPA)	60	309	60	104
	Basal Area per Acre (BA)	210	343	210	288
	% of Pine TPA	36	23	36	23
	% of Pine BA	45	35	45	35

	Pine regeneration openings (1-2 acres in size) (total acres)	Up to 75 acres	0	Up to 75 acres	Up to 15 acres
	50 yr Accurred Mortality (gross cubic foot per acre)	3217	7122	3217	6729
	50 yr Mortality as % of Growth	45%	83%	45%	79%
Road maintenance and reconstruction	Road maintenance (miles)	25	0	25	25
	Road reconstruction (miles)	24	0	24	24
	Temporary road construction (miles)	1.5	0	1.5	0.5

ALTERNATIVES

ISSUE	INDICATOR MEASURE	1. Proposed Action	2. No Action	3. No Herbicide	4. CSO IR's
1. Herbicides impacts to human health	Total acres of treatment with herbicide or acres affected	1027	0	0	1027
	Health risk	Typical exposure would be well below levels of concern, resulting in a low risk to human health.	None	None	Same as Alt. 1 (PA)

2. Logging is detrimental to the CSO	Amount of treated suitable ¹ habitat protected or retained	940 acres of >70% cc 1,690 acres of 50-69% cc	1505 acres of >70% cc 1475 acres of 50-69% cc	Same as Alt. 1 (PA)	1175 acres of >70% cc 1390 acres, 50-69% cc
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¹ Suitable habitat is defined as CWHR size class 4 or greater and $\geq 50\%$ canopy closure. All habitat that presently is at or above 50% canopy closure would remain at or above 50% canopy closure post implementation, and remain suitable at least at foraging quality.

² The commercial treatment in the proposed action (Alt. 1) and Fuel Reduction Treatment in Alt. 4 differ in the resulting canopy base height: estimated to be 49 ft. for Alt. 1, and 24 ft. for Alt. 4.

Environmental Consequences

This section contains a summary of the environmental impacts of four Alternatives with regard to environmental effects as described at 40 CFR 1508.27. A more detailed analysis of the environmental impacts can be found in the resource specialist reports listed below, and additional information is in the Project Record.

This section will cover the No Action alternative (Alternative #2) first because it provides a reference point for describing environmental effects of the action alternatives.

Effects Relative to Issues Identified Through Scoping

Issue #1: Herbicide impacts to human health and the environment.

Indicator Measure: Total acres of treatment or acres affected.

Alternative 2, No Action – Under the No Action alternative no treatment of stands or fuels would take place within the project area, and no herbicides would be applied. The understory fuels would remain in the current condition and grow at the same rate given no shrub or overstory thinning would take place.

Alternative 1, Proposed Action – In order to reduce the regrowth of woody understory species in the strategic fuel breaks, Alternative 1 proposes to apply glyphosate to up to 1,027 acres along roads and ridgetops. This estimate is the maximum number of acres that could be treated, and the actual number of acres will likely be fewer due to success of planned pre-treatment, strategic use of initial applications, and limits due to costs or manpower. The fuel break acres treated with herbicide are expected to display lower surface fuels and maintain a lower flame length following treatment when compared to the No Action alternative, allowing for a greater variety of wildfire control methods to be used should a fire occur. Following herbicide use, the areas are expected to require fewer mechanical or hand treatments to maintain the desired conditions and reduced fuel load.

Alternative 3, No Herbicide – While mechanical and hand-thinning methods would be used to reduce fuels, under Alternative 3 no herbicide would be applied within the fuel breaks (zero acres of treatment). Thinning within the fuel breaks will encourage understory plant growth, including the re-sprouting of shrubs, which would lead to an increase in fuel loads. These fuels would require more frequent re-treatment using mechanical and hand tools in order to maintain low fuel loads along these strategic areas.

Alternative 4, CSO IR's – The potential area treated or affected (1,027 acres) and consequences would be the same for Alternative 4 as for the Proposed Action (Alt. 1).

Indicator Measure: Health risk.

The potential risk to human health of the proposed use of glyphosate was analyzed in the Site Specific Human Health Risk Assessment for the Panther Fuels Reduction and Forest Health Project (Carroll 2016). Potential risks were examined for workers and members of the public. Potential exposure rates were compared to levels of concern determined from U.S. Environmental Protection Agency (EPA) reporting, a comprehensive risk assessment (SERA 2007), and a review of relevant literature (Carroll 2016).

Alternative 2, No Action- No glyphosate would be applied, meaning there would be no risk from herbicide use to human health, either to workers or to the general public.

Alternative 1, Proposed Action - Several scenarios of unintended exposure to glyphosate were examined, with scenarios for workers and for the general public considered separately. These scenarios were designed to be conservative (i.e. using higher rates of exposure that are expected to be less likely), to quantify exposure over a range (to estimate variability), and to describe potential cumulative effects. This summary compares the results of the typical estimated exposure for workers and for the general public to the guidelines set forth by the U.S. Environmental Protection Agency (EPA) to determine if any of the exposure scenarios represent a level for concern.

For workers, scenarios included exposure during application and exposure due to spills, splashes, or contaminated equipment. None of the exposure scenarios exceed a level of concern. Potential exposure for general occupational scenarios were somewhat higher than those for the accidental exposure scenarios, yet the upper limits of the hazard for both sets were below the level of concern. This means that even under the most conservative set of exposure assumptions, workers would not be exposed to levels of glyphosate that are regarded as unacceptable. Under typical backpack application conditions, levels of exposure will be at least 100 times below the level of concern.

For the general public, scenarios considered a range of potential exposures for children and adults, including exposure during application, ingestion of contaminated foraged berries, vegetation, or fish, and ingestion of contaminated water from a still pond or lake. None of the longer-term exposure scenarios approached a level of concern. Several acute exposure scenarios (higher exposure over a shorter timeframe than in the longer-term scenarios above) were examined help to identify the types of scenarios that are of greatest concern and may warrant steps to mitigate. For glyphosate, such scenarios involved oral

(contaminated water) rather than dermal (spills or accidental spray) exposure. The consumption of contaminated vegetation by a woman resulted in the highest potential exposure at the upper level of the range of estimates. This scenario may be considered extremely conservative in that it assumed large amounts of treated vegetation (leaf material) would be consumed, and did not consider the likelihood that such treated vegetation would be dead, dying, chlorotic, brittle or deformed and hence undesirable to consume. In addition, operational procedures will reduce the chance of public exposure. For example, signs will be placed at common access points in the project area that will give notice that glyphosate has been applied to reduce the chance of individuals unknowingly entering areas where application has occurred. While the highest scenario would be an unacceptable level of exposure, it is far below doses that would likely result in overt signs of toxicity, and is over 50 times lower than doses where mild signs of toxicity were apparent. What's more, any reduction in the application from the maximum potential rate would also reduce the potential exposure to the general public. None of the other acute/accidental exposure scenarios approached a level of concern.

The typical exposure levels analyzed for workers applying the glyphosate and for the general public are below the EPA recommended maximum levels, indicating that the proposed action (Alternative 1) poses low risk to human health.

Alternative 3, No Herbicide - No glyphosate would be applied, meaning there would be no risk from herbicide use to human health, either to workers or the general public.

Alternative 4, CSO IR's – The proposed application of herbicide and associate risks to human health would be identical to those described for Alternative 1.

Details of the quantitative analyses and their interpretation are available in the project record (Carroll 2016).

Issue #2: Logging is detrimental to the California spotted owl.

Indicator Measure: Acres of habitat protected or retained.

Suitable habitat for the California spotted owl is defined as California Wildlife Habitat Relationships (CWHR) size class 4 or greater and $\geq 50\%$ canopy cover. The 2004 SNFPA requires surveys be conducted in areas of proposed actions, and directs protected activity centers (PAC's) be designated as approximately 300 acres of the highest quality habitat available. Home range core areas (HRCA's) are designated as the best 1,000 acres of suitable habitat within 1.5 miles of, and including, the PAC. Given the density of PAC's within the project areas, HRCA acres may overlap between adjacent PAC's. Another way to describe the spotted owl habitat is as a Territory, which is defined as

approximately the 1,000 acres around a PAC (Draft IR, 2015). Current information indicates maintaining high canopy cover ($\geq 70\%$) within PAC's and a mix of moderate (50-69%) and high canopy cover across the HRCA or Territory scale may be important for promoting survival and occupancy at existing spotted owl sites. Structural heterogeneity within the moderate canopy closure areas appears important to foraging and retains or may improve occupancy of owl habitat (Temple et al. 2016). The size and composition of high-quality and suitable habitat will be compared among alternatives in order to quantify the potential effects to California spotted owl.

The change in suitable habitat proposed by each action alternative was estimated. For all action alternatives, all habitat that presently is at or above 50% canopy cover would remain at or above 50% canopy cover post implementation, and thus would remain suitable at least for foraging. In much of these areas, the stands may be changed from greater than 60% to something closer to 50% canopy cover, which would be an effect to the California spotted owl, but is unquantifiable at this scale. A comparison of the number of acres affected by each alternative is provided in Table 5 under Issue 2 (page 41).

Alternative 2, No Action - The No Action alternative also describes the current condition, as no treatments would change the forest structure. Currently, the project area contains approximately 3,800 acres of potential habitat. Approximately 2,090 acres of this is considered high quality habitat (CWHR size class 4 or greater and $\geq 70\%$ canopy cover) and an additional 1,710 acres of suitable habitat (CWHR size class 4 or greater and 50-69% canopy cover). These acreages would be retained.

Alternative 1, Proposed Action – Approximately 1,505 acres of high-quality habitat and 1,475 acres of suitable habitat would be treated under the Proposed Action. Of these, 565 acres of high quality habitat (19% of suitable habitat; 10% of total project area) would be converted from $\geq 70\%$ canopy cover to 50-69% canopy cover. Following implementation, the acreage of California spotted owl habitat maintained in the project area would be 940 acres of high quality habitat and 1,690 acres of suitable habitat. None of the acres reduced in canopy cover would occur within PACs; all acreage would be within HRCA or Territory areas. These actions would not reduce the total amount of suitable habitat available, may increase the structural heterogeneity within HRCA's, consistent with improved foraging habitat, and would reduce the wildfire threat to the existing habitat.

Alternative 3, No Herbicide – The acres of habitat protected or retained by Alternative 3 would be the same as for Alternative 1.

