ENVIRONMENTAL ASSESSMENT
USDA Forest Service
VISTA FIRE RESTORATION PROJECT
Kern River Ranger District, Sequoia National Forest
Tulare County, California

INTRODUCTION
This Environmental Assessment (EA) documents the analysis performed by an interdisciplinary team on the Vista Fire Restoration Project area on the Kern River Ranger District of the Sequoia National Forest. The Vista Fire Restoration Project is located on the central portion of the Kern Plateau, mainly in the Trout Creek watershed and encompasses the Vista Fire perimeter and three miles of road along Forest Roads 22S20, 22S28, and 22S38. The legal description is Township 22 South, Range 34 East, Sections 8, 15, 16, 17, 20, and 21, Mount Diablo Base and Meridian (see Map 1: Vicinity Map, page 31).

This project was originally listed on the Schedule of Proposed Actions in January 2008, as a categorical exclusion. The scoping letter in February 2008 also stated that the project, as proposed, would proceed as a categorical exclusion. However, in June 2008, the Forest Service decided the best course of action would be to prepare an EA for the project.

The analysis documented in this EA provides the Forest Service (FS) responsible official with current information to aid in the decision-making process. It complies with the Council of Environmental Quality's Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act (NEPA; 40 CFR Parts 1500-1508) and the Forest Service's Environmental Policy and Procedures Handbook (FSH 1909.15).

The Vista Fire Restoration Project Environmental Assessment is tiered to the Sequoia National Forest Land and Resource Management Plan (LRMP), as amended by the Sierra Nevada Forest Plan Amendment (SNFPA) (2004). The action alternatives described in this document respond to the need for the proposal and issues developed through the scoping process. The proposed action and other alternatives are designed to implement treatments that will move resources in the project area toward their desired conditions as described in the LRMP, and the SNFPA 2004. The information required by the signators of the 1990 Sequoia National Forest Land and Resource Management Plan Mediated Settlement Agreement (MSA) has been composed as a separate document in Appendix F. This allows the discussion of environmental effects to focus more closely on the alternative actions and potential for significant effects in terms of context and intensity (40 CFR 1508.27, 1986).

NEED FOR THE PROPOSAL
The Vista Fire started in late summer and burned a total of 420 acres from August 22 to August 26, 2007, entirely within the Sequoia National Forest. The fire included 75 acres within the Domeland Wilderness. The Vista Fire is situated four miles west of the Manter Fire (2000), one mile south of the McNally Fire (2002), and one mile north of the Boone Fire (1950) on the Kern Plateau in southeastern Tulare County.

The fire was driven by westerly upslope winds and burned in mature Jeffrey pine, white fir, and red fir forest. Most of the western half of the fire area burned at high intensity. This area included a crown fire that resulted in a stand-replacing event (greater than 75 percent mortality of standing trees) covering approximately 198 acres. The eastern half of the fire burned at lower intensity, resulting in a mosaic of low to moderate mortality of standing trees. The low-intensity underburn generally

produced positive results by reducing surface fuels and creating small gaps providing openings for early seral and snag habitat for wildlife as well as conifer regeneration. Overall, the eastern portion of the fire represents a "desired condition" for high elevation eastside mixed conifer stands. Such stands provide old forest habitat and are resilient to future wildfire. Eighteen acres of Jeffrey pine plantations and 14 acres of openings that had been naturally reforested also burned.

The Sierra Nevada Forest Plan Amendment Record of Decision, 2004 (SNFPA ROD) provides direction for the ecosystem restoration following catastrophic events. These restoration activities are included in all land allocations and call for managing disturbed areas to achieve long-term desired fuels profiles, to restore habitat, and recover the value of some dead and dying trees (SNFPA ROD, pg. 6). Land allocations within the Vista Fire boundary are: old forest emphasis; southern Sierra fisher conservation area (SSFCA); riparian conservation area (RCA); the Trout Creek watershed critical aquatic refuge (CAR); spotted owl protected activity center (PAC), and wilderness (see Map 2: Resource Map, page 32).

The goal of this project is to move the fire area toward desired conditions defined in the SNFPA ROD (pg. 36-48):

- Desired conditions for old forest emphasis areas (ROD pg. 48) include high levels of horizontal and vertical diversity, trees of varied sizes, ages, and species composition, and sufficient dead trees, standing and fallen, to meet habitat needs of old forest associated species, while allowing for successful establishment of early seral stage vegetation.
- Desired conditions for PAC (ROD pg. 45) include at least two tree canopy layers, dominant and co-dominant trees that average at least 24 inches diameter at breast height (dbh), 50-70% canopy cover, some very large snags, and higher than average levels of snags and down woody material.
- In RCAs (ROD pg. 42-43), the desired condition is to meet the water quality goals of the Clean Water Act and Safe Drinking Water Act, with streams that are fishable, swimmable, and suitable for drinking after normal treatment. This includes habitat that supports viable populations of native and desired non-native plant, invertebrate, and vertebrate riparian and aquatic-dependent species.
- Desired conditions for the Trout Creek CAR (ROD pg. 44) are to provide habitat for native fish, amphibian and aquatic invertebrate populations maintaining and restoring remnant plant and animal populations in aquatic communities. Water quality meets State stream standards.
- Desired conditions for the SSFCA (ROD pg. 47) are to provide a minimum of 50% of the forested area with greater than or equal to 60% canopy cover within the Hydrological Unit Code (HUC) 6 watershed (Trout Creek watershed).

The entire project area falls within the SSFCA and the Trout Creek CAR. The owl territories shown on Map 2 on page 32 include both the PAC and home range core area for California spotted owl.

Meeting the desired conditions described above requires survival and growth of individual trees and forested stands over many years without the occurrence of another stand-replacing wildfire.

The Vista Fire resulted in adverse effects to forest resources including soil, riparian areas, and wildlife habitat. The fire killed relatively large stands of trees that, if left untreated, will contribute to extremely high fuel loading over time and remain as large openings in forest canopy. Without

treatment to restore the fire area, additional impacts are likely over the short and long term. There is a need in the Vista Fire area for:

1. **Re-establishment of forested conditions in burned stands to provide cover in the short-term and to provide the basis for growth of important habitat for old forest-dependent species:** The western portion of the Vista fire suffered a stand-replacing event and has very few live trees to provide a future seed source. This has created a gap in canopy cover of about 200 acres and exacerbates the existing fragmentation of forest cover. It will take at least 100 years to reestablish large trees (>24" dbh) and, with appropriate silvicultural treatments, at least 250 years to develop old trees with decadence features beneficial to wildlife (SNFPA FEIS Vol. 1, Ch. 2, pg. 138). Replanting trees in the treatment units will help forest stands to recover in a shorter time frame than natural recovery would allow.
2. **Recruitment and retention of both short and long term large down logs and snag habitat for the purpose of providing sufficient burned forest habitat for dependent species:** Nearly all the existing down and woody material and coarse woody debris burned in the western half of the fire area. Over the next 50 years dead trees and burned logs retained in the fire area will provide the primary source of snags and logs for early-seral dependent wildlife. Some dead trees standing today may also contribute in the short term to the decaying, fallen log component of future old forests and spotted owl habitat. Retaining snags and trees with decadence features in areas of low fire mortality can also contribute to the future desired condition for large down logs.
3. **Restoration of effective ground cover (logs, limbs, and twigs) for soils left unprotected by the fire to minimize erosion in the short-term and begin to replace soil organic material over the long-term:** The western portion of the fire area that sustained moderate to high burn severity are likely to contribute sediment due to lack of ground cover and larger down woody debris to hold soil. While scorched conifer needles, fine twigs, and recently fallen trees have begun to rebuild the organic surface layers, the process of dead tree removal will provide immediate and effective ground cover in the form of limbs, tree tops, and small tree boles that would otherwise be delayed if all dead trees are left to fall naturally. Two events of heavy precipitation occurred in July 2008 and November 2008 producing rilling, movement of fine sediment, and scouring of ephemeral channels within the Vista Fire area. Intense rain events and summer thunderstorms will continue to perpetuate local soil erosion unless effective ground cover is established.
4. **Reduction of long-term fuel loading in order to reduce the risk of another high intensity, stand-replacing wildfire that would damage recovering habitats, and the reduction of fuels to facilitate future fire management (prescribed fire and wildland fire use) and to restore historic fire return intervals in the old forest emphasis areas:** Based on Geographic Information System (GIS) records, the majority of the Vista Fire area should have been in Fire Regime Group 1, which has a low severity fire return interval of 0 to 35 years. The establishment of old forest habitat requires the survival and growth of individual trees and forested stands over the next 250+ years without the occurrence of another stand-replacing fire. Currently surface fuel loading is less than 5 tons per acre with very little down woody material and almost no duff layer. As dead trees fall surface fuels will increase significantly over time, affecting future fire behavior (attributes such as resistance-to-control, rate-of-spread, and heat per unit area) and suppression/management capabilities. Additionally, it is expected that shrub species will resprout or germinate, forming dense thickets in many areas within three to four years after the fire. Preventing another stand-replacing fire requires a combination of recurring fuel treatments to modify fire behavior, and effective fire management. High volumes of large woody debris can lead to difficulty in suppressing or managing wildfires (see page 14). Large woody debris also

increases burn severity by increasing burning "residence" time, further impacting watersheds and soils. Dead trees that aren't removed, will contribute to extremely high fuel loading (40-100 tons/acre) in 30 years. The McNally Fire (2002) burned through areas previously burned by the Flat (1975) and Bonita (1977) fires demonstrating the consequences of both active and passive management on re-establishment of forest habitats, future fire behavior and fire effects, and watershed restoration. Burned areas that were actively managed with salvage harvest and reforestation show much less damage from the McNally Fire than areas that were allowed to recover naturally (*McNally/Sherman Pass Restoration Project FEIS (2004), pg. 4-5*).

The SNFPA ROD (pg. 45-48) identifies a management objective for treatments in old forest emphasis of designing economically efficient treatments to reduce hazardous fuels. In the future, the use of prescribed burning and wildland fire use will be an economically efficient means to reduce hazard fuels in the Vista Fire area. High volumes of down logs, however, may preclude the use of prescribed fire or wildland fire use. Wildland fire use or prescribed fire under these conditions could result in killing a significant portion of trees growing on the site, jeopardize the development of old forest characteristics, and increase the risk of escaped fires.

5. **Recovery of the economic value of timber killed or severely injured by the fire, in an expeditious manner, for the purposes of reducing the cost of restoration activities and supplying wood fiber to local sawmills:** The Forest Service has a role to play in providing a wood supply for local manufacturers and sustaining a part of the employment base in rural communities (SNFPA ROD, pg. 4). The SNFPA provides for salvage logging following wildfires for the objective of recovering economic value from dead and dying trees (SNFPA ROD, pg. 52). Based on stand exams it is estimated that approximately 1.4 MMBF of merchantable timber was killed by the fire and is readily accessible from roads. Dead trees deteriorate rapidly relative to wood quality and quantity. Decay rates vary by trees species and size class but most trees will no longer retain value as timber after five years and many will only hold their value for two years. The value of trees removed covers the cost of their removal and associated fuel treatments; it can also be used to pay for other restoration work including treatment of additional fuels, reforestation, and watershed improvement projects. If trees aren't removed while they have value, the Forest Service would request supplemental funding from Congressional appropriations to pay for their removal in order to achieve desired conditions.
6. **Reduction of safety hazards to the public and forest workers from falling trees:** Dead, dying, and structurally unsound trees pose a significant safety hazard to forest visitors and workers.

PROPOSED ACTION

The action proposed by the Forest Service to meet the needs described above is to remove dead and dying trees and to replant conifer stands in those areas containing forested habitat (outside the Domeland Wilderness) that sustained a moderate to high burn severity, resulting in heavy tree mortality. Where possible, dead and dying trees not needed to meet resource objectives will be removed from the site through a commercial timber sale. It is estimated that reducing the number of dead and dying trees to meet forest restoration objectives would provide approximately 1.4 million board feet of sawtimber to local manufacturers thus contributing to sustaining part of the employment base of Tulare County, California.

Project Area Description: The Vista project is located in Township 22 South, Range 34 East, Sections 8, 15, 16, 17, 20, and 21, Mount Diablo Base and Meridian, Tulare County, California. It is centrally located on the Kern Plateau on 420 acres primarily in the Trout Creek watershed. The project area

encompasses the Vista Fire perimeter and the 3 miles of road along 22S20, 22S28, and 22S38. The area can be accessed by Sherman Pass Road (22S05) from the north. See Map 3: Proposed Action, page 33.