Alternative 4, CSO IR's – Under the Draft IR guidelines, Alternative 4 proposes to treat 1,242 acres of high quality habitat and 1,323 acres of suitable habitat. As a result, 67 acres (2.6% of treated suitable habitat; 1.2% of total project area) of high quality habitat would be converted from $\geq 70\%$ canopy cover to 50-69% canopy cover. Following implementation, the acreage of California spotted owl habitat maintained in the project area would be 1,175 acres of high quality habitat and 1,390 acres of suitable habitat maintain in the project area. This represents 678 fewer acres (12.5% of total project area) of commercial thinning treatment compared to Alternative 1. None of the acres reduced in canopy cover would occur within PACs; all acreage would be within HRCA or Territory areas. These actions would not reduce the total amount of suitable habitat available, may increase the structural heterogeneity within HRCA's, consistent with improved foraging habitat, and would reduce the wildfire threat to the existing habitat.

Effects Relative to the Achievement of Purpose and Need

Project Need: To promote healthy forest stands.

Indicator Measure: Stand Density Index (SDI).

Stand Density Index (SDI) 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 such that 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 will happen, only that one is likely. An SDI at the lower end of the range (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 inter-tree competition. In a study of a west side Sierra ponderosa pine plantation, Oliver (1997) found mortality from bark beetles and snow damage was confined almost exclusively to stands with SDIs of more than 183, or 32% of maximum SDI for ponderosa pine.

Alternative 2, No Action - The current total average stand density index is 547. The default maximum SDI for ponderosa pine is 571, as provided by the Forest Vegetation Simulator (FVS) Western Sierra Nevada Variant (Keyser and Dixon, 2008; revised November 2, 2015), meaning the current stand is at 96% of maximum and at extremely high risk of mortality. Across stem sizes, 36% of the total SDI is in trees over 30" dbh, which are restricted from management by Forest Wide Standard and Guideline # 6 (SNFPA, USDA Forest Service, 2004) when doing harvests for controlling stand densities. Even with the reduction of SDI through mortality, in 50 years the stand would

still be at 67% of maximum, which is above the desired target. The percentage of pine in the stand would drop over time. Increased mortality under the No Action alternative would also contribute to down and dead fuel loading over time.

Alternative 1, Proposed Action – The commercial and understory thinning treatments would reduce the SDI to approximately 265, or 46% of maximum within those commercial units. The prescription as modeled would reduce stand density and maintain it at an acceptable level at least the first 20 years of the 50 year modeling period.

Treatments in the fuel break area (a total of approximately 3000 acres) are primarily focused on reducing surface and ladder fuels. It is anticipated that treatments would change units from a brush dominated understory to one being predominately grass and forbs. There would be little effect to stand density and forest health.

Alternative 3, No Herbicide – The No Herbicide alternative is identical to the proposed action (Alt. 1) except there would be no use of herbicide to maintain fuel breaks. The effects of the treatments in Alternative 3 would be similar to the proposed action, except that without the use of herbicide, other maintenance tools would be used to control understory growth. The anticipated SDI within the commercial units would be the same as Alternative 1 (proposed action). However, in young plantations where there is a large concentration of woody brush, trees would continue to be at higher risk of mortality from wildfire or prescribed fire as brush re-establishes. There would be little to no gain in tree growth as individual shrubs will still be alive and consuming limited resources such as water.

Alternative 4, California Spotted Owl IR's – Under Alternative 4, approximately 678 acres would be removed from the commercial treatment. The remaining 105 acres of commercial harvest would be treated as described in the Proposed Action (Alt. 1). Outside of the strategic fuel break, 240 acres that would be commercially harvested under Alt. 1 would be treated as mechanical fuel reduction units under Alt 4. The mechanical fuel reduction units would see a greater change in the number of trees per acre than the fuel break units due to the denser stocking in the current condition. A total of 47 acres proposed for treatment under Alternative 1 would receive no treatment under Alternative 4. For Alternative 4, the resulting SDI is predicted to be 381, or 66% of maximum. This stand density is greater than the range stated as a desired condition of the Panther Project, meaning the stands would be at greater risk of insect and disease related mortality than desired.

Project Need: To reduce surface and ladder fuels and maintain strategically placed fuel breaks.

Indicator Measures: Tons of fuel per acre, flame length, and rate of spread of fire after treatment.

Alternative 2, No Action - Under the No Action alternative, fuel accumulation would continue to surpass natural decomposition rates. Two fuel models with higher fuel loading best described the current condition: a timber model with litter and understory fuels, and a model with medium logging slash, indicating additional ground fuels in the area. As a result, fire severity and intensity would continue to increase as fuel loading naturally increases. The resulting flame lengths and rates of spread would support passive and active crown fire. In the event of a wildfire, fuel accumulation within travel corridors would reduce the options for safe firefighter access, thus limiting potential suppression tactics.

An increase in surface fuels would occur over time as existing snags, needle cast, and woody debris continue to accumulate. Snag densities are anticipated to increase due to naturally occurring senescence and recent tree mortality event. Ladder fuels are also anticipated to increase as regeneration continues and in turn decreases the average canopy base height within the project area.

Alternative 1, Proposed Action - The treatments proposed to treat fuelbreaks will provide firefighting forces a safe anchor point to make a direct attack on wildland fires. The combination of treatments would convert the thick timber understory to a more open timber understory where the primary carrier of the fire would generally be the surface fuels made up of litter cast by the shrubs, grasses, or forbs in the understory. The fuel loads would be dramatically decreased in both the ridgetop fuel breaks and the commercial thinning areas, and the canopy base height would be raised compared to the No Action alternative. These changes in fuel quantity and structure would result in a change in fire behavior, with the potential fire under the 90th percentile weather conditions expected to remain a surface fire, without transitioning to a crown fire. For the ridgetop fuel breaks, the fuel model changed from the higher fuel loading of the no action alternative to two lower fuel models: a brush model and a closed timber model with understory litter, but lower fuel loading. For the commercial treatment units, the resulting fuel models included the timber with understory litter (as in the no action alternative), and the brush and closed timber models as observed in the fuel breaks (the higher fuel loading model from the no action alternative was no longer appropriate). As a result, flame lengths would be reduced to 4.8 ft. in the commercial units and 3.1 ft. in the ridgetop fuelbreaks compared to the No Action alternative. While the surface rate of fire spread would increase due to the change in fuel type and open space, the reduction of brush cover plus the repairs to the fuelbreak road system mean the surface fires would be easier to access and control.

Alternative 3, No Herbicide – Following mechanical treatment the existing shrub species will be released from shade competition and will sprout from roots to reestablish vegetatively. This difference in treatment resulted in the fuel models describing the post-treatment condition including the brush and closed timber with lower understory litter models as observed in the proposed action, plus the chaparral model, which has a higher loading of fuels. This increase in fuels resulted in estimated flame lengths and rates of spread much higher than the proposed action (Table 5). In order to keep flame lengths beneath the critical 4 ft. limit without the application of herbicides, the fuelbreak system would need to be treated mechanically every three to five years. When treated with prescribed fire, including both broadcast burning and lighting of piles, a fire return interval of twice in every 10 year period would be required to maintain the same results as the proposed action. These frequent repeat treatments may depend on budget and staffing availability, and, in the case of prescribed fire, the appropriate weather conditions. However, mechanical treatment and prescribed fire treatments alone would not kill re-sprouting brush species or reduce the seed sources, and would thus allow the unwanted species of brush to continue to spread in the open areas of fuel breaks.

Alternative 4, California Spotted Owl IR's – The alternative based on the Draft IR's (2015) would remove some of the commercial thinning and harvest units from the treatment compared to the proposed action (Alt. 1). The mechanical fuel reduction units would be treated using multiple methods (including mechanical or hand tools), and would result in a multi-layered structure and a diversity of diameter classes, with moderate to low tree canopy cover. The different treatments changed the resulting fuel models when compared to the proposed action. The mechanical fuel reduction treatments resulted in the closed timber with light understory litter and the timber with greater understory litter models describing the resulting fuel structure, without the brush component observed in the commercial thinning results. Compared to the No Action alternative, the resulting fuel load would be cut nearly in half, the expected flame length and rate of spread would be reduced, and the canopy base height would be increased by a factor of eight. The canopy base height under Alternative 4 (24 ft.) would be lower than that predicted under Alternative 1 (38 ft.). However, when compared to the no action alternative, these treatments did not result in a wildfire transitioning from a low-intensity surface fire to a passive or active crown fire. The strategic intent of the fuel breaks are the same for Alternative 1 and 4, and reducing fuels in the areas next to the fuel breaks would better protect the strategic lines during wildfire.

Effects Relative to the Finding of No Significance (FONSI) Elements

In 1978, the Council on Environmental Quality published regulations for implementing the National Environmental Policy Act (NEPA). These regulations (40 CFR 1500-1508) include a definition of “significant” as used in NEPA. The ten elements of this definition are critical to reducing paperwork through use of a finding of no significant impact (FONSI) when an action would not have a significant effect on the human environment, and is therefore exempt from requirements to prepare an environmental impact statement (EIS). Significance as used in NEPA requires consideration of the following ten intensity factors in the appropriate context for that factor.

Mitigations and management requirements designed to reduce the potential for adverse impacts were incorporated into the proposed action and alternatives, including standards and guidelines outlined in the Eldorado National Forest LRMP (USDA Forest Service 1989), as amended by the Sierra Nevada Forest Plan Amendment (USDA Forest Service 2004), Best Management Practices, and project-specific design criteria based on resource specialist knowledge and experience. These management requirements would minimize or eliminate the potential for adverse impacts caused by the proposed project.

Context

For the analyzed alternatives, the context of the environmental effects is based on the environmental analysis in this EA. All of the resource analyses identified the spatial and temporal bounds of their analysis, based upon the potential environmental impacts. These impacts are well known, as the proposed activities have all previously occurred on the Eldorado National Forest. The potential environmental effects would be localized to the project area, and would not be measurable at a regional or larger scale.

Intensity

Intensity is a measure of the severity, extent, or quantity of effects, and is based on information from the effects analysis of this EA and the references in the project record. The effects of this project have been appropriately and thoroughly considered with an analysis that is responsive to concerns and issues raised by the public. The agency has taken a hard look at the environmental effects using relevant scientific information and knowledge of site-specific conditions gained from field visits. A finding of no significant impact is based on the context of the project and intensity of effects using the ten factors identified in 40 CFR 1508.27(b).

1) Impacts that may be both beneficial and adverse. A significant effect may exist even if the Federal agency believes that on balance the effect will be beneficial.

Botanical Resources

The potential effects of the proposed action and alternatives were analyzed in a Biological Evaluation for botanical species (Brown 2016). No federally protected endangered, threatened, or candidate botanical species occur within the project area. As a result, the BE determined the Panther Project would not affect endangered, threatened, or candidate species or their habitat. For the Region 5 Sensitive Species list, 33 botanical taxa are known or suspected to occur on the Eldorado National Forest, and three are known to occur within the project area (Pleasant Valley Mariposa lily, veined aquatic lichen, and Kellogg's Lewisia). Potential habitat for another dozen sensitive species are known to occur in the project area, including for seven *Botrychium* species, *Allium tribracteatum*, *Cypripedium montanum*, *Dendrocollybia racemose*, *Phaeocollybia olivacea*, and Kellogg's Lewisia.

For those sensitive species with known occurrences or potential habitat within the project area, the BE determined that the proposed activities may affect individuals but is not likely to result in a trend toward Federal listing or loss of viability of those species. This determination was based on the likely impacts of the proposed activities of each of the four alternatives on the occurrences plus the design criteria and BMP's in place to minimize negative effects. For example, known occurrences of terrestrial sensitive species will be flagged and avoided during mechanical treatments, herbicide application, road maintenance, grazing activities, and fire line construction prior to prescribed burning, thus reducing the potential for adverse effects to existing populations. Analysis of the proposed herbicide application indicated that there may be a low risk to native plant species within 100 feet of the application zone, but past monitoring on the Eldorado National Forest has never found evidence of glyphosate drift effecting non-target vegetation, even when application have occurred within 25 feet of sensitive plants. Potential effects to veined aquatic lichen in the project area may occur on 0.125 miles of streams (or 7% of the 1.8 miles of occupied stream habitat), including potential changes in water quality and reduction of canopy cover. However, these affects are expected to be mediated through the use of design criteria and BMP's, and if any occur, they would be temporary in nature. In addition, the reconstruction of existing culvert where 09N05 crosses West Panther Creek could impact a small portion of the veined aquatic lichen that currently grows in and around the existing culvert. Where feasible, lichen would be relocated outside the construction zone, but impacts to individuals are still likely to occur. These effects would be minor since the lichen is extremely prolific throughout 1.8 miles of West Panther Creek and the veined aquatic lichen would be expected to recolonize the stream channel affected by replacing a culvert. Even in the absence of recolonization, the relative impacts of repairing or replacing the culvert would be minor to the existing population, and should not affect the species viability or lead towards a trend to listing.

The project area also contains potential habitat for two species of fungi listed as R5 Sensitive Species. The Panther proposed action and alternatives should maintain suitable habitat for fungi species, including the Region 5 Sensitive fungi, but impacts to undetected populations is still plausible given the difficulty in detecting rare fungi.

The proposed activities, including soil disturbance and movement of equipment within and across the project area, increases the opportunity for invasive plant species to colonize an area. In addition, the development of fuel breaks across the project area will provide ideal conditions for existing and potentially new infestations to thrive as long as the fuel breaks are being maintained. These species have the potential to quickly outcompete native plants including Sensitive plants for sunlight, water, and nutrients. Generally, the Panther project is free of invasive plant species, but there are a number of priority isolated infestations along access routes and adjacent to project units (see noxious weed risk assessment). These infestations could easily be spread during project activities including into Pleasant Valley Mariposa lily and Kellog's Lewisia occurrences. To limit the potential for spread, known priority infestations would be treated during Panther project implementation using methods described in the Eldorado Forest Invasive Plant EA to reduce existing seed sources throughout the project area. In addition the project area will be surveyed for five years following implementation and any newly detected infestation will also be controlled. Additional standard measures, such as excluding vehicle traffic from known infestations, equipment cleaning, and use of weed free material, are included in the design criteria to further limit the risk of invasive species spreading into the project area. While the risk of invasion cannot be completely eliminated, these measures are expected to greatly reduce the potential effects of invasive species in the project area, thereby reducing the risk of invasive plants spreading in the project area.

Together, these analyses indicated that the actions considered would not have a significant impact on botanical resources within the project area.

Aquatic Wildlife

The following summarizes the analysis contained in the Biological Evaluation and Assessment (BE/BA) for Aquatic Wildlife Species prepared for the Panther Fuels Reduction and Forest Health Project, hereby incorporated by reference. Pursuant to the Endangered Species Act of 1973, as amended, a list of federally endangered, threatened, or candidate aquatic wildlife species that may be present in the vicinity of the project area was obtained from the US Fish and Wildlife Service (May 16, 2016). Based on geographic and elevational distribution of the species, and the lack of suitable habitat within a reasonable distance as to be affected by the implementation of the Project, a "No Effect" determination was made for seven species: Steelhead trout (Northern California Distinct Population Segment) (*Oncorhynchus mykiss*), Winter –run Chinook

(*Oncorhynchus tshawytscha*), Central Valley spring-run Chinook (*Oncorhynchus tshawytscha*), Delta smelt (*Hypomesus transpacificus*), California Red-legged Frog (*Rana draytonii*), Lahontan Cuthroat Trout (*Onchorynchus clarkii*), and Yosemite Toad (*Anaxyrus canorus*).

Sierra Nevada yellow-legged frog

Sierra Nevada yellow-legged frog (SNYLF) is a federally-listed endangered species that may occur within the project area. No Designated Critical Habitat for SNYLF occurs within the project area, so a determination of “No Effect” was made for the SNYLF critical habitat.

For the purposes of analysis, potentially suitable SNYLF habitat was defined as any perennial or intermittent stream, meadow, or lake habitats occurring 4,500 feet and above within one mile of the project area. All land within a 25 m (82 ft.) buffer of these aquatic features was assumed to provide suitable terrestrial habitat. Since the SNYLF is highly aquatic, the potential for impacts beyond the 25m (82 ft.) buffer of suitable habitat is very low and would likely result in negligible effects to the species. In 2014 and 2015, Forest Service visual encounter surveys (VES) were performed along East and West Panther Creek main-stems and several unnamed tributaries within each watershed. Any wet aquatic features (i.e. streams, seeps, and springs) within 100 meters (upstream and downstream) of roads and treatment units within the project area were surveyed. No SNYLF were observed during the surveys.

Approximately 776 acres, or 39 linear miles, of potentially suitable stream habitat occur within 1-mile of the proposed Panther project area. The effects analyses for the SNYLF assumed the suitable habitat to be occupied. In total, approximately 115.7 acres (Alternatives 1 and 3) or 105.2 acres (Alternative 4) (up to 15%) of the potentially suitable habitat may be impacted by the action alternatives. These activities would be implemented over several years, and would result in different levels of impacts. Skyline logging proposed as part of the commercial harvest may result in ground disturbance within habitat or SNYLF injury, mortality, or displacement due to the cable suspension systems. The likelihood of occupied habitat being impacted is low given the proposed harvest units occur in potential habitat with low suitability, and the lack of frogs observed in recent surveys. Additional impacts may occur due to fuel reduction treatments, including short-term disturbance by hand crews, displacement, or noise harassment, and less likely, injury or mortality. Prescribed fire activities could result in direct mortality to SNYLF from burning or crushing, although direct fire-related mortality of adult amphibians is expected to be rare (USFWS 2014). Proposed road maintenance would impact potential SNYLF habitat at water crossing, and may involve increased sedimentation, harassment, disturbance, injury or mortality. All impacts are expected to be short term and unlikely given BMP's and implementation during the dry season, when

habitat quality and potential occupancy is lowest. While all action alternatives would have equivalent impacts to habitat due to fuel break thinning and maintenance activities, the amount of potential habitat that would be affected due to sky-line commercial thinning or road obliteration would be smaller in Alternative 4 than in Alternatives 1 or 3 (Table 6).

Alternatives 1 and 4 propose to use herbicide (glyphosate) to reduce vegetative growth in fuel breaks. Several additional design features and application restrictions have been included to restrict the use of herbicide near riparian areas and the SNYLF. Glyphosate has a the low potential to leach into soil (Landry et al. 2005; Mamy and Burriuso et al. 2005), and studies on the Eldorado National Forest show that standard application procedures result in undetectable levels of herbicide in downstream features, even when the additional design criteria proposed for the Panther project were not used (Markman 2011). No effect to the SNYLF is expected from the use of herbicide as a result of these design criteria and restrictions.

Past disturbances from management activities having the greatest impact on streams and watersheds within the project area include multiple timber harvest events (on private and public lands), road construction, grazing, mining, off-highway vehicle use, and hydrologic development (e.g. water diversion), that often resulted in increased sediment delivery and other alterations to streams. Present disturbances within the cumulative effect area include human-related activities such as dispersed recreation, fuels reduction, prescribed burning, off-highway vehicle use, and grazing. Future projects anticipated in the area include reforestation activities, road maintenance and reconstruction and fuel reduction work. Together, the anticipated impacts to SNYLF, the short duration of the project activities (<5 years), the established stream buffer exclusion zones, improvement to habitat due to road maintenance and restoration activities, and the overall reduction in wildfire risk lead to a determination that Alternatives 1, 3, and 4 *may affect and is likely to adversely affect the Sierra Nevada yellow-legged frog*. Formal consultation with the U.S. Fish and Wildlife Service pursuant to Section 7 of the Endangered Species Act regarding the possible disturbance to suitable habitat for SNYLF within the Panther project area was completed, and concurrence with the prepared Biological Assessment was received on April 4, 2017 (08ESMF00-2017-F-1337-1).

Table 6. Acres of potentially suitable SNYLF habitat that would be affected by each activity proposed by the Panther Project. Acreages overlap between treatments.

	Alternative 1 (Proposed Action)	Alternative 2 (No Action)	Alternative 3 (No Herbicide)	Alternative 4 (Draft IR's)
Project Activities				
Ground Based Mechanical Commercial Thinning	12.72	0.0	12.72	12.72
Skyline Commercial Thinning	10.53	0.0	10.53	0.0
Hand Thinning¹ Initial Fuel Break	83.6	0.0	83.6	83.6
Prescribed Burn¹ Maintenance Fuel Break treatment	83.6	0.0	83.6	83.6
Herbicide Application²	1,027 (acres to be treated)	0.0	0.0	1,027 (acres to be treated)
Road Maintenance	2.89	0.0	2.89	2.89
Road Reconstruction (miles)	5.7	0.0	5.7	5.7
Temporary Roads³	0.29	0.0	0.29	0.29
Culvert Reconstruction	0.009	0.0	0.009	0.009
Road Obliteration³ (temporary road)	0.29	0.0	0.29	0.29
Total Acres	115.7	0.0	115.7	105.17

¹ Hand thinning and prescribed burning are in the same footprint and therefore acres are counted once.

² No Effect to SYNLf based on design criteria, therefore the acres are not included in the acres potentially affected.

³ Temporary roads and road obliteration are in the same footprint and are therefore counted once.