Proposed restoration treatments include:

1. **Salvage dead and dying trees, by ground-based yarding, on 130 acres.** Tree mortality within the project area is either a result of the fire, post-fire stress (root, bole, crown scorch), or pre- and post-fire insect damage. A mortality prediction model, developed by Forest Service researchers, as described in**, Delayed Conifer Tree Mortality Following Fire in California,** PSW-GTR-203 (Hood, Smith, and Cluck 2007), will be used to identify which dying trees will be harvested (SNFPA 2004, ROD pg 52). The Forest proposes to remove 29 dead trees per acre and 4 dying trees per acre, greater than 15 inches in diameter. The dying trees were identified using a mortality threshold of 0.8 as described on page 15-16 of this document.
2. **Plant, by hand, approximately 90 acres.** Trees would be planted to re-establish the burned plantations, where natural regeneration is not adequate, and in areas that would be salvaged. Reforestation with conifers is proposed to re-establish habitats occupied by late-seral species prior to the fire, to link together suitable remnant habitats, and restore old forest habitat. Jeffrey pine, white fir, red fir, and western white pine, would be planted. Planting areas would be selected based on soil type, productivity, slope, and accessibility to afford the seedlings the best chance of survival. This action would accelerate the development of canopy cover and mature forest habitat (SNFPA 2004, ROD pg. 52). A minimum planting rate of 300 seedlings per acre is planned, which based on a survival rate of 50 percent after three years (worst case scenario), would leave 150 trees per acre meeting USFS Region 5 standards for adequate regeneration of mixed conifer stands.
3. **Fuels treatments on approximately 143 acres.** The proposed action would remove approximately 4,900 tons of potential fuel from treatment units. To meet management standards, 10 to 15 tons per acre of large woody material and less than 5 tons per acre of woody material less than or equal to 3 inches in diameter would be left. Excess fuels would be hand piled and burned including 13 acres of incinerated Jeffrey pine plantations. These activities help manage fuel profiles and reduce both short-term and long-term surface fuel loading (SNFPA 2004, ROD pg 52).
4. **Contour felling on approximately 5 acres within Riparian Conservation Area.** Scattering of dead trees and limbs across the slope is proposed to stabilize soil along the ephemeral drainages primarily in the snag retention corridor. Contour felling would be used to increase ground cover in these areas that continue or are likely to contribute sediment due to lack of ground cover and larger down woody debris to hold soil. This action would accelerate the dispersal of coarse woody debris, provide soil cover, and reduce potential soil erosion (SNFPA 2004, ROD pg 52).
5. **Retain all snags on 68 acres.** This patch of high tree mortality occurs on steep slopes and erosive soils. It contains 50 trees per acre greater than 10 inches in diameter or approximately 3,400 snags of mixed species and size classes. No mechanical ground disturbance is proposed on this terrain. This area of burned forest provides desirable characteristics of nesting and foraging habitat for many wildlife species. It also provides abundant coarse woody debris and legacy structures (large diameter snags, large trees with cavities or broken tops) to maintain and enhance soil productivity over the long term (SNFPA 2004, ROD pg 52 & 53). Snags would also be left in the untreated areas of the Vista Fire, approximately 209 acres, including the

Domeland Wilderness. In harvest units, snag recruitment would be provided from future mortality of fire damaged trees not meeting current marking guidelines, cull snags that are non-merchantable, inoperable areas, and adjacent areas of low to moderate mortality. Based on stand exams leaving existing snags in inoperable and other areas along with recruitment of dying trees that do not meet the marking guidelines is expected to result in approximately three to four snags per acre within the harvest units.

6. **Construct approximately 1500 feet of temporary roads to access treatment areas.** Temporary roads would be low standard roads with 8-foot width, native surface, and generally located on flat ridge tops. Treatment units would be accessed by a combination of existing forest roads and temporary roads constructed for restoration activities. Temporary roads would be closed to the public. Temporary roads and landings would be rehabilitated after logging is completed. No new permanent road construction or reconstruction is proposed.
7. **Remove roadside hazard trees and maintain approximately 3 miles of National Forest System roads that would be used as haul routes for salvaged timber**. Hazard trees to be removed are dead trees and live trees that are burned or sufficiently damaged to pose a risk of falling within the next three years that have potential to reach the road (Sequoia National Forest Hazard Tree Identification Guidelines 2004). Existing forest roads would receive normal road maintenance activities, such as surface blading and repair and maintenance of rolling dips and over-side drainage structures.

Site specific treatments were developed based on specific restoration needs, the slope of the terrain, the degree of conifer mortality, and the land management allocation. With the proposed activities, the Forest expects to re-establish conifers and treat fuels to reach the desired condition at a faster rate than if no action was taken.

If approved, the Kern River Ranger District proposes to implement this project proposal in the spring of 2009.

PUBLIC INVOLVEMENT

The Vista Fire Restoration Project was listed in the Sequoia National Forest Schedule of Proposed Actions on January 17, 2008. The proposal was provided to a total of 34 individuals; local tribal organizations; federal, state, and local agencies; and groups potentially interested in or affected by this project for comment during scoping from February 1, 2008 to March 1, 2008. Twelve responses were received; all twelve respondents submitted comments. One response was received after the scoping period had closed. All of these comments were considered and included in the development of significant issues and alternatives. The public involvement file contains copies of the scoping letter and comments and is part of the project record.

Using the comments from the public and other agencies, an interdisciplinary team developed a list of issues to address.

ISSUES

The issues were separated into two types: significant and non-significant issues. Significant issues were defined as those directly or indirectly caused by implementing the proposed action. Non-significant issues were identified as those: 1) outside of the scope of the proposed action; 2) already decided by law, regulation, Forest Plan, or other higher level decision; 3) irrelevant to the decision to be made; or 4) conjectural and not supported by scientific or factual evidence. The Council on

Environmental Quality (CEQ) NEPA regulations require this delineation in Sec. 1501.7, "…identify and eliminate from detailed study the issues which are not significant or which have been covered by prior environmental review (Sec. 1506.3)…" A list of non-significant issues and reasons regarding their categorization as non-significant may be found in the project record.

The Responsible Official identified three significant issues raised during scoping:

Issue #1: A conifer mortality threshold of 0.5 would result in removal of half or more of the large trees that would otherwise survive.

Response: This comment resulted in the Forest Service revising the original proposed mortality threshold of 0.5 to a more conservative level of 0.8 for the Proposed Action (pages 15-16). The discourse of opinion about fire-damaged tree mortality research and application of related marking guidelines also led to the development of Alternative 3.

Issue #2: Direct cambium sampling further damages trees whose survival may be marginal and the subjective nature makes it prone to errors.

Response: This issue led to the development of a design feature that is incorporated into all action alternatives. The Proposed Action will not utilize cambium sampling and Alternative 3 proposes to remove dead trees only.

Issue #3: Leaving heavy fuels untreated, such as the proposed snag retention corridor, will provide excessive ground fuels for the next fire, destroying regeneration along with live remnants of the original stand.

Response: An alternative was considered but eliminated from detailed study which proposed fuels treatments in the snag retention corridor as well as stands that sustained low burn severity (page 8). A comparison of the alternatives includes a discussion of the current and expected post-treatment fire behavior and intensities as it relates to future fuel loading (page 15).

DECISION TO BE MADE

Given the purpose and need, the responsible official will review the proposed action, the other alternatives, and the environmental consequences in order to make the following decision:

Should restoration treatments be implemented in the analysis area?

If so, what restoration treatments would be most appropriate?

Is the proposed project consistent with the Forest Plan, as amended by the SNFPA ROD (2004)?

In addition, the responsible official may decide to invoke specific measures to ensure ecological protection.

ALTERNATIVES

The interdisciplinary team developed alternatives to meet the purpose and need, address significant issues, and create a range of reasonable alternatives. Alternative development was also guided by and is consistent with direction of the LRMP as amended by SNFPA, and NEPA. In addition this project is consistent with the MSA.

Alternatives Considered and Eliminated from Detailed Study

A range of alternatives were considered, of which three were eliminated from detailed study. The eliminated alternatives, along with the rationale for their dismissal, follow:

Retain all snags over 15" dbh for wildlife, while treating dead trees <15"dbh for fuels reduction – Trees < 15" dbh would be felled and treated by lopping, scattering, and/or piling and burning to meet the needs for ground cover and fuel loading. These trees are the ones most likely to fall naturally in the next five to thirty years and begin the decaying process before the larger trees contribute significantly to the surface fuel buildup. Trees over 15" dbh would add to the coarse woody debris over the next 30+ years. The project area would not be available for planting due to the hazard presented by the numerous remaining snags.

This alternative would not meet the need for reduction of fuel loading both to reduce the risk of future high intensity fires and to facilitate future fire management. The retention of larger snags would lead to future fuel loading levels with high volumes of large logs that may preclude the use of prescribed fire or wildland fire use. Wildland fire use or prescribed fire under these conditions could result in killing a significant portion of trees growing on the site; jeopardizing the development of old forest characteristics and increasing the risk of escaped fires. This alternative would also fail to meet the need for the recovery of the economic value of timber killed or severely injured by the fire because it is expected that trees <15" dbh will have deteriorated losing their value as timber. This alternative would delay re-establishment of forest cover for wildlife, and not meet the need to re-establish forested conditions to provide cover in the short-term. Finally, this alternative would not meet the need to provide for the safety of forest visitors and workers, as some of the trees >15" dbh would be considered hazards.

Treat (remove by commercial harvest or felling, piling, and burning) burned trees throughout the fire area (outside wilderness) including the areas that burned at low severity – This alternative was developed in response to significant issue #3 "Leaving heavy fuels untreated, such as the proposed snag retention corridor, will provide excessive ground fuels for the next fire, destroying regeneration along with live remnants of the original stand." In addition to the commercial harvest of trees >15" dbh identified in the Proposed Action, this alternative would include treatment of trees of all sizes in the snag retention corridor and the low severity burn area in the northeast portion of the fire area. Service contracts and Forest Service crews would be used to fell trees and treat the resulting slash by piling and burning and/or jackpot burning to achieve the desired wildlife, soil, and fuels objectives. Specific recommendations were to "cut and dispose of virtually all of the heavy (100 and 1000 hour) fuels in order to give the regenerated stand a chance of long term survival regardless of the possible short term deficit of habitat."

The low burn severity areas that would be treated under this alternative currently have very low fuel loadings (less than 5 tons/acre). A gradual increase in fuel loading and a corresponding increase in fire behavior can be expected over time. However, desirable fire behavior characteristics are predicted well beyond 30 year post Vista Fire without any fuel treatments. There is no need to treat the fuels in the low severity burn areas as fuel load levels are already below desired levels.

This alternative would not meet the needs for the recruitment and retention of both short and long term large down logs and snag habitat to provide sufficient burned forest habitat for dependent species. Also, this alternative would not meet the legal requirements of SNFPA for providing essential snags and downed woody material for soils and wildlife. Therefore, this alternative was eliminated from detailed study.

Harvest burned trees using a low impact Cut-to-Length (CTL) method and/or logging during the winter season to minimize impacts to soil and natural vegetative regeneration – This alternative would treat the same acres as the Proposed Action but would require a different harvest method and/or season. CTLs are often considered for use on fragile or highly compactable soils as a means to reduce the impact of heavy equipment on these soils. CTLs are capable of processing tree boles less than 22" dbh; therefore trees larger than 22" dbh would be left. They also create "slash mats" to drive on, which reduces the impact on soils, but in locations with slow decomposition rates (like the Kern Plateau) these concentrations of slash are a fuels concern. Winter season logging could reduce the soil compaction if the ground remains frozen under the snow.

This alternative would not meet the need for the reduction of long-term fuel loading as trees greater than 22" dbh would be left on site and would increase the surface fuel loading over time as they fall. "Slash mats" left by this logging method would create concentrations of finer fuels that would be mixed with soil, would not readily burn and, therefore, could persist for years. While winter logging has occurred on the Kern Plateau in eastside environments between 6,000 and 7,000 feet elevation, the Vista project area is between 8,000 and 9,000 feet elevation. The need to plow over Sherman Pass to access the project area, the potential loss to wood utilization due to snow depth, and faller/worker safety, as well as the potential damage from hauling on native surface roads during freeze/thaw cycles led the interdisciplinary team to eliminate this alternative from detailed study because it would not meet the need for recovery of the economic value of the timber killed or severely damaged by the fire.