Foothill yellow-legged frog and Western pond turtle

Two aquatic wildlife species identified as Sensitive Species by Region 5 of the USDA Forest Service have suitable habitat within the Panther Fuels Reduction and Forest Health Project area: the foothill yellow-legged frog (*Rana boylei*) and the Western pond turtle (*Actinemys marmorata*). For the purposes of analysis, potentially suitable FYLF habitat

is defined as any perennial or intermittent stream, meadow, or lake-habitat occurring below 6,000 feet and within one mile of the project area (an arbitrary but conservative buffer). Approximately 443 acres of FYLF suitable habitat are located within 1-mile of the project area, occurring along 24.6 miles of potentially suitable perennial streams, East Panther Creek and West Panther Creek. In 2014 and 2015, USFS visual encounter surveys (VES) for amphibians were performed by qualified aquatic biologists along perennial and intermittent streams within the project area. No detections of FYLF occurred within the Panther project boundary.

The effects analyses for the BE/BA assumed the suitable habitat to be occupied. Direct and indirect effects to FYLF were identified for the commercial thinning, hazard tree removal, fuel reduction, prescribed fire, dust suppressant, and road reconstruction and repair activities proposed under the action alternatives (Alternatives 1, 3, and 4). The number of acres of potentially affected habitat (24.6 acres for Alternatives 1 and 3, or 24.5 acres for Alt. 4) represented no more than 6% of the 443 acres suitable habitat in the analysis area. The effects analyses showed that any impacts to FYLF would be small in context of the available habitat.

The Western Pond Turtle (WPT) occur in a wide variety of permanent and intermittent aquatic habitats, preferring to have ponds or pools nearby to escape from predators. Habitat needs can be varied, so western pond turtles could be found in most streams below 1,525 m (5,000 ft.) in elevation (Jennings and Hayes 1994). A GIS analysis was conducted to identify potentially suitable habitat and nesting habitat for WPT within the project analysis area. A total of 14,905 acres of suitable habitat was identified within the analysis area. No WPT were observed during the VES conducted in 2014 and 2015.

The effects analyses for the BE/BA assumed the suitable habitat to be occupied. Direct and indirect effects to WPT were identified for the commercial thinning, hazard tree removal, fuel reduction, prescribed fire, dust suppressant, and road reconstruction and repair activities proposed under the action alternatives (Alternatives 1, 3, and 4). The number of acres of potentially affected habitat (3,318.6 for Alternative 1, 3,321.5 for Alternative 3, and 3,235.5 for Alternative 4) represent no more than 25% of the suitable habitat in the analysis area, indicating that any affects to WPT would be small in context given the potential habitat in the analysis area.

The potential cumulative effects to FYLF and WPT habitat include multiple past timber harvest events (on private and public lands), road construction, grazing, off-highway vehicle use, hydrologic projects (e.g. water diversion) that often resulted in increased sediment delivery and other alterations to streams, and planned reforestation activities. In addition to the limited context (acreage) of possible effects to both FYLF and WPT, the

intensity of the possible impacts were found to be small. The use of design features such as established stream exclusion zones (including for the possible use of magnesium chloride), the short (less than five years) duration of the project-level effects, and the overall reduction in wildfire risk and improvements in road crossings were found to on balance benefit aquatic species. For these reasons, the determination was made for the foothill yellow-legged frog and the Western pond turtle that Alternatives 1, 3 and 4 *may affect individuals, but are not likely to result in the trend toward Federal listing or loss of viability.*

Terrestrial Wildlife

The following summarizes the analysis contained in the Biological Evaluation and Assessment (BE/BA) for Terrestrial Wildlife Species and the Management Indicator Report prepared for the Panther Fuels Reduction and Forest Health Project, hereby incorporated by reference. A list of federally endangered or threatened species that may be present in the vicinity of the project area was obtained from the US Fish and Wildlife Service (February 6, 2017). No terrestrial species protected as Endangered or Threatened under the Endangered Species Act of 1973, as amended, occur within the project area. Of the 12 terrestrial species identified as Sensitive Species by Region 5 of the USDA Forest Service, four do not occur in, do not have suitable habitat in, or there would be *no effect* to the species from the proposed actions and alternatives, and so were not considered in the analysis (American bald eagle, great gray owl, willow flycatcher, and California wolverine). The effects analyses and determinations for the remaining eight Sensitive Species are summarized below.

California Spotted Owl

Approximately 3,800 acres of suitable habitat for California spotted owl occur within the project area, of which up to 2,345 acres are proposed for treatment under Alternatives 1, 3, and 4. Within and surrounding the project area, suitable habitat was surveyed for spotted owl using the approved Region 5 survey protocol. Prior to project level surveys, three PAC's were known to occur within the project area, and two PAC's were known to have territories overlap the project area. Surveys were completed in 2015, and no new territories or pairs were located.

For Alternative 2 (No Action), the existing condition would persist. Currently, 3,800 acres of potential habitat occur within the project boundary. Of these, approximately 2,090 acres are considered high quality habitat (CHWR size class ≥ 4 and canopy cover $\geq 70\%$) and 1,710 acres are suitable habitat (CHWR size class ≥ 4 and canopy cover between 50-69%). No change in canopy cover or structure would occur under the No Action alternative. The stands would remain at risk of high-intensity, possibly stand replacing wildfire.

Under Alternative 1, the Proposed Action, the amount of habitat at >70% canopy cover would be reduced by 565 acres (15% of suitable habitat in the project area) (all outside of PAC's). In total, 1,505 acres of high quality habitat and 1,475 acres of suitable habitat would be treated. The treated acres would remain at $\geq 50\%$ canopy cover and thus would remain suitable habitat, but would be reduced in cover and understory compared to current levels. In addition, the proposed removal of recently killed trees would not change habitat suitability for this species since snag retention would match the 2004 SNFPA guidelines on average across the project area, and only hazardous snags would be removed from PACs. The use of prescribed fire may result in a 0-5% reduction in canopy cover, but the use of fire is expected to more closely mimic natural processes (compared to mechanical treatments), and is not expected to result in territory abandonment (Roberts et al. 2011, Bond et al. 2002). Further, the Proposed Action was designed to reduce the potential for stand-replacing wildfire within the project area, and thus protect existing California spotted owl habitat by reducing the intensity of wildfire and increasing the effectiveness of suppression activities should one begin.

Under Alternative 3, the acreages affected and size of effects would be identical to the Proposed Action immediately after implementation. However, without the use of herbicides, a greater number of follow up treatments would be needed to maintain fuel breaks, resulting in more frequent disturbance to individual owls outside of the LOP's. In the long term, the persistence of shrub and taller understory species would maintain higher wildfire potential than a species conversion to grasses and short shrubs, as would be expected from Alternative 1. As another result, Alternative 3 would result in a slightly higher wildfire risk.

Alternative 4 was developed in compliance with the California spotted owl Draft IR's (2015) and conforms to the habitat retention standards at the four scales recommended for management. Alternative 4 proposes to treat 1,242 acres of high quality habitat and 1,323 acres of suitable habitat. Under this alternative, the amount of habitat at >70% canopy cover would be reduced by 67 acres (2% of suitable habitat in the project area) (all outside of PAC's). The treated acres would remain at $\geq 50\%$ canopy cover and thus maintain suitable habitat, but would be reduced in cover and understory compared to current levels. No recently killed trees would be removed from the treatment area unless they posed a hazard. The fuel reduction activities would reduce the potential for wildfire.

The proposed road maintenance activities would have no effect on California spotted owl habitat. The potential cumulative impacts within and adjacent to the project area include effects from recreational use, grazing, ongoing and foreseeable future fuel reduction and timber programs, road maintenance, and reforestation activities. Based on the anticipated effects, the small proportion of suitable habitat that would be affected, the potential benefit to foraging habitat that would occur by increasing structure diversity within HRCA's, the use of design features and limited operating periods to minimize direct

impacts to owls, and the reduction in wildfire threat that would result from the fuel reduction treatments, the determination was made that Alternatives 1, 3, and 4 *may affect/impact individual California spotted owls but is not likely to result in trend toward Federal listing or loss of species viability.*

Northern goshawk

Suitable habitat for the northern goshawk overlaps with suitable habitat for the California spotted owl when nesting and foraging habitat is combined. Nesting habitat for goshawk is more inclusive of vegetation type, but generally the analysis of habitat effects are very similar to those for spotted owl. Northern goshawk protected activity centers (PACs) include the best 200 acres of suitable habitat with the highest nesting habitat capability (CWHR type 5D). There are approximately 3,800 acres of habitat which meets these criteria within project area, up to 2,345 acres of which, depending on the alternative, occurs within proposed treatment units. A single goshawk PAC occurs in the project area. Given the similarity between northern goshawk and California spotted owl habitat requirements, the effects analyses for the two rely on very similar acreages.

Alternatives 1 and 3 would reduce 565 acres of habitat that is currently >70% canopy cover to between 50-69% canopy cover. This includes 70 acres of suitable habitat designated in the PAC. All existing habitat would be maintained at or above 50% canopy cover, but those proposed for treatment would be reduced in cover and understory compared to current levels. While recently killed trees would be removed from the treatment units, snags would be retained following the 2004 SNFPA guidance. Northern goshawks may experience slightly greater disturbance under Alternative 3 due to the more frequent re-entry to treat understory vegetation.

Alternative 4 would have similar effects as Alternatives 1 and 3, but would have fewer acres treated by commercial thinning. Under this alternative, 67 acres would be reduced from >70% canopy closure to 50-69% canopy closure following treatment as fuel reduction areas. In addition, no treatments would take place in the goshawk PAC, and fewer snags would be removed from the project area.

The potential cumulative impacts within and adjacent to the project area include effects from recreational use, grazing, ongoing and foreseeable future fuel reduction and timber programs, road maintenance, and reforestation activities. The scope of the proposed activities and design features mean that if implementation-related disturbance occurs, the disturbance should be a temporary displacement of foraging individuals, with no effects to reproduction. In summary, the three action alternatives present potential low intensity effects when compared to the increased resiliency to wildfire and stand health. Based on these factors, a determination was made that Alternatives 1, 3, and 4 *may affect/impact individuals, but is not likely to result in trend toward Federal listing or loss of species viability of northern goshawk.*

American marten and Pacific fisher

The designated Sensitive species American marten and Pacific fisher require similar habitat, including 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). The species differ in the elevation they inhabit, with marten occurring above 5,500 feet and fisher occurring below 8,500 feet in elevation. The two overlap in potential distribution within the Panther project area. There are no known denning sites for either marten or fisher within the project area or on the Amador Ranger District.

For Alternative 2 (No Action), the existing condition would persist. Currently, 1,505 acres of habitat with $\geq 70\%$ canopy cover and 1,475 acres of habitat with between 50-69% canopy cover occur within the project boundary. No change in canopy cover or structure would occur under the No Action alternative. The stands would remain at risk of high-intensity, possibly stand replacing wildfire.

Under Alternative 1, the Proposed Action, the amount of habitat at $>70\%$ canopy cover would be reduced by 565 acres. The treated acres would remain at $\geq 50\%$ canopy cover. In addition, the proposed removal of recently killed trees would match the 2004 SNFPA guidelines on average across the project area. The use of prescribed fire may result in a 0-5% reduction in canopy cover, but the use of fire is expected to more closely mimic natural processes (compared to mechanical treatments). Further, the Proposed Action was designed to reduce the potential for stand-replacing wildfire within the project area, and thus protect existing marten and fisher habitat by reducing the intensity of wildfire and increasing the effectiveness of suppression activities should one begin.

Under Alternative 3, the acreages affected and size of effects would be identical to the Proposed Action (Alternative 1) immediately after implementation. However, given the requirement for more frequent follow-up treatments, there would be a greater chance for recurring disturbance as the fuel breaks are maintained without herbicide.

Under Alternative 4, approximately 67 acres of habitat would be reduced from $>70\%$ canopy cover to 50-69% canopy cover, maintaining all acres as suitable habitat. No recently killed snags would be targeted for removal, unless they posed a hazard. Additional fuel reduction treatments would occur on approximately 240 acres of potential marten/fisher habitat, of which approximately 235 acres currently have 70-100% canopy cover, and 5 acres have 50-69% canopy cover. The treatments would maintain key features of the habitat including large trees and snags.

The proposed road maintenance activities would have no effect on Pacific fisher or American marten. The potential cumulative impacts within and adjacent to the project area include effects from recreational use, grazing, ongoing and foreseeable future fuel reduction and timber programs, road maintenance, and reforestation activities. Based on

the anticipated effects, the inclusion of design features that would reduce the project-generated disturbances, the limited impacts to canopy cover and large tree habitat elements, and the reduced risk from wildfire due to the fuel reduction activities, it was determined that Alternatives 1, 3, and 4 *may affect individuals, but is not likely to lead to a trend towards federal listing or loss of viability for the American marten or Pacific fisher.*

Pallid bat and Townsend's big-eared bat

Pallid bat is a roosting and foraging generalist, typically found in open, dry habitats that contain large snags and rocky areas, usually below 6,000 feet elevation (USDA Forest Service 2001). Black oak is highly associated with pallid bats who use open areas to forage on ground dwelling arthropods. There are no known mine or cave sites within the project area that would provide suitable roosting habitat, and the project elevation is above the elevation at which black oak occurs. There have been no comprehensive surveys for pallid bat on the Eldorado National Forest, but given the generalist nature of the pallid bat and the lack of comprehensive surveys within the project area, the area was considered potential habitat for effects analyses.

Townsend's big-eared bat are habitat generalists, occurring in a wide range of vegetation types including mixed-conifer forests, but are highly selective of roost locations, preferring old buildings, mines, or caves that remain undisturbed. No surveys for Townsend's big-eared bat were available for the project area, so the area was considered potential habitat for effects analyses.

All three action alternatives (Alternatives 1, 3, and 4) would potentially improve foraging habitat for the pallid bat and Townsend's big-eared bat through the creation of fuel breaks and small openings within the treatment areas. The removal of snags under Alternatives 1 or 3 would slightly reduce roosting opportunities compared to Alternative 4, but as snags would be retained according to the 2004 SNFPA guidelines, this difference is not expected to be significant. Implementation of any of the three action alternatives *may result in some disturbance to individuals but is not expected to affect the local population or species viability for the pallid bat or Townsend's big-eared bat.*

Fringed myotis

The fringed myotis is a foraging generalist bat that, in Northern California, appear to use snags exclusively for day roosts (Weller and Zabel 2001). Day roosts appear to be tied to old-forest conditions, with the bat preferring a more open forest condition with large trees (Weller 2000). While large conifer snags are present in the project area, no comprehensive surveys have been conducted for fringed myotis. As a result, all acres of the project area are assumed to be suitable habitat for this species.

All three action alternatives (Alternatives 1, 3, and 4) would potentially improve habitat for the fringed myotis by reducing the density of forest stands without removing the largest trees. In all alternatives the largest diameter trees and snags would be retained (except where posing a hazard) per the 2014 SNFPA. However, the affects would differ slightly between Alternatives 1 (Proposed Action), 3 (No Herbicide) and Alternative 4 (Draft IR's) due to the difference in snag removal. The harvesting of recently killed trees from the treatment areas, as proposed in Alternatives 1 and 3, would reduce the number of snags available for the fringed myotis, although the 2004 SNFPA guidelines would be followed to retain the largest 4 snags per acre, averaged over the treatment area. The spotted owl Draft IR alternative (Alt. 4) would not remove recently killed trees, and thus would leave a greater number of potential roost sites within the project area. These differences are not expected to be significant, however. In summary, it was determined that the Alternatives 1, 3, and 4 *may affect or impact individuals but are not likely to result in a trend toward Federal listing or loss of viability for fringed myotis.*

No direct effects from the use of herbicide were identified for the three bat species, Pacific fisher, American marten, northern goshawk, or California spotted owl.

Western bumblebee

In addition to the fuel reduction and commercial thinning treatments, the use of herbicides may affect the western bumblebee. In order to assess the effect of the proposed herbicide applications on the western bumblebee in the project area, the proposed application rates were compared to the toxicity rates reported for honey bees in the SERA (2011). The proposed glyphosate application rates would be one-half to one-third the dose identified as a level for concern, indicating that the potential for adverse direct effects to western bumblebees would be very low. Indirect effects may be more important to foraging bees due to the reduction in food and shelter in the treated areas. However, three aspects of the proposed actions and implementation would reduce the indirect effects to western bumblebees. First, given the small amount of the project area proposed for herbicide treatment (1,027 acres, or 19% of the project area) and the restriction of application in riparian areas where bee diversity is highest, most of the project area would remain untreated by herbicides. Second, other proposed activities, such as the removal of recently killed trees and the creation of gaps to increase heterogeneity in the project area, will increase the understory vegetation at the same time as the herbicide treatments, providing additional habitat for this species. Third, proposed treatments would occur over multiple seasons, meaning there would be a temporal separation of treatments, providing additional refuge and shelter for western bumbles if they occur in the area. Together, the proposed actions with specific design features are not expected to impact western bumblebees in a way that would cause nest failure, longer term impacts to local populations, or adversity affect the species at large. Based on these analyses, a determination was made that Alternatives 1, 3 and 4 *may affect or impact*

individuals but are not likely to result in a trend toward Federal listing or loss of viability of Western bumblebee.

Summary: For all eight of the Region 5 Sensitive Species within the project area (California spotted owl, northern goshawk, Pacific fisher, American marten, Townsend's big-eared bat, pallid bat, fringed myotis, and western bumblebee), the biological evaluation found that the action alternatives (Alternatives 1, 3, and 4) *may affect or impact individuals but are not likely to result in a trend toward Federal listing or loss of viability.*

Management Indicator Species (MIS)

The Eldorado National Forest Land and Resource Management Plan (USDA Forest Service 1989) as amended by the Sierra Nevada Forests Management Indicator Species Amendment Record of Decision (USDA Forest Service 2007) requires documentation and disclosure of potential affects due to the proposed action and alternatives for the 13 established Management Indicator Species (MIS).

The MIS are animal species that have been selected to characterize changes to a number of distinct habitat types across the Sierra Nevada. The MIS amendment directs Forest Service resource managers to (1) at project scale, analyze the effects of proposed projects on the habitat of each MIS affected by such projects, and (2) at the bioregional scale, monitor populations and/or habitat trends of MIS, as identified in the ENF LRMP as amended.

Of the 13 MIS, five species (aquatic macroinvertebrates, yellow warbler, greater sage-grouse, sooty grouse, and Pacific tree frog) are not found within the proposed treatment areas or would be protected from impact by design features, and were not considered in detailed analysis. The remaining seven MIS species were analyzed at the project and bioregional scale to estimate how the three action alternatives (Alternatives 1, 3, and 4) may affect the species and associated habitat (Table 6).

The potential cumulative impacts within and adjacent to the project area include effects from recreational use, grazing, ongoing and foreseeable future fuel reduction and timber programs, road maintenance, and reforestation activities. While the treatments may temporarily reduce the quality of some habitat for the fox sparrow, mountain quail, California spotted owl, American marten, northern flying squirrel, and hairy woodpecker, the availability of suitable habitat and/or project design features would reduce the adverse effects. In contrast, treatments are expected to neither create nor remove habitat for the mule deer, but would likely improve oak survival and growth. Finally, given the time since the fire that produced the black-backed woodpecker habitat (12 years), the existing habitat is no longer of moderate or high quality due to past salvage harvests and ongoing

snag decay. As a result, it was determined that the action alternatives would not alter the existing trend in the habitat, nor would it lead to a change in the distribution of any of the MIS.

Table 6. Sierra Nevada Forests Terrestrial MIS Selected for Project-Level Habitat Analysis for the Panther Project. Acres of habitat currently existing (Alt. 2) or remaining after proposed treatments (Alts. 1, 3, and 4).

Habitat Type	CWHR Type(s) defining the habitat ¹	MIS <i>Scientific Name</i>	Alt. 2, No Action (Existing Condition)	Alt. 1, Proposed Action	Alt. 3, No Herbicide	Alt. 4, CSO Draft IR's
Shrubland (west-slope chaparral types)	Montane chaparral, mixed chaparral, chamise-redshank chaparral	Fox sparrow <i>Passerella iliaca</i>	188	53-128	53-128	53-68
Oak-associated Hardwood & Hardwood/conifer	Montane hardwood, montane hardwood- conifer	Mule deer <i>Odocoileus hemionus</i>	51	51	51	51
Early Seral Coniferous Forest	Ponderosa pine, Sierran mixed conifer, white fir, red fir, eastside pine, tree sizes 1, 2, and 3, all canopy closures	Mountain quail <i>Oreortyx pictus</i>	446	446-521	446-521	446-461
Mid Seral Coniferous Forest	Ponderosa pine, Sierran mixed conifer, white fir, red fir, eastside pine, tree size 4, all canopy closures	Mountain quail <i>Oreortyx pictus</i>	2,678	2,678	2,678	2,678

Habitat Type	CWHR Type(s) defining the habitat ¹	MIS <i>Scientific Name</i>	Alt. 2, No Action (Existing Condition)	Alt. 1, Proposed Action	Alt. 3, No Herbicide	Alt. 4, CSO Draft IR's
Late Seral Closed Canopy Coniferous Forest	Ponderosa pine, Sierran mixed conifer, white fir, red fir, tree size 5 (canopy closures M and D), and tree size 6	California spotted owl <i>Strix occidentalis occidentalis</i> ; American marten <i>Martes Americana</i> ; Northern flying squirrel <i>Glaucomys sabrinus</i>	1,145	1,070-1,145	1,070- 1,145	1,130- 1,145
Snags in Green Forest	Medium and large snags in green forest	Hairy woodpecker <i>Picoides villosus</i>	4,024	3,000-3,500	3,000- 3,500	3,500- 4,000
Snags in Burned Forest	Medium and large snags in burned forest (stand- replacing fire)	Black-backed woodpecker <i>Picoides arcticus</i>	618	422	422	422

¹ All CWHR size classes and canopy closures are included unless otherwise specified; **dbh** = diameter at breast height; **Canopy Closure classifications:** S= Sparse Cover (10-24% canopy closure); P= Open cover (25-39% canopy closure); M= Moderate cover (40-59% canopy closure); D= Dense cover (60-100% canopy closure); **Tree size classes:** 1 (Seedling)(<1" dbh); 2 (Sapling)(1"-5.9" dbh); 3 (Pole)(6"-10.9" dbh); 4 (Small tree)(11"-23.9" dbh); 5 (Medium/Large tree)(≥24" dbh); 6 (Multi-layered Tree) (Mayer and Laudenslayer 1988).