The FS developed three alternatives, including the no action alternative and the Proposed Action, in responding to the significant issues.

Alternative 1 (No Action)

In the no action alternative, no dead and dying tree removal or restoration treatments would occur. Other management activities such as fire suppression, minor road maintenance, and personal use fuelwood cutting would continue. The felling of hazard trees to maintain safe access for visitors and workers would be dependent upon available funding and personnel.

Alternative 2 (Proposed Action)

Alternative 2 is the proposed action as described on pages 4-6 of this document. The treatments proposed are designed to address the needs, and current standards and guidelines in the LRMP as amended by the SNFPA.

Alternative 3

This alternative responds to the needs for the proposed action, and significant issues #1 "A conifer mortality threshold of 0.5 would result in removal of half or more of the large trees that would otherwise survive" and #2 "Direct cambium sampling further damages trees whose survival may be marginal and the subjective nature makes it prone to errors." In this alternative, **only dead trees** (defined as having no green needles) would be marked for removal on 130 acres by ground-based yarding. This alternative would provide approximately 700 thousand board feet of sawtimber.

All other treatment activities described in Alternative 2 would remain the same under this alternative, specifically:

1. Plant by hand approximately 90 acres;
2. Fuels treatments on approximately 143 acres;

3. Contour felling on approximately 5 acres within RCAs;
4. Retain all snags on 68 acres;
5. Construct approximately 1500 feet of temporary roads to access salvage areas; and
6. Remove roadside hazard trees and maintain approximately 3 miles of National Forest System roads that would be used as haul routes for salvaged timber.

Features Common to All Action Alternatives

A conservative approach was used in design of the action alternatives to ensure the sensitivity of the post-fire landscape and to minimize the occurrence of any adverse impacts as part of these restoration activities. Over 70 design criteria were established to guide development of actions and alternatives that would be environmentally, technically, and economically feasible. These criteria are based on: law and regulation; national and regional guidelines; goals, objectives, and standards in the LRMP as amended by SNFPA and scientific commentary including: *Wildfire and Salvage Logging; Recommendations for Ecologically Sound Post-Fire Salvage Management and Other Post Fire Treatments on Federal Lands in the West* (Beschta et al 1995). The following features, integral to the action alternatives, show how design criteria were applied.

- Sixty-six percent of National Forest System (NFS) lands that burned during the Vista Fire would be retained in their post-fire condition. These areas would provide for a "natural" representation of the post-fire landscape.
- Harvest activities will not occur within approximately one-half mile of the Domeland Wilderness boundary.
- A snag retention corridor will be maintained for wildlife dependent on stand replacing events of high tree mortality.
- Mechanical disturbance was avoided on soils with an erosion hazard rating of "high" in design of the action alternatives.
- Retain an average of five or more logs per acre totaling 10-20 tons/acre. Optimum logs are greater than 20 inches diameter at midpoint and greater than or equal to 20 feet long for wildlife habitat and soil enhancement. Do not retain pieces smaller than 12 inches in diameter at mid point to meet this guideline. Small piles of three to five or more cull logs in the 12-20" diameter range may be used where there is inadequate larger material. Use cull logs whenever possible to meet down wood requirements.
- Treat fire-killed trees <15" dbh to reduce residual fuel loading to achieve a desired condition of 10-15 tons/acre of large woody material.
- Fell, lop, and scatter dead trees <15" dbh as needed post-harvest to protect planting crews from hazardous trees.
- Remove hazard trees in accordance with OSHA standards and the Sequoia National Forest Hazard Tree Guidelines for Forest Plan Compliance (2004).
- Hand-grub brush as needed within five years to release planted seedlings from competition.
- Treat all pine stumps greater than 16" with SPORAX to prevent spread of *Heterobasidion annosum*. Apply this fungicide in accordance with labeling directions.
- Close the restoration area to firewood gathering during timber sale and reforestation operations. The area will be re-opened to firewood gathering after timber sale operations are completed and newly planted trees can be protected.

- Use water to reduce dust from road use and protect native surface roads.
- A Streamside Management Zone (SMZ) of 50-75', for ground-based equipment, will be applied to seasonally flowing streams.
- Specifically implement state certified Best Management Practices (BMPs) (see Appendix C).
- Implement all standards and guidelines associated with Riparian Conservation Objectives (RCOs) as described in SNFPA 2004, Appendix A (pg 62-66). See Appendix D: RCO Consistency Analysis.
- Limit detrimental soil compaction (areas with greater than 10% loss of soil porosity) to less than five percent of the area within RCAs.
- Fell, lop, and scatter coarse woody material up to 20 tons per acre within RCAs to trap sediment and facilitate establishment of vegetation.
- Maintain a limited operating period (LOP) prohibiting log hauling on Saturdays and Sundays, on Memorial Day, Fourth of July, and Labor Day holidays, and the Friday preceding the opening of general deer season.
- Maintain a LOP prohibiting activities (except road use and maintenance) within ¼ mile of known spotted owl nest sites during the breeding season (March 1 to August 16) unless surveys confirm that California spotted owls are not nesting. Currently, there are no known spotted owl nest sites within ¼ mile of the proposed treatment boundaries. This LOP would be applied to any spotted owl nest sites that are discovered during project implementation.
- Maintain a LOP prohibiting activities (except road use and maintenance) with ¼ mile of known goshawk nest sites during the breeding season (February 15 through September 15 unless surveys confirm that goshawks are not nesting. Currently, there are no known goshawk nest sites within ¼ mile of the treatment unit boundaries. This LOP would be applied to any goshawk nest sites that are discovered during project implementation.
- Use screening devices for water drafting pumps to minimize removal of aquatic species from aquatic habitats, including juvenile fish, amphibian egg masses, and tadpoles.
- Measures to prevent noxious weed infestation will be enforced and monitored under contract clause B6.35. Equipment will be free of soil, seeds, vegetative matter, or other debris that could contain or hold seeds prior to entering the Sale Area.
- Measures for protection of known cultural properties will be enforced and monitored. A contract clause, Site Specific Special Protection Measures C6.24, would be included in the timber sale contract or similar provision in service contracts and implementation plans to assure that such resource damage during operations is minimized.
- All burning will be conducted under an approved Prescribed Burn Plan in full compliance of California Code of Regulations – Title 17, outlined in the San Joaquin Valley Air Pollution Control Districts. Burn the slash piles outside the tourist season (Memorial Day to Labor Day).

Comparison of Alternatives

Both of the action alternatives propose similar treatments across the Vista Project area, as shown in Table 1 below. Alternative 3 was developed in response to Issues 1 and 2. Under Alternative 2, dead and dying trees (predicted at the 0.8 mortality risk level) would be harvested, while Alternative 3 would harvest only dead trees.

Table 1: Summary of Proposed Activities by Alternative.

	Alternative 1 – No Action	Alternative 2	Alternative 3
Salvage Harvest Trees >15" dbh – ground-based yarding	0 acres	130 acres	130 acres
Fuels Treatment - trees < 15" dbh, including 13 acres of burned plantations	0 acres	143 acres	143 acres
Planting Conifers by hand	0 acres	90 acres	90 acres
Contour felling and other soil stabilization treatments	0 acres	5 acres	5 acres
Snag Retention – Stand-replacing burn area	198 acres	68 acres	68 acres
Roadside Hazard Tree Abatement	3 miles [1]	3 miles	3 miles
Construct and obliterate temporary road	0 miles	1500 feet	1500 feet
Marking guidelines for salvage	None	Dead and high probability of dying	Dead only

[1] The felling of hazard trees to maintain safe access for visitors and workers would be dependent upon available funding and personnel.

As displayed in Table 2, both the action alternatives address the need for the proposal. Both alternatives address the needs for: (1) re-establishing forested conditions in burned stands; (2) recruiting logs and retaining snags for wildlife and old forest habitat; (3) restoring effective ground cover to protect soils; (4) reducing future fuels to facilitate fire management; (5) utilizing the value of the trees to reduce the costs of restoration projects; and (6) reducing safety hazards to the public and forest workers from falling trees.

Table 2: Comparison of Alternatives

	Alternative 1 – No Action	Alternative 2	Alternative 3
Total number of trees per acre >15" dbh	37	37	37
Harvest (trees >15" dbh per acre) on 130 acres. Significant Issues #1 & #2	0	33	29
Volume in MBF (thousand board feet)	0	1,400	700
Estimated Time to Regenerate Conifers (150 trees per acre, 5 years old)	50+ years	5 years	5 years
Estimated Time to Restore Old Forest Habitat	300-500+ years	200-400 years	200-400 years
Snag Recruitment in Vista Fire for Wildlife & Soils (snags/acre)*	20	10	11
Short-Term Effective Soil Cover (%)	50	75	75
Down logs/acre (minimum retained or created in the short term - < 5 years)**	0	5	5
Fuel Accumulation (>8" diameter) Within the Treatment Units in 30 years	40-100 tons/acre	<20 tons/acre	<25 tons/acre
Probability of Using Prescribed Fire as Future Management Tool	Low	High	High
Improvement to Firefighter Safety	No	Yes	Yes
Anticipated Revenue	$0	$22,400	$11,200
Total Treatment Costs	Planning – $70,000	$158,742	$143,826
Anticipated Number of Local Jobs Supported	0	13	7
Relative Safety Risk to the Public and Workers	High	Low along roads; High in snag retention area	Low along roads; Moderate in treatment units High in snag retention area

* Weighted average of dead and dying trees/acre >15" over the entire Vista Fire perimeter incorporating high and low severity areas and proposed removals.
** Five down logs/acre >12" where available for wildlife and soils. Down log creation would be dependent on falling snags in the no action alternative

Under both action alternatives the planting of conifers would reduce the time to re-establish forested conditions, while the retention of down logs, standing live cull trees and fire damaged trees that survive would contribute in the short term to the decaying, fallen log component of future old forests and spotted owl habitat. Retention of 68 acres of burned snags would provide short term burned forest

habitat for dependent species as well as contributing down logs in the future. The slash (limbs, twigs, small boles) from the salvage and fuel treatment activities would contribute effective ground cover in the treated areas. In addition, dead trees would be strategically felled along ephemeral stream courses where erosion is evident to prevent additional sediment from reaching the stream course. The fuel treatment activities would both provide woody material for effective ground cover and reduce the amount and size of future surface fuels. This would allow for greater flexibility in future fire management including the use of prescribed fire and wildland fire use. Both of these alternatives would recover the economic value of timber killed or severely damaged by the fire. According to the *Vista Fire Restoration Project Financial Analysis* (Financial Analysis) (Bergman and Price 2009) the residual value of the dead and dying trees proposed for removal in Alternative 2 is estimated to be $22,400; while the value for the dead trees to be harvested under Alternative 3 is estimated to be $11,200. The costs to implement the Alternatives differ due to the differences in treatments (Alternative 2 = $158,742 and Alterative 3 = $143,826), but the cost associated with planning is common to all alternatives ($55,000). This cost and the cost of felling hazard trees for public safety and road maintenance would be incurred under Alternative 1. By implementing Alternative 2 there would be an estimated 14 cent return for each dollar invested in the project; Alternative 3 would only have an 8 cent return for each dollar invested. The *Vista Fire Restoration Project Financial Analysis* is hereby incorporated by reference. The removal of dead, dying, or structurally unsound trees that could fall onto roads or other areas used for operations would increase the safety of both the public and forest workers. Under Alternative 1 none of the proposed salvage, fuels treatments, or conifer planting would occur, so forested conditions in the fire area would not be re-established for centuries. The soils in the fire area would remain unprotected by soil cover in the short term, and the down log component of wildlife habitat would take years to develop. As dead trees fall over time surface fuel loading would increase with a large proportion of heavy fuels that would increase the risk of another stand-replacing fire. This also would reduce the options for fire management due to the high volume of large down logs and standing snags. Alternative 1 would not recover the economic value of fire killed or damaged timber, nor would it reduce the safety hazards to the public and forest workers from falling trees.

A brief discussion comparing the responsiveness of each alternative to the significant issues follows. Further discussion of each issue can be found in the subsequent section: Environmental Impacts of the Proposed Action and Alternatives on pages 15-29 of this document.