Hydrological Resources

Most of the Panther Fuels Reduction and Forest Health Project (Panther Project) occurs in the 6th field watershed of Panther Creek; the Panther Project occupies approximately 26 percent of the 11,989 acre watershed. The Panther Creek watershed was rated as Class II (functioning at risk) in the 2010 Watershed Condition Assessment; this rating was primarily the result of high road density, poor forest cover/health, and changes to water quantity. The beneficial uses of water within the Panther Creek watershed are municipal water supplies for domestic use, hydropower generation, recreation, and wildlife habitat. There are no bodies of water within or immediately downstream of the project area on the 303(d) list of impaired water bodies (CRWQB 2015). Beneficial uses of water and the 303(d) list are designated by the California Regional Water Quality Control Board.

Alternative 2 (No Action) increases the risk of adverse effects to the water quality and the condition of streams from two sources.

- A large, high-intensity wildfire in the Panther Creek watershed would be more likely. The potential effects of a large, high-intensity wildfire are well documented in the literature (USDA Forest Service, 2005, RMR-GTR-42). These effects include loss of soil cover and soil hydrophobicity. This tends to result in an increase in runoff and erosion rates during precipitation events by two or more orders of magnitude for several years. This in turn frequently results in stream channel erosion and an increase in the sediment and turbidity levels of streams.
- The maintenance and reconstruction of approximately 50 miles of roads in the project area, which includes the replacement of inadequate drainage structures, would not occur. This would increase the risk of the failure of drainage structures at stream crossings during precipitation events, which in turn would tend to increase the sediment and turbidity levels of streams.

Alternative 1 (Proposed Action) would result in several effects.

- Short-term (less than five years) adverse effects to soil and water quality in the project area are expected to be minor or negligible. This conclusion is largely based on the implementation of Best Management Practices (BMPs) as described in Appendix B and the Design Criteria in Tables 3 and 4. These BMPs and Design Criteria are designed to reduce impacts within the Riparian Conservation Areas (RCAs) that border or surround all aquatic features.
- A large, high-intensity wildfire in the Panther Creek watershed would be less likely. This in turn reduces the likelihood of adverse effects to water quality and streams as described under Alternative 2 (No Action).
- The maintenance and reconstruction of approximately 50 miles of roads in the project area, which includes the replacement of inadequate drainage structures,

- would decrease the risk of the failure of drainage structures at stream crossings and the resulting adverse effects to water quality.
- The Panther Creek watershed would remain in a condition rating of Class II (functioning at risk) because road density and water quantity would not change and improvements in forest health would occur in only a portion of the watershed.

The effects of Alternatives 3 and 4 are expected to be the same as those described for Alternative 1 (Proposed Action). This is because the areal extent, location, and methods of treatment under Alternatives 3 and 4 are the same as Alternative 1 (Proposed Action). However, there are two small exceptions. Alternative 3 does eliminate the risk of improper use of herbicides (such as spills) into aquatic features because no herbicides would be used under this alternative. Alternative 4 would result in slightly less ground disturbance than Alternatives 1 and 3 because there would be 0.5 less miles of temporary road construction.

2) The degree to which the proposed action affects public health or safety.

The Panther Project is designed to reduce risks to public health and safety by implementing strategic fuel breaks and reduce fuel loads in a heavily utilized area of the Eldorado National Forest. Treatments that improve road conditions and remove hazard trees will improve safety for the public. Analysis of the proposed use of herbicide in the fuel breaks showed that potential exposure levels will be many times lower than levels of concern defined by the U.S. EPA reference dose (US EPA 1993, 2000a, 2000b). The proposed application would also be mitigated through public health measures described in the design features, meaning the proposed use of herbicide poses little risk to public health or safety.

3) Unique characteristics of the geographic area such as the proximity to historical or cultural resources, parklands, prime farmlands, wetlands, wild and scenic rivers, or ecologically critical areas.

There are multiple known historic and pre-historic cultural sites within the project area. Design criteria have been included to protect the known sites from potential adverse impacts of implementing the action Alternatives.

Other than two small springs, the project area does not contain parklands, prime farmlands, meadows, or other ecologically critical areas. The Riparian Conservation Objectives Analysis (Norman, Chow, and Brown, 2016) and design criteria, including BMP's, will protect these sites from potential adverse impacts of implementing the action Alternatives.

4) The degree to which the effects on the quality of the human environment are likely to be highly controversial.

Controversy in this context refers to cases where there is substantial dispute as to the size, nature, or effect of Federal action on the human environment, rather than opposition to its adoption. The proposed project follows the management direction in the Eldorado National Forest Land and Resource Management Plan (USDA Forest Service 1989), as amended by the Sierra Nevada Forest Plan Amendment (USDA Forest Service 2004). Any controversy regarding the potential effects to the California spotted owl were thoroughly considered in the Terrestrial Wildlife BE/BA, and the effects analysis and consideration of issues raised by the public as presented in the EA. The actions in the proposed project are well founded in science, current research, and other available information that is relevant to the actions. The Forest Service considered and reviewed numerous publications and research in support of our conclusions about effects to vegetation, soils, hydrology, and wildlife. This analysis integrated studies, professional knowledge and site-specific surveys of the project area.

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

The proposed project follows the management direction in the Eldorado National Forest Land and Resource Management Plan (USDA Forest Service 1989) as amended by the Sierra Nevada Forest Plan Amendment (USDA Forest Service 2004). Similar actions have been analyzed and implements regularly throughout the local and regional area. Local expertise in implementation of these types of projects minimizes the chance of highly uncertain effects, which involve unique or unknown risks. Proposed activities are routine in nature, employing standard practices and design criteria, and their risks and effects are generally well known.

6) The degree to which the action may establish precedent for future actions with significant effects or represents a decision in principle about a future consideration.

Although it is acknowledged that the project area will not remain static, and may need future maintenance in the form of prescribed burning or other fuels treatments, this decision will not set a precedent for future actions. Any future decisions will require a site-specific analysis to consider all relevant scientific and site-specific information available at that time.

7) Whether the action is related to other actions with individually insignificant but cumulatively significant impacts. Significance exists if it is reasonable to anticipate a cumulatively significant impact on the environment. Significance cannot be avoided by terming an action temporary or by breaking it down into small component parts.

Botanical Resources

Adverse impacts to sensitive plants from recent (1989-2011) activities have largely been minimized by the use of mitigation measures, mainly the use of avoidance. Ongoing and future management activities in the Panther project area would continue to minimize impacts through the use of avoidance during foreseeable future actions, which include road maintenance and hazard tree removal. Avoidance or other means of mitigating effects to sensitive plant occurrences is consistent with direction contained in in the ENF LMRP (1989), and will prevent cumulatively significant impacts.

Aquatic Wildlife

A cumulative effects analysis was conducted for all federally protected (endangered, threatened, or candidate) and Region 5 Sensitive aquatic wildlife species having suitable habitat within the Panther project area. The potential cumulative impacts within and adjacent to the project area include effects from recreational use, grazing, ongoing and foreseeable future fuel reduction and timber programs, road maintenance, and reforestation activities. The use of design features would minimize adverse effects due project activities.

Terrestrial Wildlife

A cumulative effects analysis was conducted for all Region 5 Sensitive terrestrial wildlife and Management Indicator Species that occur or have suitable habitat within the Panther project area. No federally listed endangered, threatened, or candidate terrestrial wildlife species occur or have suitable habitat within the project boundary. The potential cumulative impacts within and adjacent to the project area include effects from recreational use, grazing, ongoing and foreseeable future fuel reduction and timber programs, road maintenance, and reforestation activities. The use of design features would minimize adverse effects due project activities.

Hydrological Resources

The risk of cumulative watershed effects (CWE) was assessed using the Equivalent Roaded Acre (ERA) method developed by USDA Forest Service Region 5. The primary cumulative impact of concern is an increase in sediment delivery to aquatic features and the resulting degradation of aquatic habitat. The risk of CWE was analyzed in the six 7th field watersheds located within the Panther project area. The land disturbances described in the four analyzed alternatives resulted in the following risks of CWE in the six watersheds:

- All watersheds are currently at a *low* or *moderate* risk of CWE.
- The East and West Panther Creek watersheds would increase from a *low* risk to a *moderate* risk of CWE for a few years under Alternatives 1, 3, and 4.
- If the Panther Project does not occur (Alternative 2 - No Action), the risk of CWE would stay at *low* or *moderate* in each watershed for a number of years.

- None of the watersheds would be at a *high* or *very high* risk of CWE under any Alternative.

This model indicates that the Panther Project would not cause the affected watersheds to exceed the Threshold of Concern and would not result in any watershed being at a *high* or *very high* risk of cumulative watershed effects.

Fuels

The Panther Ridge fuel breaks are part of a larger fuel break strategy constructed and maintained over the last 20 years. As a result, the areas have already been treated using heavy equipment, wildfire, and fire suppression activities, and as such some ground disturbance and vegetation modification has occurred. Under the No Action alternative (Alternative 2), a lack of effective fuel break would increase the chances that a wildfire could threaten surrounding communities, and require significant ground disturbance and vegetation modification activities as part of fire suppression efforts. For Alternative 1, the Proposed Action, potential cumulative effects include changes in air quality during fuel break maintenance and prescribed burning operations. The communities adjacent to the project area are considered smoke-sensitive areas, and could be affected if weather patterns prevent smoke from venting into the upper atmosphere during prescribed burn operations. The use of mastication followed by herbicide would reduce the amount of particulates, and allow managers to focus on pile-burning rather than understory burning. Under the No Herbicide alternative (Alternative 3), the understory fuels would have to be treated more often to maintain the low fuel load required for hand treatment of wildfires. The understory vegetation would be more difficult to control should a wildfire start, and would make prescribed fire difficult due to fuel levels, burn windows, and budgetary constraints. The California spotted owl Draft IR's alternative (Alternative 4) would treat fewer acres in the commercial harvest units, thus causing fuel loadings to increase, leading to more aggressive fire behavior should wildfire start. Over time, the higher fuel loadings, intensity, and flame lengths would increase the potential that a surface fire would transition to a crown fire, which would in turn increase the likelihood of a stand-replacing wildfire event.