In terms of Issue 1, the level of mortality risk used in the tree marking guidelines for the two action alternatives has varying effects. Alternative 2 uses a mortality risk level of 0.8. This means that prediction of tree death would be correct 95% of the time; prediction of survival is only accurate 63% of the time. This favors leaving additional trees that will die. It is estimated that there is an average of approximately 4 trees per acre over the 130 acre proposed harvest units that are in the category of trees with a few green needles but are damaged to the extent that there is a 95 percent probability of mortality within three years. Salvage of these trees in one entry is more efficient and reduces the need for subsequent entries to capture economic value. Furthermore, it reduces hazards in an area where forest workers will be concentrated during reforestation efforts. The use of mortality guidelines also reduces the need for repeated entries, which could reduce disturbance to wildlife and soils. Alternative 3 would retain severely damaged trees that would provide future snag habitat and would provide large tree legacy elements in the future forested stands.

In terms of Issue 2, the use of direct cambium sampling to determine mortality risk of individual trees could intensify the effects caused by fire-damage. Direct cambium sampling increases the validity of the determination of probable mortality. It does, however, open a wound on the tree and is a time consuming procedure. The effect of the cambium sampling on survival is unknown but may expose

trees that may not die to greater risk. Neither action alternative would use direct cambium sampling to determine mortality risk of individual trees. Alternative 2 would use the following variables to predict mortality risk of fire damaged trees: species, crown injury, bark beetle activity, and size (dbh). Alternative 3 would only remove dead trees (defined as having no green needles).

In terms of Issue 3, leaving heavy fuels untreated could contribute to future stand-replacing fire; both action alternatives treat fuels on 143 acres and retain 68 acres of snag retention corridor. Both of the action alternatives preserve this corridor except for approximately five acres of contour felling of dead trees along the ephemeral stream courses to help reduce sediment movement downhill into the streams. This snag area will recover naturally, therefore the effects of fuel load levels and fire behavior described for Alternative 1 (No Action) for the treatment areas will be the same as those in this snag area. In the short-term (10 years) this area will have less fuel loading that the treatment units. From year 10 to year 20, the snags will fall adding to the chaparral growth to create a fuel model by year 30 that would present the greatest risk to the surrounding treatment units. During the McNally Fire (2002), located approximately one mile north of the Vista Fire, fire burning from the untreated areas of the Flat and Bonita fires (1975 & 1977) burned into areas that were actively managed with salvage harvest and reforestation. The McNally Fire burned much less intensely in these actively managed areas, leaving the young trees damaged but not destroyed. The differences in fuel loading and fuel type between the brush fields and the plantations appeared to moderate fire intensity and slowed the progress of the fire (*McNally/Sherman Pass Restoration Project FEIS (2004), pg. 4-5*). Based on this experience, potential damage to the treatment units from a fire burning through the untreated areas is expected to be along the edges (< 50 feet into the unit).

ENVIRONMENTAL IMPACTS OF THE PROPOSED ACTION AND ALTERNATIVES

Effects relative to significant issues

Issue #1: A conifer mortality threshold of 0.5 would result in removal of half or more of the large trees that would otherwise survive.

The Proposed Action (Alternative 2) was revised and developed to address this issue. Alternative 3 was brought forward to address the concern that mortality guidelines would harvest fire-damaged trees that have potential to survive and recover. Alternative 3 also addresses the concerns in regards to correct application and implementation of mortality guidelines. Alternative 1, no action, does not include any harvesting.

Alternative 2 would use Report # R0-07-01, produced by the Forest Health Protection staff, as Fire Salvage Marking Guidelines. These guidelines are based on the paper, *Delayed Conifer Tree Mortality Following Fire in California*, PSW-GTR-203 (Hood, Smith, and Cluck 2007). Selecting a probability of mortality at the 0.8 level is conservative and retains more fire injured trees. Fire-damaged trees will be assessed by species, crown injury, bark beetle activity, and size (dbh).

Table 3, below, compares and contrasts the mortality thresholds and characteristics for the proposed Yellow (Jeffrey) Pine model. The table displays the differences between mortality thresholds of 0.5 and 0.8 for Yellow Pine. The percent crown length killed (PCLK) is much greater under the 0.8 threshold; therefore, tree crowns must be more severely burned to be marked for removal. For example, a tree with a 20-30”dbh that has red turpentine beetle pitch tubes can be marked for removal using the 0.5 threshold with 30% or greater of its crown length killed, while under the 0.8 threshold, the same tree would require 50% or greater crown kill. Another difference occurs under the percent of correctly predicted survival. The 0.5 threshold correctly predicts survival almost 20 percentage points

better than the 0.8 threshold. This means that under the 0.8 threshold, thirty-seven percent of retained Jeffrey pines will die whereas under the 0.5 threshold, eighteen percent of retained Jeffrey pines will die. Thus the authors' statement that 0.5 mortality threshold provides the most overall accuracy, in this case 87.4%, when applied in the field.

Table 3: Yellow Pine Percent Crown Length Killed (PCLK) by DBH with and Red Turpentine Beetle pitch tubes Present

Probability of Mortality	0.5	0.8
DBH	PCLK	PCLK
<20"	45	60
20-30"	30	50
>30-40"	20	35
>40-50"	5	25
>50-60"	--	10
Correctly Predicted Mortality (%)	88.9	94.7
Correctly Predicted Survival (%)	82.3	63.4
Total Correct (%)	87.4	82.6

In restoring and rehabilitating burned areas, the Forest Service recognizes the need to take advantage of the natural capacity of trees to recover from fire damage. Leaving trees that would survive offers a chance to retain a native seed source and the possibility of natural regeneration. Fire-damaged tree survival is influenced by the following: 1) season of burn, 2) growth rate, 3) site, 4) crown damage, 5) (bole) cambium damage, 6) fuel concentrations at root collar, 7) rooting in shallow soils, 8) bark beetle attack, 9) cone production, and 10) drought stress.

The research conducted by Hood, Smith, and Cluck (2007) (PSW-GTR-203) provide the best available estimate of mortality. The mortality models have been developed with full consideration of available literature, ongoing studies, and the professional judgment of people with many years experience. Modifications and changes to guidelines for California, by both field personnel and academic researchers, have been ongoing for decades, primarily beginning with Wagener's study in 1961. Estimating mortality is a professional endeavor based on the best available science, which is evolving.

A scoping comment stated that there was evidence indicating much higher survival rates at high crown scorch and cambial kill levels than previously believed by the Forest Service. A review of studies that predict tree death investigated post-fire mortality using a variety of methods to directly and indirectly measure fire damage to tree tissue. As yet, no consensus has developed on which methods are most accurate or practical in predicting short-term post-fire mortality. This lack of consensus is due in part to confounding issues related to studies themselves, such as differences in study sites (which ranged across eight western states), pre- and post-fire environments, varying fire severities and seasonality, plus differences in tree sizes and stand densities (Fowler and Hull, 2004).

The basis for Alternative 3 is that each tree that survives a fire is important to restoration. Therefore this alternative removes only dead trees and does not consider the probability of survival.

The effects of the fire reduced habitat suitability for 198 acres to the point that these stands will not provide nesting or denning habitat for sensitive species for a minimum of 100 years and likely for a much longer period. There is limited research that spotted owls may still use burned forests for foraging for a short time after the fire. Retention of the additional 4 trees per acre does not appear to make a significant difference in terms of use by old forest dependent sensitive species since canopy

cover will still be well below threshold for use even for foraging. Some species appear to prefer unsalvaged high density burned snags, such as black-backed woodpeckers. This habitat is provided in the 68 acre unsalvaged portion of the Vista Fire and nearby thousands of acres of unsalvaged burned forest habitat in the Manter and McNally fires. Salvaged burned forests appear to benefit other species such as bluebirds. A study of snag density and bird use (Raphael and White (1984) indicates that avian populations may show small increases up to 15 snags/ hectare (6 snags/ acre), but 95 percent of the maximum diversity and numbers were found at 4 snags/ hectare (1.5-2 snags/ acre). The retention of additional green trees even for a short time could provide seed sources that would aid natural regeneration of the forest. However the contribution of 4 severely damaged trees per acre, which are highly likely to die within three years, is not likely to make a significant difference in regeneration. Due to the severity of the loss of forest, the Forest would plant trees in the salvaged area regardless of which action alternative is chosen. So, the significance in terms of regeneration and restoration of the forest is likely marginal.

Direct and Indirect Effects

Alternative 2 would remove 29 dead trees and 4 dying trees per acre (based on pre-cruise data) under the 0.8 mortality threshold while Alternative 3 would remove only the 29 dead trees per acre.

As described for Jeffrey pine above, five percent of the Jeffrey pines marked for removal would have lived and 37% of Jeffrey pines left as unmarked leave trees would die. Ultimately, Alternative 2 by applying Report #R0-07-01, at the proposed 0.8 level, minimizes the chance of trees being cut which might otherwise have survived, while accepting a relatively high probability of many additional trees which do not meet the guidelines subsequently dying. By removing dead only Alternative 3 provides maximum protection to fire damaged trees and provides the opportunity to produce a cone crop and/or survive.

The effects of harvesting or leaving 4 trees per acre (>15”), is minor as it relates to specific resource areas. The dying trees proposed for harvest under Alternative 2 are not likely to survive. There is little chance for retained trees to reproduce and/or provide canopy cover since by definition they are severely damaged and sparsely distributed. Alternative 2 would have slightly higher soil cover in the short term but also a slight increase in <3” diameter hazardous fuels. By using a higher mortality threshold, as previously stated, many of the fire damaged trees not meeting the marking guidelines will die and create reserve of snag recruitment and legacy structures that would benefit some wildlife in the short term and slightly increase fuel loading in the long term. Alternative 3, by removing dead trees only, would likely double snag recruitment within the harvest units and increase long-term fuel loading. Removing dead only would provide more short term benefit to wildlife species which prefer a higher snag density but it would also leave slightly higher fuel loading both in the short- and long-term..

Alternative 2 would use one entry to harvest severely damaged trees that in all likelihood, based on local and scientific knowledge, will die. Alternative 3 could lead to the need for multiple entries to treat additional dead trees after each wave of mortality. The McNally Fire Hazard Tree Abatement EA and the McNally/ Sherman Pass Restoration Project EIS decisions allowed removal of dead trees only (defined in this case as having no green needles), which subsequently required multiple entries and contracts to remove delayed mortality for up to 5 years post-fire. Treating dead trees without harvesting them represents an opportunity lost to capture the economic value while increasing the costs to implement the treatments.

Cumulative Effects
The magnitude of the direct and indirect effects of applying mortality guidelines to the marking prescriptions is so small that any cumulative effects of this action are not measurable.

Issue #2: Direct cambium sampling further damages trees whose survival may be marginal and the subjective nature makes it prone to errors.
The Proposed Action (Alternative 2) would not utilize marking guidelines that require direct sampling of the cambium. Alternative 3, harvesting of dead trees only (i.e.-no green needles), would have no need to sample the cambium during harvest tree designation. Alternative 1, no action, does not include any harvesting.

Issue #3: Leaving heavy fuels untreated, such as the proposed snag retention corridor, will provide excessive ground fuels for the next fire, destroying regeneration along with live remnants of the original stand.
An alternative addressing this issue was considered but eliminated from detailed study as described on pages 8-9 of this document. In addition, in terms of significant issue #3, both of the action alternatives propose to treat fuels on approximately 143 acres to reduce heavy fuels over the long-term while providing down logs and snags in the short-term. Alternative 1, no action, does not treat fuels or salvage trees in the Vista Fire area.

Most of the western half of the fire area burned at high intensity. This area included a crown fire that resulted in a stand-replacing event (greater than 75 percent mortality of standing trees) covering approximately 198 acres. The eastern half of the fire burned at lower intensity, generally resulting in a mosaic of low to moderate mortality of standing trees. The low-severity underburn generally produced positive results by reducing surface fuels and creating small gaps providing openings for early seral and snag habitat for wildlife as well as regeneration of the forest over time. Approximately 68 acres of the area that burned at high intensity is located on steep, rocky soils with high erosion hazard rating making them inoperable for salvage operations, unsuitable for replanting, and creating an opportunity for snag reserve area. This area is located in the south central portion of the Vista Fire area with proposed treatment units to the west and north. Both of the action alternatives would retain this area untouched except for approximately five acres of contour felling of dead trees along the ephemeral stream courses to help reduce sediment movement downhill into the streams. This snag area will recover naturally, therefore the effects of fuel load levels and fire behavior described for Alternative 1 (No Action) for the treatment areas will be the same as those in this snag area.

Direct Effects
According to the *Fuels Specialist Report for the Vista Fire Restoration Project* (Fuels Report), (Yearwood 2009) current fuel loadings in the Vista Fire area are less than 5 tons/acre; therefore, the fire area would act as a barrier or be resistant to fire spread for at least the first 10 years without treatment (Alternative 1, no action). In order to meet standards and guidelines for ground cover and large woody material (SNFPA ROD pg. 51), the treatments proposed in Alternatives 2 and 3 would result in 10 to 15 tons/acre of large woody material and less than 5 tons/acre of 0 to 3-inch diameter woody material left within the proposed treatment units. Due to this additional fuel load in the proposed treatment units these areas would be more flammable in the short-term (10 years post Vista Fire) than if left untreated but will still meet the standards and guidelines in SNFPA ROD pg. 49-50.

Indirect Effects
Without any restoration actions, Alternative 1, the fuels would change to young fire resistant chaparral with large volumes of the fallen, fire killed trees beneath the chaparral canopy by 20 years post Vista Fire. By year 30, the chaparral would be mature enough to support active fire. The combination of the

mature chaparral with the estimated 40 to 100 tons/acre of fire killed trees on the ground would result in greater than 65% of the proposed treatment acres exceeding fire behavior threshold limits as defined in the Fuels Report. This means that any trees and plantations that survived the Vista Fire would be at risk of destruction by a stand-replacing fire. By year 100 after the Vista Fire decay would finally reduce the high fuel loadings to the point that they do not contribute to the expected fire behavior. The high mortality conifer areas left by the Vista Fire at this point would be chaparral fields.

Under Alternative 2, young fire resistant chaparral and plantation trees would dominate the proposed treatment units by 20 years post fire. At least 96% of the proposed treatment acres would be at or below threshold levels. By 30 years post fire, the number of acres that exceed threshold levels increases because the chaparral would be mature enough to support active fire spread. The plantations would be at risk starting around 30 years post fire until the trees are old and tall enough to withstand a surface fire (50 to 75 years). By 100 years post fire, the plantations would transition into a conifer forest and at least 85% of the proposed unit areas would be at or below fire behavior threshold limit.

The Fuels Report states that by implementing either of the action alternatives, the existing and proposed plantations would have a high probability of surviving another wildland fire based on FlamMap results showing that most of the fire behavior characteristics would be at or below threshold limits most of the time. It was found that plantations within the McNally Fire perimeter had good survival when the fuel treatments, similar to those proposed in the action alternatives, were completed. The greatest risk to the plantations occurs around 30 years post fire and lasts until the trees are tall enough to survive a surface fire. At 30 years, the plantations are being modeled as a chaparral field and would probably suffer high mortality should a wildfire burn through the area when conditions exceed the 90th percentile fire weather conditions.

Another factor that will affect the plantation survival in the action alternatives is the 68 acre snag corridor. The FlamMap Analysis in the Fuels Report indicates this would be a hot spot adjacent to existing and proposed plantations. The fringes of these plantation would be at risk starting after year 10. After year 10 but before year 20, these fire killed trees will fall to the ground and become available fuel for a future wildfire that would produce high heat energy and not only adversely impact the fringes of plantations but any surviving trees adjacent to the snag corridor.

Alternative 3 would have similar indirect effect as Alternative 2 but the existing and proposed plantation would be at slightly higher risk to wildfire than Alternative 2 because of the potential for delayed mortality creating pockets of high fuel loading along the fringes of some units. The Fuel Report states the there could be up to 5 acres of these pockets of high fuel loading that could occur as additional trees die.

Cumulative Effects

Alternative 1, No Action, would not reduce future fuel loading and potential fire behavior within the Vista Fire perimeter. This alternative would not help reduce future potential fire behavior on a landscape scale when combined with other fuels reduction projects such as: Blackrock Hazard Tree Removal, McNally Roadside Hazard Tree Abatement, Manter Restoration, and the McNally Fire/Sherman Pass Restoration. All of these other projects either reduce roadside fuel loading along primary fire control points (roads) and/or help fragment the future heavy fuel loadings that are anticipated as the fire killed trees in the Manter, McNally, and Vista Fires fall to the ground. Also, the existing plantations that survived the Vista Fire will be at risk from wildfire or wildland fire use as the fuel loading increases in and around them.

There have been several large fires in the immediate area of the Vista Fire: 1950 Boone Fire, 1975 Flat Fire, 1977 Bonita Fire, 2000 Manter Fire, and 2002 McNally Fire. The recent Manter and McNally

Fires burned approximately 225,000 acres and less than 2,500 acres received any fuels treatments. The Vista Fire high mortality areas would result in heavy fuel loading that would combine with those in the Manter and McNally Fires. In 15 to 30 years, the acreage of high fuel loading across the Kern Plateau from these incidents has the potential for high intensity fires with a high resistance to control. These conditions would not only make suppression of unwanted fires more difficult but it would make the use of future prescribed fire and wildland fire use riskier and more difficult.

Alternative 2 would reduce future heavy fuel loading and potential fire behavior not only within the Vista Fire perimeter but on a landscape scale when combined with other fuels reduction projects such as: Blackrock Hazard Tree Removal, McNally Roadside Hazard Tree Abatement, Manter Restoration, and the McNally Fire/Sherman Pass Restoration. All of these projects either reduce roadside fuel loading along primary fire control points (roads) and/or help fragment the future heavy fuel loadings that are coming as the fire killed trees in the Manter, McNally, and Vista Fires fall to the ground. By keeping roads open with low fuel loadings and breaking up the fuel continuity, the probability of successful management of future fire uses, prescribed fires, and/or control of unwanted wildfires would increase.

Alternative 3 would be the same as Alternative 2 except there will be slightly higher fuel loadings resulting from delayed mortality that will make the implementation of wildland fire uses slightly more difficult. Also, the higher fuel loads may increase the risk to the existing and planned plantations by wildfire or fire use.

Effects relative to significance factors

Beneficial and adverse impacts: The Vista Fire Restoration project is a site-specific project and was analyzed within the context of a portion of the Trout Creek watershed. Based on the specialist reports summarized in the following discussion all the impacts from this project would be minimal. In terms of context and intensity, none of them would be significantly beneficial or adverse as discussed under the cumulative effects analysis summarized on pages 24-27 of this document. As described under the need for the proposal, the Vista Fire resulted in adverse effects to forest resources such as soil, riparian areas, wildlife habitat, and numerous fire-killed trees. The magnitude of adverse effects of the Vista Fire itself would be partially offset or reduced by the beneficial effects of the proposed activities under either action alternatives for the Vista Fire Restoration Project.

The degree to which the proposed action affects public health or safety: The removal of dead, dying, or structurally unsound trees that could fall onto roads or other areas used for operations would increase the safety of both the public and forest workers in both action alternatives. Alternative 2 would also remove dead and dying trees from the treatment units, thus reducing the hazard to the public and forest workers from falling trees across the landscape, not just along roads. Alternative 3 would only remove dead trees in the treatment units, leaving the dying trees that could become future hazards. Preventative measures to minimize the emissions of smoke and particulates during harvest, road maintenance, and burning activities are included in the action alternatives. Water or other dust palliatives would be used to abate dust on Forest Service roads during road maintenance and hauling. Smoke management requirements enforced by the San Joaquin Valley Air Pollution Control District (SJVAPCD) would be met. These requirements would reduce the direct and indirect effect to public health and safety during project implementation. The proposed salvage and fuels reduction activities under Alternatives 2 or 3 would have beneficial impacts on health and safety in the project area over the next several decades. These treatments would reduce the magnitude of predicted fire behavior

characteristics (e.g., flame lengths <4 feet; fire line intensity < 100 BTU/ft/second; and rate of spread < 5 chains/hour) enhancing firefighter safety and, therefore, the ability to provide for public safety. The completed project would reduce the risk of a stand-replacing wildfire in the project area for an estimated thirty years or more.

Trees deemed to be an imminent hazard would be felled under Alternative 1, but the proactive felling of trees that could die and become a hazard in the future would not occur as it would in Alternatives 2 and 3. Therefore, under Alternative 1 the felling of hazard trees would take multiple entries over a number of years, potentially subjecting the public and forest workers to hazardous trees in the interim between entries. There could be measurable negative impacts on health and safety in the project area in the event of a stand-replacing wildfire. During a fire of this magnitude there could be dense smoke and rolling burning debris posing health risks. The magnitude of fire behavior characteristics (as described above) would result in the need to modify fire suppression tactics to provide for firefighter safety; this could lead to larger fire size that could threaten the Sherman Pass Road (22S05) corridor disrupting traffic patterns in the project area and vicinity. These impacts would be expected to be fairly long term; several years to a few decades.

Unique characteristics of the geographic area: The Vista Fire Restoration Project is not near park lands, prime farmlands, wild and scenic rivers, or wetlands. There are no known historic or cultural resources within the project area. Past surveys, however, recorded five prehistoric sites within one-half mile of the project area. The project area is within the Trout Creek Critical Aquatic Refuge (CAR) designated by SNFPA 2001 and affirmed in SNFPA 2004. The *Watershed Working Papers for the Vista Fire Restoration Project* (Watershed Paper) (Stewart 2009) documents the determination that no adverse effects would be expected as a result of the action alternatives on beneficial uses for which the CAR was established. The Vista Fire burned 75 acres in the Domeland Wilderness. No treatments are proposed within or adjacent to the wilderness. Therefore, the Vista Fire Restoration Project would not affect the wilderness area.

The degree to which the effects on the human environment are likely to be highly controversial: The authors of "*Wildfire and Salvage Logging; Recommendations for Ecologically Sound Post-Fire Salvage Management and Other Post-Fire Treatments on Federal Lands in the West*", R.L. Beschta, C.A. Frissell, R. Gresswell, and others. 1995. Oregon State University (Beschta Report), "*Post-fire Management on Forested Public Lands of the Western United States*", R.L. Beschta, J.J. Rhodes, J.B. Kauffman, R.L. Gresswell, and others, 2004, and "*The Effects of Post-fire Salvage Logging on Aquatic Ecosystems of the American West*", J.R. Karr, J.J. Rhodes, W. Minshall, and others, [including R.L. Beschta], 2004, address general principles and recommendations concerning post fire salvage as well as their arguments against this practice in general. The papers are intended as generally applicable to federal lands throughout the western United States and are not focused on the specific ecological, social, and economic characteristics of the Vista Fire on the Kern Plateau of the Sequoia National Forest or the Sierra Nevada. The Sequoia National Forest considered the authors' suggested principles and recommendations in the context of site specific conditions as well as conflicting opinion in McIver (2001) when considering the appropriate direction for the Vista Project.

The task of the interdisciplinary team assigned to the Vista Project was to identify and evaluate ecological, social, and economic issues, including those raised by the Beschta and Karr papers associated with management needs addressed in the Environmental Assessment. Unlike the authors of these papers, the team's task was to evaluate these issues in the specific context of the post-fire conditions of the Vista Fire and the goals and objectives of SNFPA. The results of their work are documented in this Environmental Assessment.

The immediate effects of management in a post-fire environment depend on several specific features of the burned stands, including the severity of the burn, slope, soil texture and composition, the presence or building of roads and post-fire weather (McIver 2001). The extent to which logging exacerbates soil, sediment, and hydrological problems in a post-fire landscape depend on the site characteristics, logging methods and whether new roads are needed (McIver 2000). The potential impacts of management activities on sensitive sites are important considerations in this decision.

It is well understood that the harvest of trees may lead to increased erosion, soil compaction, loss of down wood, and soil fauna. However, the extent to which these effects occur depends upon a variety of factors such as specific site conditions, the methods used, the timing of these activities, and their duration. Harvest methods would be conducted at particular times of the year and for limited duration, resulting in very little impact to erosion rates, soil compaction, soil fauna, or sediment production. In addition, the Forest Service has prescribed the amount of large and small wood to be left on site to achieve various objectives including erosion control, soil productivity, nonsymbiotic nitrogen fixation, mycorrhizal functions, and wildlife habitat.

Both action alternatives were designed to mitigate adverse effects of logging on soil, watersheds, and wildlife and to provide adequate nutrients for future tree growth, microbial activity and nitrogen fixation (see design criteria listed on pages 10-11). The fuel reduction activities of the action alternatives would not permanently impair the productivity of the land or irreversibly damage soil, slope, or other watershed conditions. Moreover, the combined fuel reduction and watershed improvement activities would positively contribute to the maintenance and enhancement of beneficial uses of watersheds within the burned area.