8) The degree to which the action may adversely affect districts, sites, highways, structures, or objects listed in or eligible for listing in the National Register of Historic Places or may cause loss or destruction of significant scientific, cultural, or historical resources.

This project complies with Section 106 of the National Historic Preservation Act of 1966, as amended in accordance with provisions of the Programmatic Agreement among the USDA Forest Service, Pacific Southwest Region (Region 5), the California State Historic Preservation Officer, the Nevada State Historic Preservation Officer, and the Advisory Council on Historic Preservation Regarding Processes for Compliance with Section 106

of the National Historic Preservation Act for Management of Historic Properties by the National Forest of the Pacific Southwest Region (Regional PA 2013). A comprehensive Heritage Resource Report (R2016-05-03-10003) was completed. A total of 22 cultural resource sites have been identified within the project area: 17 prehistoric sites, 4 historic sites, and 1 multicomponent site. Protection of heritage resources in the area was incorporated into the proposed action through such measures as flagging and avoiding sites during project implementation and modifications to the original project design. Based on the analysis documented in the Heritage Resource Report, the proposed action will not cause loss or destruction of significant scientific, cultural, or historical resources.

9) The degree to which the action may adversely affect an endangered or threatened species or its habitat that has been determined to be critical under the Endangered Species Act of 1973.

No endangered, threatened, or candidate botanical species, terrestrial wildlife, or their associated habitat occur within the project area. Suitable habitat for Sierra Nevada yellow-legged frog (SNYLF), a federally listed endangered species, occurs in the project area. A Biological Evaluation and Assessment was completed for the Panther project, and a determination was made that the Panther project *may affect and is likely to adversely affect the Sierra Nevada yellow-legged frog*. Formal consultation with the U.S. Fish and Wildlife Service pursuant to Section 7 of the Endangered Species Act regarding the possible disturbance to suitable habitat for SNYLF within the Panther project area was completed, and concurrence with the prepared Biological Assessment was received on April 4, 2017 (08ESMF00-2017-F-1337-1). The scope and intensity of the proposed actions, and the use of design features relative to the application of the herbicide has resulted in a determination that the use of herbicide would have No Effect on the SNYLF. No critical habitat for the SNYLF occurs within the project boundary, so a determination was made that there would be No Effect to critical habitat.

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

Alternatives 1, 3, and 4 were developed in accordance with and, therefore, do not threaten to violate any Federal, State or local laws or requirements for the protection of the environmental (i.e. Endangered Species Act, National Historic Preservation Act, Clean Water Act, Clean Air Act, and the National Forest Management Act). The actions proposed under any of the alternatives are consistent with the Eldorado National Forest Land and Resources Management Plan (1989) as amended by the Sierra Nevada Forest Plan Amendment (2004).

As part of compliance with the National Forest Management Act (NFMA), a project level Management Indicator Species (MIS) Report has been prepared. No noise or activities

associated with the implementation of the action alternatives would knowingly disturb bald eagle or golden eagle nesting. A report has been prepared documenting this determination in compliance with the Bald and Golden Eagle Protection Act as amended, and is available as part of the Project Record. A report has been prepared in compliance with the Landbird Conservation Strategic Plan and North American Landbird Conservation Plan to disclose the possible effects of the action alternatives on migratory land birds. The report concluded that due to the variety of habitats contained in the project, diversity of proposed actions, and implementation of the design features, the project would not adversely impact migratory land bird species or their associated habitats. These documents are summarized in this EA and are available for review as part of the project record.

The proposed action and all alternatives may affect/impact individuals but is not likely to result in a trend toward Federal listing or loss of viability for the following Forest Service Sensitive species: California spotted owl, Northern goshawk, Pacific fisher, American marten, Townsend's big-eared bat, pallid bat, fringed myotis, and Western bumble bee. The proposed action and all alternatives may affect/impact undiscovered individuals but is not likely to result in a trend toward Federal listing or loss of viability for the following Forest Service Sensitive botanical species: *Allium tribracteatum*, *Botrychium ascendens*, *Botrychium crenulatum*, *Botrychium lunaria*, *Botrychium minganense*, *Botrychium montanum*, *Botrychium paradoxum*, *Botrychium pendunculatum*, *Cypripedium montanum*, *Dendrocollybia racemosa*, *Lewisia kelloggii* ssp. *kelloggii*, *Phaeocollybia olivacea*. Known occurrences of *Calochortus clavatus* var. *avius*, *Lewisia kelloggii* ssp. *kelloggii*, and *Peltigera gowardii* will be flagged and avoided during implementation of any action Alternative, leading to a determination that all alternatives may affect or impact undiscovered individuals but is not likely to result in a trend toward Federal listing for these species, as well.

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Appendix A. Agencies and Persons Consulted

Provided below is a list of individuals; federal, state, and local agencies; tribes, and non-USDA-FS persons consulted during the development of this EA.

Amador Calaveras Consensus Group	Gladen Family Limited Partnership
Amador County Agricultural Commissioner	Gwen Starrett
Amador County Air District	Heissenbuttel Natural Resource Consulting
Amador County Board of Supervisors	Ione Band of Miwok Indians
Amador County Planning Department	J&R Logging
Amador Fire Safe Council	J.W. Dell'Orto
Amador Water Agency	Jackson Rancheria
Bob Clark	Jan Bray
Buena Vista Biomass Power	Jeffrey and Mary Obrien
Buena Vista Rancheria	John B. Hoffman
CalFire	John Muir Project
California Department of Fish & Wildlife	Karen Schambach
California Department of Transportation (Caltrans)	Loree and Douglas Joses
California Native Plant Society, Sierra Nevada Region	Maidu Group of the Sierra Club
California Regional Water Quality Control Board	Mark and Sharon Lehbeck
Californians for Alternatives to Toxics	Michael J. Fallon
Center for Biological Diversity	Pacific Gas & Electric (PG&E)
Central Sierra Environmental Resources Center	Robert Johnson
Charles Iley	Sam Baugh
Clinton Brownlie	Sherry Curtis
Dick Artley	Sierra Forest Legacy
East Bay Municipal Utility District	Sierra Native American Council
El Dorado County Air Quality Management District	Sierra Pacific Industries
El Dorado County Board of Supervisors	Steve Brink
El Dorado County Fire Safe Council	Tatum Tree Management
Erik Holst	Terry and Margaret Sutton
Evelyn Cuneo	The Onetos
Foothills Conservancy	Thelma and Geoffrey Williams Trust
Gary and Nancy Gladen	Thomas Newcomer
Geoffrey and Carrina Williams Trust	Tri-County Technical Advisory Committee
Gerald and Venita Meyers Family Trust	Trout Unlimited
	Upper Mokelumne River Watershed Authority
	Warren Carleton
	Washoe Tribe of Nevada and California
	Whiting Family Living Trust

Appendix B. Soil and Water Best Management Practices

(N)- Guidance provided in USDA Forest Service National Best Management Practices for Water Quality Management on National Forest Lands, Volume 1: National Core BMP Technical Guide., FS-990a. April 2012.

(R)- Guidance provided in USDA Forest Service Region 5, Water Quality Management Handbook. R5 FSH 2509.22, Chapter 10, Amendment 2509.22-2011-01. December 2011.

(N) Plan-3	Aquatic Management Zone Planning/ <i>To maintain and improve or restore the condition of land around and adjacent to waterbodies in the context of the environment in which they are located, recognizing their unique values and importance to water quality while implementing land and resource management activities.</i>	Generally follow guidance provided in California Forest Practice Rules, as well as Fish and Wildlife Service Biological Opinion for Sierra Nevada Foothill Yellow legged frog. (see Veg-3)
(N) Veg-1	Vegetation Management Planning/ <i>Use the applicable vegetation management planning processes to develop measures to avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources during mechanical vegetation treatment activities.</i>	Either do not implemented fuels reduction treatments in areas identified as historic mass slope failure sites, or use very light fuels reduction treatments, to maintain soil and vegetation structure (see Veg-2)
(N) Veg-2	Erosion Prevent and Control/ <i>Avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources by implementing measures to control surface erosion, gully formation, mass slope failure, and resulting sediment movement before, during, and after mechanical vegetation treatments.</i>	Restoration of disturbed soils within RCAs, restore soil cover to 70% through placement of organic debris;subsoil compacted surfaces; and install waterbars as needed to insure that preferential flow paths from subsoiling furrows do not develop. For disturbed soils outside of RCAs; install waterbars as needed to prevent creation of preferential flow paths.
(N) Veg-3	Aquatic Management Zones/ <i>Avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources when conducting mechanical vegetation treatment activities in the AMZ.</i>	In Region 5 also known as Riparian Conservation Areas. See water body buffers prescribed in Table X. No removal of woody debris within stream channels or embedded in streambanks. No removal of vegetation (living or dead) within stream channel or on stream banks.
(N) Veg-4	Ground-Based Skidding and Yarding Operations/ <i>Avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources during ground-based skidding and yarding operations by minimizing site disturbance and controlling the introduction of sediment, nutrients,</i>	See Veg-2. Utilize footprints of historic skid trails, as displayed on LiDAR imagery where practical for mechanical equipment access routes.

	<i>and chemical pollutants to waterbodies.</i>	
(N) Veg-5	Cable and Aerial Yarding Operations/ <i>Avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources during cable and aerial yarding operations by minimizing site disturbance and controlling the introduction of sediment, nutrients, and chemical pollutants to waterbodies.</i>	Utilize footprints of historic skid trails, as displayed on LIDAR imagery, where practical, for feller-buncher access routes .No ground-based equipment would be allowed on slopes greater than 35% without consultation by the soil scientist. (Forest-Wide Forest Plan Standards and Guidelines 86, 1989 Eldorado National Forest Plan). An exception for this would occur in skyline units where feller bunchers would be allowed to operate on slopes up to 45%. This would be allowed for cutting and pre-bunching of logs that would be removed using a skyline logging system.
(N) Veg-6	Landings/ <i>Avoid minimize adverse effects to soil, water quality, and riparian resources from the construction and use of log landings.</i>	The following practices would be implemented around machine created slash piles left within landing. Locate machine slash piles as far as possible on upslope side of landing. Recontour landing surface to prevent creation of preferential flow paths; rip/subsoil landing surfaces and main skid trails connected to landing to reduce surface compaction; and provide organic debris soil cover up to 50% to reduce potential for offsite runoff and sediment delivery. If landing is within RCA, approval by a Hydrologist, Fisheries Biologist, or Soil Scientist is needed for placement of new landings and/or modification and use of existing landings. Also see Veg-2, for soil restoration requirements.
(N) Veg-8	Mechanical Site Treatment (ie. Masticators,Chippers)/ <i>Avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources by controlling the introduction of sediment, nutrients, and chemical pollutants to waterbodies during mechanical site treatment.</i>	See Veg-2.
(N) Fire-2	Use of Prescribed Fire/ <i>Avoid, minimize, or mitigate adverse effects of prescribed fire and associated activities on soil, water quality, and riparian resources that may result from excessive soil disturbance as well as</i>	See waterbodies buffers, in Aquatic Biologist Specialist Report.