The action alternatives comply with the National Forest Management Act requirement to “insure that timber will be harvested from National Forest System lands only where soil, slope, or other watershed conditions will not be irreversibly damaged.” The alternatives are consistent with LRMP, Pacific Southwest Region Soil Quality Standards, and SNFPA.

In addition to the literature that provides a wide range of opinions and science on the issue, the Sequoia National Forest has a long history of post fire management that can shed some light on anticipated local effects. The 1970 Red Mountain Fire burned approximately 26,000 acres in the Greenhorn Mountains to the west. Most of the merchantable timber within the fire was salvaged and an aggressive reforestation program was initiated. After over thirty years of management, plantations within the fire area are 30 to 40 feet tall and have achieved a density that appears to support at least anecdotal reports of foraging fishers. Adjacent areas within the fire that were not reforested support few conifers and have little cover or potential to develop tree cover in the near future. The 1990 Stormy Fire burned approximately 21,000 acres also in the Greenhorn Mountains. Within the Stormy Fire large patches of unsalvaged dead trees were left for wildlife habitat, riparian corridors and sensitive plant habitat. These areas were generally not planted due to concern for forest worker safety. These untreated areas exhibit high volumes of down woody debris that do not meet desired conditions for fuels management identified in the SNFPA, exhibit conditions that have a high resistance to control, high potential for spotting and escape fires in the event of new fires occurring in the immediate area. The high volumes of snags and down woody debris limit options for fire management including the restoration of wildland fire as a dynamic tool in forest restoration. Large down logs and snags were a factor in fire spread and intensity in portions of the McNally Fire that reburned the Flat (1975) and Bonita (1976) fires. Post fire salvage activities within the Sequoia National Forest have been subject to post project evaluation of effectiveness of the implementation of Best Management Practices to minimize or prevent sediment transport and compaction of soils. The monitoring program has shown that when properly applied these practices have been effective in meeting their intended purpose.

Although there is some concern and controversy as stated by Bestcha and others regarding the effects of post fire salvage logging, the Sequoia National Forest has addressed these issues through site specific implementation of appropriate mitigation measures and review of past projects. The Vista Fire Restoration Project maintains components for an ecologically defensible salvage policy as prescribed in, "Salvage Logging, Ecosystem Processes, and Biodiversity Conservation", D.B. Lindenmayer and R.F. Noss. 2006. Conservation Biology.

Report # R0-07-01, produced by the Forest Health Protection staff, will be used as Fire Salvage Marking Guidelines. Guidelines are based on the paper, *Delayed Conifer Tree Mortality Following Fire in California*, PSW-GTR-203 (Hood, Smith, and Cluck 2007). This research monitored the survival 5,246 fire-injured trees in five wildland fires that occurred across California between 1999 and 2002. This dataset includes 3,693 trees from the McNally Fire, which burned to within one mile of the Vista Fire area. Thus some of the sample directly equates to local environmental conditions. Fire-damaged trees will be assessed by species, crown injury, bark beetle activity, and size (dbh).

In restoring and rehabilitating burned areas, the Forest Service recognizes the need to take advantage of the natural capacity of trees to recover from fire damage. Leaving trees that would survive offers a chance to retain a native seed source and the possibility of natural regeneration. Fire-damaged tree survival is influenced by the following: 1) season of burn, 2) growth rate, 3) site, 4) crown damage, 5) (bole) cambium damage, 6) fuel concentrations at root collar, 7) rooting in shallow soils, 8) bark beetle attack, 9) cone production, and 10) drought stress.

Research conducted by Hood, Smith, and Cluck (2007) provide the best available estimate of mortality. The mortality models have been developed with full consideration of available literature, ongoing studies, and the professional judgments of people with many years experience. Modifications and changes to guidelines for California, by both field personnel and academic researchers, have been ongoing for decades, primarily beginning with Wagener's study in 1961. Estimating mortality is a professional endeavor based on the best available science, which is evolving.

A scoping comment stated that there was evidence indicating much higher survival rates at high crown scorch and cambial kill levels than previously believed by the Forest Service. A review of studies that predict tree death investigated post-fire mortality using a variety of methods to directly and indirectly measure fire damage to tree tissue. As yet, no consensus has developed on which methods are most accurate or practical in predicting short-term post-fire mortality. This lack of consensus is due in part to confounding issues related to studies themselves, such as differences in study sites (which ranged across eight western states), pre- and post-fire environments, varying fire severities and seasonality, plus differences in tree sizes and stand densities (Fowler and Hull, 2004).

The degree to which the possible effects on the human environment are highly uncertain or involve unique or unknown risks: The Vista Fire Restoration Project proposes resource management activities under similar circumstances to numerous other projects that have been successfully implemented for many years. The timber salvage, fuels reduction, and planting activities proposed under the action alternatives are designed to re-establish forest conditions, improve public safety by reducing falling hazards and fuels, and reduce the potential of large intense fires burning through the project area. However, under Alternative 1 the removal of hazard trees would be completed by Forest Service crews on an intermittent basis (as funding and personnel are available), which could pose uncertain risks to forest visitors and firefighters from falling trees. The nature and magnitude of the effects to the human environment from implementing one of the action alternatives of the Vista Fire Restoration Project are well understood and do not pose highly uncertain, unique or unknown risks.

The degree to which the action may establish a precedent for future actions with significant effects or represents a decision in principle about a future consideration: All of the proposed management practices under the Vista Fire Restoration Project have been conducted both separately and in various combinations within similar landscapes and vegetation types – notably the McNally/Sherman Pass Restoration Project; one mile north of the Vista Fire area. These management practices, as well as the project objectives, are envisioned by the goals of the LRMP as amended and are consistent with applicable standards and guides, as noted below. Therefore the precedent for this proposal (as well as the action alternative) is already well established.

Regarding the potential for significant effects, the Sequoia National Forest has implemented such practices for many years. Projects are designed with protection measures to prevent such effects from occurring. Based upon the analysis of the proposed action and action alternative, as documented herein, none of the proposed activities should result in significant effects.

Whether the action is related to other actions with individually insignificant but cumulatively significant impacts: In order to understand the contribution of past actions to the cumulative effects of the proposed action and alternatives, this analysis relies on current environmental conditions as a proxy for the impacts of past actions. This is because existing conditions reflect the aggregate impact of all prior human actions and natural events that have affected the environment and might contribute to cumulative effects. This analysis approach was taken to assure the inclusion of all the residual effects of past human actions and natural events, regardless of which particular action or event contributed to these effects, and allows the analysis to "concentrate on the issues that are truly significant to the action in question" 40 CFR § 1500.1(b). Also, public scoping for this project did not identify any public interest or need for detailed information on individual past actions. Finally, on June 24, 2005, the Council on Environmental Quality (CEQ) issued an interpretive memorandum regarding analysis of past actions, which states, "agencies can conduct an adequate cumulative effects analysis by focusing on the current aggregate effects of past actions without delving into the historical details of individual past actions." The CEQ memorandum "Guidance on Consideration of Past Actions in Cumulative Effects Analysis" June 24, 2005, quoted above, is incorporated by reference. For these reasons, the analysis of past actions in this section is based on current environmental conditions.

Reasonable foreseeable actions consist of the Blackrock Roadside Hazard Tree Removal Project.

Vegetation – According to the *Silviculture Report for the Vista Fire Restoration Project* (Silviculture Report) (Bergman and Powell 2009) the effects of Alternative 1 in the Vista Fire Restoration Project area are that old forest attributes such as large trees, a high percentage of canopy cover, and a diverse tree species mix would take much longer to develop in the area of high tree mortality than if no action were taken to reduce woody fuels and plant trees within the area of the stand replacing event. Damage to residual trees and natural regeneration is likely if another fire were to occur before the trees become fully re-established.

Alternative 1 would result in long term loss of tree growth because dead trees and shrubs, rather than live trees, would occupy the area for decades. The effect would be that a much longer period of time would be required to return to an old forest condition. Likewise, the chance of lasting effects to tree densities is increased with this alternative because of an increased chance of future wildfire escaping initial attack without the fuels reduction treatments.

The action alternatives are expected to re-establish canopy cover in areas of high tree mortality. This would provide a variety of individual structures such as large live trees, snags, and downed logs; provide horizontal heterogeneity visible in structural patches, including canopy gaps and areas of high

stem densities. In the event of another fire, the reduction in long-term fuel loading resulting from these projects is expected to aid in the survival of the remaining live trees in treated areas. The *Silviculture Report for the Vista Fire Restoration Project* is hereby incorporated by reference.

Wildlife BE/BA – The *Biological Evaluation and Assessment for the Vista Fire Restoration Project* (Wildlife BE) (Anderson 2009) documents that no federally listed Threatened, Endangered or species proposed for listing are affected by the proposed action or action alternatives. The Pacific fisher, California spotted owl, northern goshawk, Kern Plateau slender salamander, California golden trout (hybrids), and Townsend's big-eared bat are Forest service sensitive species found in the area. The BE/BA determines that all alternatives would meet Regional direction for sensitive species and therefore, there would be no significant adverse effects to these species. The *Biological Evaluation and Assessment for the Vista Fire Restoration Project* is hereby incorporated by reference.

Management Indicator Species – Management Indicator Species (MIS) for the Sequoia National Forest are animal species identified in the Sierra Nevada Forests Management Indicator Species (SNF MIS) Amendment Record of Decision signed December 14, 2007. The habitats, ecosystem components and associated MIS analyzed for the project were selected from this list of MIS, as indicated in the *Management Indicator Species Report for the Vista Fire Restoration Project* (MIS Report) (Anderson 2009). The following habitats occur within or adjacent to the Vista Project area, but are not affected by the proposed treatments: shrubland; riparian; late-seral closed-canopy coniferous forest. Management indicator habitats that may be affected by the project include: snags in burned forest, snags in green forest and early or mid seral coniferous forest habitats. These habitats are not in short supply since the McNally and Manter fires have created very large blocks of burned snag, early and mid seral coniferous forest habitat. Areas within these fires and the Vista fire that burned at low intensity resulted in high numbers of snags in green forest in the immediate and surrounding area. Tree mortality within the Kern Plateau and surrounding area has been exacerbated by several years with low snow pack (as low as 30% of average in 2007), and a high incidence of disease and insect attack. It was determined that the proposed project and action alternatives would have very little effect on availability of high quality habitat with these components. The *Management Indicator Species Report for the Vista Fire Restoration Project* is hereby incorporated by reference.

Soils – According to the *Soil Working Papers for the Vista Fire Restoration Project* (Soil Analysis) (Linton and Bergman 2009) both of the action alternatives (Alternatives 2 and 3) would enhance soil organic cover (by adding topwood and limbwood from standing dead trees) and help prevent excessive topsoil erosion. Under both action alternatives, remaining live trees, standing dead snags, and delayed tree mortality would serve as future sources of needed soil organic cover/matter.

The granitic coarse textured soils in the project area are not particularly susceptible to compaction. Also, most of these soils have a significant component of coarse gravel fragments, which inhibits compaction as well. However, detrimental soil compaction and displacement can occur on the main skid trails with multiple passes by mechanical equipment. Field transects indicate a low density of previous existing soil disturbance within the treatment units. Under both action alternatives, any skid trails present from previous timber operations would be re-used to minimize new soil disturbance or displacement. Also both action alternatives, as a design feature, avoid mechanical entry where soil is designated with a "high" erosion hazard rating.

The implementation of best management practices and treatment layout would make it possible to implement either action alternative while conserving soil organic matter cover and minimizing soil disturbance, thus preventing detrimental soil compaction and soil displacement/erosion. Both action alternatives for the Vista Fire Restoration Project will be consistent with soil conservation and

productivity guidelines. Alternative 1 (No Action) would be consistent with these guidelines as well, but would provide less soil cover and downed woody material in the short-term. The *Soil Working Papers for the Vista Fire Restoration Project* is hereby incorporated by reference.

Watershed – Based on the *Hydrology Working Papers for the Vista Fire Restoration Project* (Hydrology Report) (Stewart 2009) the cumulative watershed effects (CWE) analysis shows that implementing the action alternatives would improve the condition of the subwatersheds analyzed and reduce the impacts caused by the Vista Fire. The CWE model shows that in the year 2011 the No Action (Alternative 1) would average 238% over the threshold of concern (TOC) whereas Alternatives 2 and 3 would average 123% over the TOC for Boone Meadow Creek and Unnamed Tributary respectively. If the No Action alternative is implemented these subwatersheds would average 1,913% over TOC for 2009 versus 986% over TOC under the action alternatives for this calendar year.

Alternative 1 (No Action) has a higher potential to impact water quality, stream stability, temperature, and soil displacement than the proposed restoration activities under the action alternatives. This is a result of the Vista Fire. Currently ground cover percentages within the fire area are low, ash and fine material are high, and surface roughness is very smooth with low levels of woody debris. Also decreased rain water interception increases the potential for sedimentation to the creek that would be perpetuated under the No Action alternative. The Cumulative Watershed Effects for the No Action Alternative are over threshold as a result of the Vista Fire. Past fires, recreational activities, naturally occurring landslides and existing roads contribute to cumulative watershed impacts.

Alternatives 2 and 3 reduce CWE. CWE for these alternatives indicates the subwatersheds would be over threshold; however, there is no net increase in CWE from the proposed treatments. CWE potential is lower under these alternatives because of increases in soil organic cover, water holding capacity, and soil roughness. These factors increase the potential for soil to stay onsite and not be deposited to nearby drainages thus promoting a quicker return to pre-fire conditions. The *Hydrology Working Papers for the Vista Fire Restoration Project* is hereby incorporated by reference.

Fuels – According to the *Fuels Specialist Report for the Vista Fire Restoration Project* (Fuels Report), (Yearwood 2009) current fuel loadings in the Vista Fire area are less than 5 tons/acre; therefore, the fire area would act as a barrier or be resistant to fire spread for at least the first 10 years without treatment (Alternative 1, no action). Treatments proposed in Alternatives 2 and 3 would result in 10 to 15 tons/acre of large woody material and less than 5 tons/acre of 0 to 3-inch diameter woody material left within the proposed treatment units. Because of the additional fuel load in the proposed treatment units these areas would be more flammable in the short-term (10 years post Vista Fire) than if left untreated.

Without any restoration actions (Alternative 1) the fuels would change to young fire resistant chaparral with large volumes of the fallen, fire killed trees beneath the chaparral canopy by 20 years post Vista Fire. By year 30, the chaparral would be mature enough to support active fire. The combination of the mature chaparral with the estimated 40 to 100 tons/acre of fire killed trees on the ground would result in greater than 65% of the proposed treatment acres exceeding fire behavior threshold limits as defined in the Fuels Report. This means that any trees and plantations that survived the Vista Fire would be at risk of destruction by a stand-replacing fire. By year 100 after the Vista Fire decomposition would ultimately reduce the high fuel loadings to the point that the contribution to the expected fire behavior is negligible. The high mortality conifer areas left by the Vista Fire at this point would be chaparral fields.

Under Alternative 2, young fire resistant chaparral and plantation trees would dominate the proposed treatment units by 20 years post fire. At least 96% of the proposed treatment acres would be at or

below threshold levels. By 30 years post fire, the number of acres that exceed threshold levels increases because the chaparral would be mature enough to support active fire spread. The plantations would be at risk starting around 30 years post fire until the trees are old and tall enough to withstand a surface fire (50 to 75 years). By 100 years post fire, the plantations would transition into a conifer forest and at least 85% of the proposed unit areas would be at or below fire behavior threshold limit.

The Fuels Report states that by implementing either of the action alternatives, the existing and proposed plantations would have a high probability of surviving another wildland fire based on FlamMap results showing that most of the fire behavior characteristics would be at or below threshold limits most of the time. It was found that plantations within the McNally Fire perimeter had good survival when the fuel treatments, similar to those proposed in the action alternatives, were completed. The greatest risk to the plantations would occur around 30 years and last until the trees are tall enough to survive a surface fire. At 30 years, the plantations are being modeled as a chaparral field and would probably suffer high mortality should a wildfire burn through the area when conditions exceed the 90th percentile fire weather conditions. The *Fuels Specialist Report for the Vista Fire Restoration Project* is hereby incorporated by reference.

Sensitive Plants – According to the *Biological Assessment for Federally Listed Threatened or Endangered Plant Species and Biological Evaluation for Forest Service Sensitive Plant Species Vista Fire Restoration Project* (Plant BA/BE) (Linton 2009) there are no known threatened or endangered plant populations or their potential habitat within the project area. Surveys were conducted in the late spring of 2008 but did not discover any individuals or populations of Region 5 Sensitive Plants within the proposed treatment units. The following five species have the potential to occur within the Vista Fire Restoration Project area: Nine Mile Canyon Phacelia (*Phacelia novenmillensis*), Kern Plateau Horkelia (*Horkelia tularensis*), DeDeker's Clover (*Trifolium dedeckerae*), Kern Plateau Milk-Vetch (*Astragalus lentiginosus* var. *kernensis*), and Kern Plateau Bird's-Beak (*Cordylanthus eremicus* var. *kernensis*).

According to the Plant BA/BE the only potential adverse effects of the action alternatives could be to undiscovered individual sensitive plants. These effects could be either the direct disturbance from treatment activities or the indirect effects of soil erosion of potential habitat caused by the removal of trees by ground-based skidding. Also, the action alternatives would increase the risk of introduction and spread of noxious weeds from equipment. Recommended management requirements and constraints are included to reduce the risk of inadvertent disturbance of undiscovered sensitive plant species as well as the introduction and spread of noxious weeds. Specific measures are listed in Appendix E: Management Requirements and Constraints (MR&Cs). While Alternative 1, No Action, would not have any direct effects to undiscovered sensitive plants within the project area, indirect effects would include the potential for more intense and widespread wildfire. The heavy fuel loading left would cause a longer residence time for fires burning through the project area resulting in more intense soil heating and, therefore, soil damage leaving it more susceptible to erosion which could be detrimental to some sensitive plant species. The direct and indirect effects of both the no action and action alternatives would generally be limited in scope and duration, therefore, no cumulative effects to the potential habitat for sensitive plant species is expected.

The Plant BA/BE determination is that the Vista Fire Restoration Project would have no effect on threatened, endangered, or proposed plant species. Further, it determines that the action alternatives may affect undiscovered individual sensitive plants but is not likely to result in a trend toward federal listing or loss of viability for Nine Mile Canyon Phacelia, Kern Plateau Horkelia, DeDeker's Clover, Kern Plateau Milk-Vetch, and Kern Plateau Bird's-Beak. The *Biological Assessment for Federally*

Listed Threatened or Endangered Plant Species and Biological Evaluation for Forest Service Sensitive Plant Species Vista Fire Restoration Project is hereby incorporated by reference.

The degree to which the action may adversely affect districts, sites, highways, structures, or objects listed or eligible for listing in the National Register of Historic Places, or may cause loss or destruction of significant scientific, cultural, or historic resources: According to the *Vista Fire Restoration Project Heritage Resources Specialist Report* there are no known heritage resource sites within the project area (Parr 2008). The action alternatives propose ground disturbing activities that have the potential to directly or indirectly impact heritage resources if found. In the event a new site is discovered, several standard procedures would be taken to ensure it is protected, including an immediate stop to work activities until the site can be evaluated (Appendix E: MR&Cs). Therefore, no adverse impacts to heritage resources are anticipated under any of the alternatives. The *Vista Fire Restoration Project Heritage Resources Specialist Report* is hereby incorporated by reference.

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: As discussed above, according to the *Sensitive Plant BE* and the *Wildlife BE* there are no known threatened or endangered plants or wildlife species (terrestrial or aquatic) in the project area.

Whether the action threatens a violation of Federal, State, or local law or other requirements imposed for the protection of the environment: None of the proposed activities under the action alternatives would threaten violation of applicable Federal, State, or local environmental protection laws or requirements.

The effects of all action alternatives are consistent with the 1990 *Sequoia National Forest Land Management Plan Mediated Settlement Agreement* (MSA). The MSA includes a set of resource protection/management guidelines/standards with which the Forest Service has agreed to comply when implementing resource management actions. The MSA is a settlement agreement stemming from appeals to the 1988 Sequoia National Forest Land and Resource Management Plan. The consistency of projects effects with the requirements of the MSA are documented in the *EA/EIS Mediated Settlement Agreement Requirements for the Vista Fire Restoration Project* in Appendix F of this document (MSA Requirements) (Anderson 2009).

Management requirements and constraints are set in place to protect wildlife, other resources, the public, and employees throughout the project area (See Appendix E: MR&Cs) for the Vista Fire Restoration Project). These requirements assure that all the activities of all action alternatives are consistent with the LRMP, as amended by the SNFPA by following the standards and guidelines during project implementation.

The Forest Service Manual (FSM) provides additional National Forest Management Act (NFMA) management direction regarding species viability. FSM 2670.32 provides direction to avoid or minimize impacts to species whose viability has been identified as a concern. This includes federally listed threatened or endangered species, and Forest Service sensitive species. Effects on threatened and endangered species and critical habitat are noted in the discussion of cumulative effects above. The plant biological evaluation determined that the action alternative would have little to no effect on FS sensitive species, because there would be little to no impact to suitable habitat –and none of the sensitive species with potential for occurrence in the area were found during surveys. No sensitive animals were found within the project during surveys. However, northern goshawk, California spotted owl, Pacific fisher, Kern Plateau slender salamander, California golden trout (hybrids), and Townsend's big-eared bat are known to occur in the surrounding area and may exist within or use the project area. The BE/BA documented the determination that the project may affect individuals; it

would not create trends leading to federal listing. The effect on individuals was considered negligible. The MIS Report also determined that the action alternatives would have little to no effect on habitat characteristics or availability for black-backed woodpecker for snags in burned forest, hairy woodpecker for snags in green forests or for mountain quail as an indicator for early and mid seral stages in coniferous forest.

Both action alternatives (2 and 3) would comply with the Clean Water Act, by implementing watershed best management practices (BMPs). Applicable BMPs have been identified to maintain water quality and reduce potential for soil movement resulting from harvest, road use, manual felling and piling of trees <15" dbh, and pile burning within the project area. According to the Vista Fire Restoration Project Soils Report, on steeper slopes (generally over 35%), which includes most areas with high soil erosion potential, yarding will be done by end-lining cable; greatly reducing mechanical ground disturbance. Within the project area, existing roads and staging areas would be utilized, as much as possible, for project activities. Along with these BMPs, implementation of the SNFPA Riparian Conservation Areas and Objectives, Sequoia National Forest Riparian and Wetland Standards and Guidelines, and Regional Soil Quality Standards and Guidelines have also been included as design criteria for common to both action alternatives (Appendix E: Management Requirements and Constraints, Appendix C: Best Management Practices, and Appendix D: Riparian Conservation Objectives Consistency Analysis).

AGENCIES AND PERSONS CONSULTED

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

ID Team Members: Steve Anderson, Chris Stewart, Fletcher Linton, Jim Yearwood, George Powell, Bob Parr, and John Urrutia

Other Agencies: California Department of Fish and Game, California Department of Parks and Recreation, California State Attorney General

Tribes: Tule River Tribal Council, Kern Valley Indian Council

Others: Stewards of the Sequoia, California Cattleman's Association, California Native Plant Society, Sierra Club – Sequoia Task Force, Sequoia ForestKeeper, The Wilderness Society, Phantom Duck Club, American Motorcycle Association, Sierra Forest Products, Society of American Foresters, Kern River Valley Fire Safe Council, Kern River Valley Revitalization, High Desert Multiple Use Coalition, Kerncrest Audubon, California Lands Commission, and landowners near Kennedy Meadows.