	<i>inputs of ash, sediment, nutrients, and debris.</i>	
(N) Chem-1	<i>Chemical Use Planning/Use the planning process to develop measures to avoid, minimize, or mitigate adverse effects on soil, water quality, and riparian resources from chemical use on NFS lands.</i>	Glyphosphate is the only herbicide proposed for this project, and application will be ground based.
(N) Chem-2	<i>Follow Label Direction/Avoid or minimize the risk of soil and surface water or groundwater contamination by complying with all label instructions and restrictions required for legal use.</i>	All herbicide applications are required to follow label instructions and restrictions for use to avoid water contamination by complying with all label instructions and restrictions for use. Herbicide label directions for application rates and methods, mixing, and container disposal will be followed. Label directions will be followed on all Herbicides, dyes, and adjuvants. All Herbicide applications will adhere to all appropriate laws and regulations governing the use of Herbicides, as required by the U.S. Environmental Protection Agency, the California Department of Herbicide Regulation, CalEPA regulations and safety regulations, and Forest Service policy pertaining to Herbicide use. Coordination with the appropriate County Agricultural Commissioners will occur, and all required licenses and permits would be obtained prior to any Herbicide application. All Forest Service personnel in charge of projects involving Herbicide application will be Qualified Applicator Certified. All contract applicators will be appropriately licensed by the state. These actions will effectively avoid the misuse of the herbicides used in this project and thus decrease the risk of contaminating water or applying to non-target areas. (Silviculturist, Culturist & Contract Representative responsible for application of Herbicides). See Table A1, for proposed application rates and additives.
(N) Chem-3	<i>Chemical Use Near Waterbodies/Avoid or minimize the risk of chemical delivery to surface water or groundwater when treating areas near waterbodies.</i>	See ROC analysis for specific waterbody buffers. Buffer strip locations and width are based partly on results from water monitoring from previous years' herbicide application projects on the ENF, as well as recent USFS policy for Sierra Nevada yellow legged frog protection. Buffer strip boundaries would be flagged or otherwise designated on the ground. The contractor or project employees

		<p>would be informed of the location and extent of each of the strips prior to treatment. Applications would be monitored by the Contracting Officer or project director to determine accurate placement. Spray application personnel would not be allowed into these buffers.</p> <p>In addition to buffers the following protection measures will be placed into the contract and project plans. This includes: 1) using “back pack” ground application equipment; 2) ceasing application when weather parameters exceed label requirements, precipitation, or forecast of greater than a 70% chance of precipitation in the next 24 hours; 3) requiring a spray nozzle that produces a relatively large droplet; 4) requiring low nozzle pressures (15-30 psi); 5) requiring the spray nozzle be kept within 24 inches of vegetation being sprayed; 6) requiring a pressure gauge or pressure regulator on the backpack sprayers; 7) requiring a directed spray away from riparian vegetation, oaks and non-target conifer seedlings, as well as the use of physical barriers; and 8) requiring the use of a seedling wash-down solution for accidentally oversprayed seedlings.</p>
<p>(N) Chem-5</p>	<p><i>Chemical Handling and Disposal/Avoid or minimize water and soil contamination when transporting, storing, preparing, and mixing chemicals; cleaning application equipment; and cleaning or disposing chemical containers.</i></p>	<p>To prevent water contamination resulting from cleaning or disposal of herbicide containers all herbicide and adjuvant containers would be triple rinsed, with clean water, at a site approved by the Contracting Officer or Representative, or, in the case of application by Forest Service personnel, approved by the project director. The rinsate would be disposed of by placing it in the batch tank for application. Used containers would be punctured on the top and bottom to render them unusable after rinsing. Disposal of containers would be at legal dumpsites; certification of such disposal would be required prior to final payment on contract applications. Equipment would not be cleaned and personnel would not bathe in a manner that allows contaminated water to enter any body of water on the national forest.</p>

		To reduce contamination of water by accidental herbicide spills, a spill plan (project file) will be developed for this project. A copy will be retained onsite. It will be reviewed by all Forest Service personnel involved in the project, as well as by the contractor and the appropriate forest and district staff and line officers. Any herbicide application contract will contain clauses that will minimize the chances of herbicide spills (such as designating routes of travel and mixing sites, minimizing herbicide mix in tanks while traveling between units, requiring a separate water truck from the batch truck) and, if a spill occurs, outlining responses required by the contractor. Spill kits will be required in Forest Service and contractor vehicles on site and where contractor-supplied herbicides are stored.
(N) Chem-6	Chemical Application Monitoring and Evaluation/ <i>1. Determine whether chemicals have been applied safely, have been restricted to intended target, and have not resulted in unexpected nontarget effects. 2. Document and provide early warning of possible hazardous conditions resulting from potential contamination of water or other nontarget resources or areas by chemicals.</i>	Treatments will be monitored and evaluated during application by the contract officer or representative to determine whether herbicides have been applied safely, restricted to intended target areas, and have not resulted in unexpected non-target effects. All spray equipment would be calibrated to insure accuracy of delivered amounts of herbicide. Periodically during application, equipment would be rechecked for calibration. Colorants or dyes would be added to the herbicide mixture to determine placement. Post-project monitoring would determine the effectiveness of treatment in meeting the project objectives. No water quality monitoring is proposed, based on results of previous monitoring related to use of this herbicide, performed on the El Dorado National Forest and other Forests in Region 5 (Bakke, 2001).
(N) Road-5	Temporary Roads/ <i>Avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources from the construction and use of temporary roads.</i>	Approval by a Hydrologist, Fisheries Biologist, or Soil Scientist is needed for placement of temporary roads with RCAs. Apply soil restoration requirements as described in Veg-2.
(R) BMP 2.3	Road Construction and Reconstruction/ <i>Minimize erosion and sediment delivery from roads during</i>	

	<i>road construction or reconstruction, and their related activities.</i>	
(R) BMP 2.4	Road Maintenance and Operations/ <i>To ensure water quality protection by providing adequate and appropriate maintenance and by controlling road use and operations.</i>	
(R) BMP 2.5	Water Source Development and Utilization/ <i>To supply water for road construction, maintenance, dust abatement, fire protection and other management activities, while protecting and maintaining water quality.</i>	
(R) BMP 2.8	Stream Crossings/ <i>Minimize water, aquatic, and riparian resource disturbances and related sediment production when constructing, reconstructing, or maintaining temporary and permanent water crossings.</i>	<p>Approval by a Hydrologist or Fisheries Biologist is needed for the placement of temporary stream crossing structures, except on ephemeral channels and draws. Equipment crossings would be approved by the Timber Sale Administrator, for ephemeral channels and draws.</p> <p>For the construction of new crossings on perennial channels:</p> <ul style="list-style-type: none"> ▪ A qualified aquatic biologist will survey the culvert site within 24 hours prior to construction activities. ▪ Should SNYLF be located before or during implementation, their safety shall be assessed by a qualified biologist and dealt with according to the Terms and Conditions described in the Programmatic Biological Opinion issued by the USFWS 2014.
(R) BMP 2.10	Parking and Staging Areas/ <i>Construct, install, and maintain an appropriate level of drainage and runoff treatment for parking and staging areas to protect water, aquatic, and riparian resources.</i>	
(R) BMP 2.11	Equipment Refueling and Servicing/ <i>Prevent fuels, lubricants, cleaners, and other harmful materials</i>	

	<p><i>from discharging into nearby surface waters or infiltrating through soils to contaminate groundwater resources.</i></p>	
<p>(R) BMP 2.13</p>	<p>Erosion Control Plan (including wet weather operations plan <i>Effectively limit and mitigate erosion and sedimentation from any ground-disturbing activities, through planning prior to commencement of project activity, and through project management and administration during project implementation. (Provides seamless transition between planning level (NEPA) mitigation descriptions and on-the-ground implementation of erosion control measures tailored to site conditions).</i></p>	<p>The requirements of an Erosion Control Plan (as specified in the Region 5 Water Quality Management Handbook of 2011) are met through the following: Project-specific design criteria, such as ground-based equipment exclusion zones, that are intended to reduce the delivery of sediment to aquatic features. These design criteria are in the Environmental Assessment. Sections B6.6 and C6.6 of Timber Sale Contracts contain standard language that pertain to the prevention and control of erosion. The Wet Weather Operations Plan, which applies to all timber harvest and fuels reduction projects, contains specific requirements in order to reduce erosion during periods of wet weather. This includes the cessation of all timber harvest and fuels reduction activities when specific soil conditions are met. Best Management Practices (BMPs) in the 2011 Water Quality Management Handbook that are specifically designed to reduce sediment delivery to aquatic features from timber harvest and fuels reduction activities. The applicable BMP's are described in this Table. Timber Sale Contract Maps. These maps typically show all areas of vegetation treatment as well as types of treatment, roads, aquatic features, and equipment exclusion zones adjacent to aquatic features.</p>

Appendix C: Chem- 2-Chemical Formulation, Application Rate, and Additives

Herbicide	Trade Names	Target Species	Timing	Proposed Application Rate
Glyphosate	Rodeo or equivalent	Deer brush, scotch broom, green leaf manzanita, choke cherry, whitethorn, tree of heaven, and sweet clovers	When target plants are actively growing (between late April and June).	2 to 4 lb. a.e./acre
Adjuvant		Trade Names		
Spreader-Penetrator		Syl-Tac, Hasten or Competitor (aquatic formulation)		
Marker Dye		Colorfast Purple		

Bakke, David. 2001. A Review and Assessment of the Results of Water Monitoring for Herbicide Residues for the Years 1991 to 1999. USDA Forest Service Region 5, Vallejo, Cali.

Schuetz, Jeff. 1998. Environmental fate of glyphosate. Environmental Monitoring & Pest Management. California Department of Pesticide Regulation. Sacramento, Cali.