MAPS

Vista Fire Restoration Project

Map 1: Vicinity Map

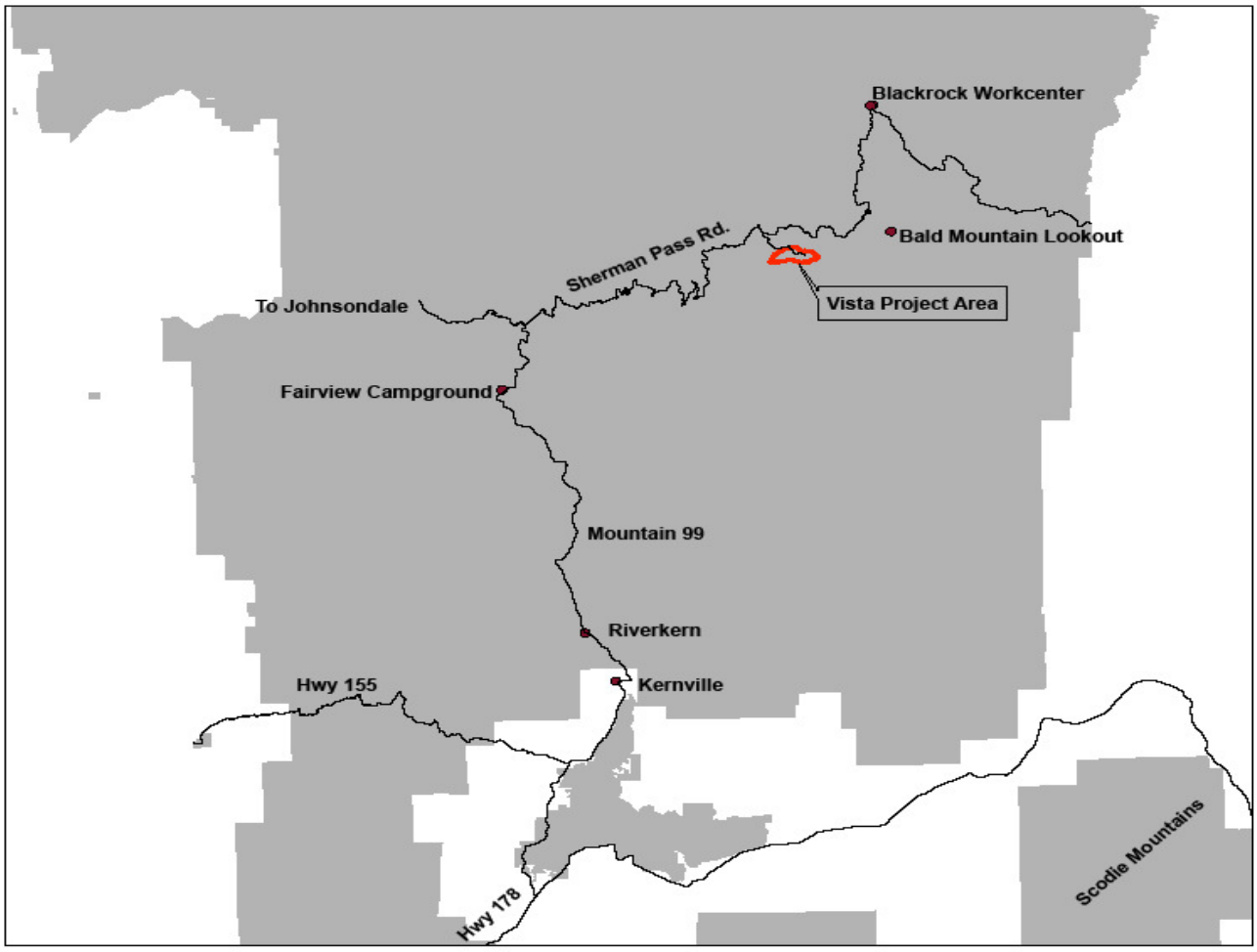
Sequoia National Forest
Kern River Ranger District

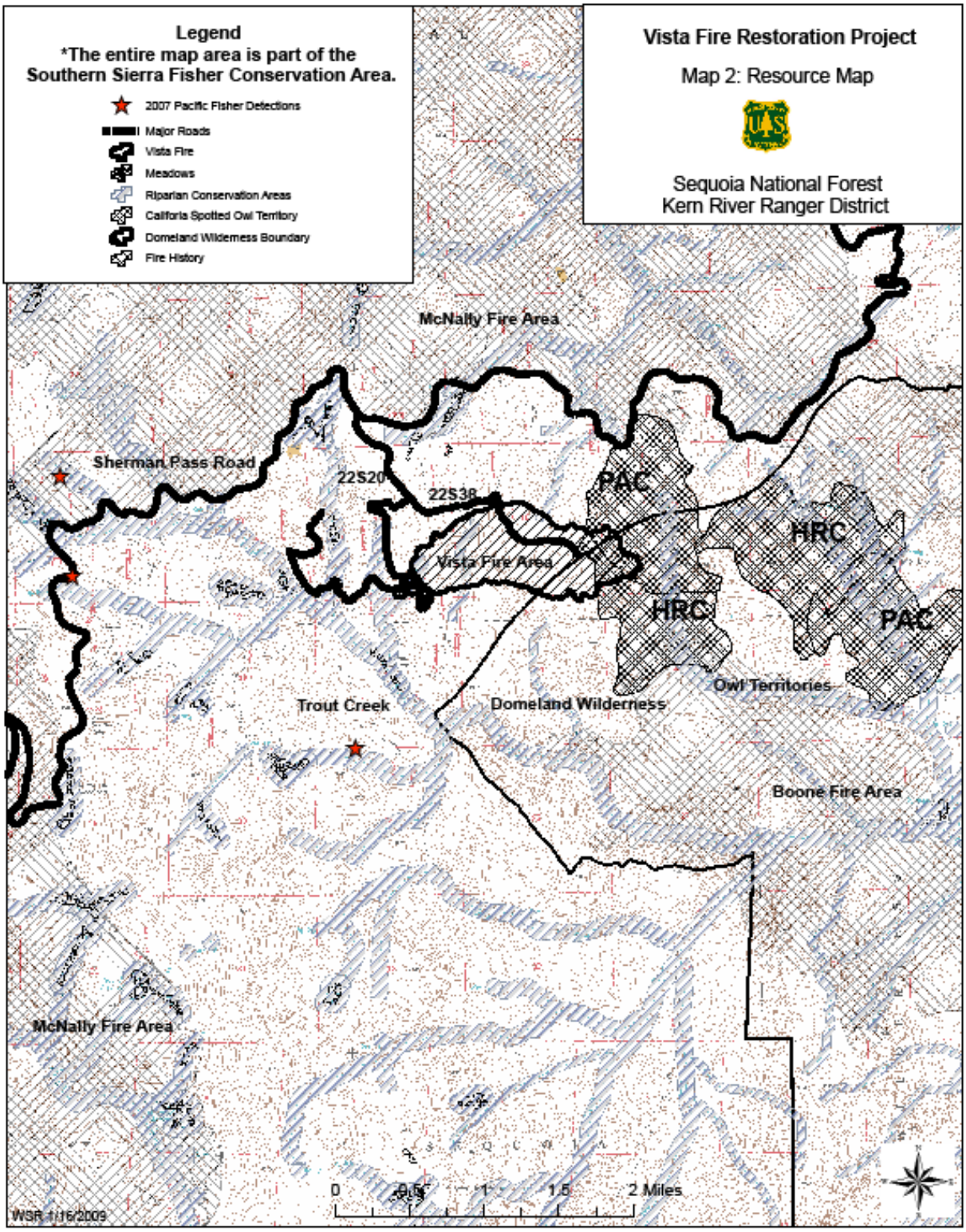
Vista Fire Restoration Project

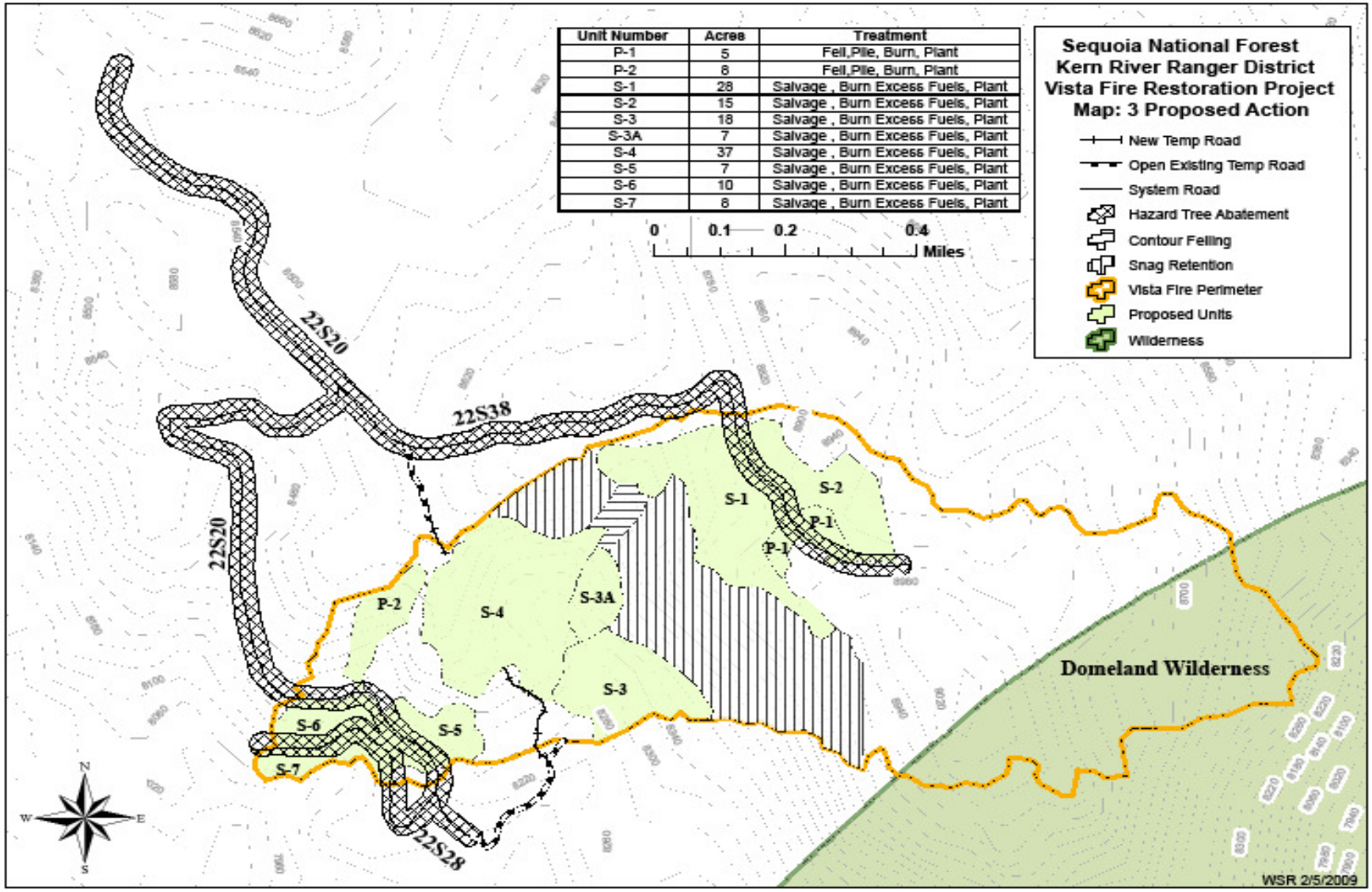
Sequoia National Forest

Vista Fire Restoration Area

Highways




Legend
*The entire map area is part of the Southern Sierra Fisher Conservation Area.
2007 Pacific Fisher Detections
Major Roads
Vista Fire
Meadows
Riparian Conservation Areas
California Spotted Owl Territory
Domeland Wilderness Boundary
Fire History
Vista Fire Restoration Project
Map 2: Resource Map
Sequoia National Forest
Kern River Ranger District
McNally Fire Area
Sherman Pass Road
22S20
22S38
PAC
HRC
Vista Fire Area
HRC
PAC
Owl Territories
Trout Creek
Domeland Wilderness
Boone Fire Area
McNally Fire Area
0
0.5
1
1.5
2 Miles
WSR 1/16/2009


Unit Number | Acres | Treatment
P-1 | 5 | Fell,Pile, Burn, Plant
P-2 | 8 | Fell,Pile, Burn, Plant
S-1 | 28 | Salvage , Burn Excess Fuels, Plant
S-2 | 15 | Salvage , Burn Excess Fuels, Plant
S-3 | 18 | Salvage , Burn Excess Fuels, Plant
S-3A | 7 | Salvage , Burn Excess Fuels, Plant
S-4 | 37 | Salvage , Burn Excess Fuels, Plant
S-5 | 7 | Salvage , Burn Excess Fuels, Plant
S-6 | 10 | Salvage , Burn Excess Fuels, Plant
S-7 | 8 | Salvage , Burn Excess Fuels, Plant
0 0.1 0.2 0.4 Miles
Sequoia National Forest
Kern River Ranger District
Vista Fire Restoration Project
Map: 3 Proposed Action
New Temp Road
Open Existing Temp Road
System Road
Hazard Tree Abatement
Contour Felling
Snag Retention
Vista Fire Perimeter
Proposed Units
Wilderness
22S20
22S38
22S20
22S28
S-1
S-2
P-1
P-1
P-2
S-4
S-3A
S-3
S-6
S-5
S-7
Domeland Wilderness
N
W
E
S
WSR 2/5/2009