Alternative D – Multiple Action

Biological Environment

Vegetation and Fire Ecology

Potential for Impacts from Catastrophic Fire

Among the action alternatives, this alternative would accomplish more fuel reduction than the passive action alternative and less then the aggressive alternative. This Multiple Action Alternative proposes moderate increases in the use of prescribed fire and managed wildland fire and use of all of the fire and fuel reduction techniques described (Chapter II, table II-6) to accomplish wildland/urban interface work. It would restore ecosystems in 15 to 20 years and provide protection for the wildland/urban interface in 6 to 8 years. This longer time frame indicates that the risk for catastrophic fire would remain high for longer than under the Aggressive Action Alternative, but not as long as under the No Action or Passive Action Alternative.

The impacts would be the same as the Alternative B, except in lower montane forests. In all action alternatives these forests would have the largest acreage targeted for prescribed fire. The relatively short fire return intervals found in lower montane forests, combined with existing moderate to high departure from normal fire return interval and the length of time it will take to restore the fire regime under this alternative, creates the conditions for increases in the departure from the natural fire regime during most of the restoration period. The time frame for restoration is within the range of the fire return intervals for all but three vegetation types: ponderosa pine/mixed conifer, ponderosa pine/bear clover forests, and dry montane meadows. These areas would need to be specifically targeted for treatments. If not, the FRID would continue to increase and the potential for catastrophic fire and type conversion would remain high. The potential for catastrophic wildland fire would only decrease in direct proportion to the amount of burning in these three vegetation types. Overall, the impact would be beneficial, long-term, and minor to moderate, which is an improvement over the adverse effects of Alternative A.

Fire Management Treatments

The Multiple-Action Alternative would utilize managed wildland and prescribed fire and, in some areas, the full array of site preparation and fuel reduction techniques described in Chapter II. For each area, the preferred treatment would cause the least impact while allowing the objectives (safety, level of protection, time, target conditions) of the area's implementation plan to be met. Within the wildland/urban interface areas and along road and utility corridors mechanical tree removal equipment would be used, however, if the objectives could be met using another, less invasive technique, that technique would be seriously considered.

Managed Wildland Fire

Impacts to each vegetation group would be the same as under Alternative B. Maximum use of managed wildland fire to maintain vegetation in its appropriate fire regime would be a major goal in the Fire Use Unit.

Re-ignition clause. Same as under Alternative B—beneficial, long-term, and moderate to major.

Holding Action and Monitoring Effects (water and retardant drops, helispots, and spike camps). Same as under Alternative B—adverse, short-term, and negligible to minor.

Prescribed Fire

Prescribed fire would typically be used in the restoration of areas where the fire return interval is three or more fires out of cycle, or to maintain target conditions in areas within the Suppression Unit or similar areas of the Fire Use Unit. The total acreage in prescribed fire units would be the same as in Alternative B, Aggressive Action, but the number of acres burned annually would be less, but still more than under Alternative A or C.

Subalpine Forests. In all alternatives, less than 1% of subalpine forests would be in prescribed fire units. The impacts of prescribed fire would be expected to be the same as under Alternative A—beneficial, short-term, and minor.

Upper Montane Forests. Less than 20% of upper montane forests would be in prescribed fire units in Alternative D. However, it is twice the acreage as is in prescribed units under Alternative A. The impact of prescribed fire in these forests would be expected to be the same as under Alternative A, although the larger acreage would decrease the chance of catastrophic fire. Due to the longer fire return intervals in this vegetation group, the longer time frame for restoration would have a negligible effect. Impacts of prescribed fire on upper montane forests would be the same as under Alternative B—beneficial, long-term, and moderate.

Lower Montane Forests. These forests are a primary focus of the prescribed fire program. The acreage to be restored would remain the same as in Alternative B, but fewer acres would be treated per year. The relatively short fire return intervals, combined with the present moderate to high departure from normal fire return interval, would mean that during most of the restoration period, these forests would continue to increase in departure from normal fire regime. The potential for catastrophic wildland fire would decrease in proportion to the amount and location of work performed in these lower montane forests. It would be enhanced by strategic placement of the first few years of prescribed burning. By providing breaks in the canopy and reduced surface fuels in the right areas, additional protection would be provided for forests and developed areas, especially against spread of high-intensity fire. The impact of prescribed burns in these forests would be expected to be the same as under Alternative A, No Action. Under this alternative, the effect of prescribed fire on lower montane forests would be beneficial, long-term, and minor to moderate. Because of the increase in area treated, this would be an increase in intensity, compared to Alternative A.

Meadows. Meadows have the shortest fire return intervals of all vegetation types described for the park. Short fire return intervals found in this group, combined with their moderate to high departure from normal fire return interval, would suggest that during most of the restoration period, the meadows would continue to increase in departure from normal fire return intervals. Many of the meadows are included in the multi-year plan and more would be treated with maximum use of managed wildland fire. The acreage to be restored would remain the same as in Alternative B, Aggressive Action, but fewer acres would be treated per year. The effects of prescribed fire would be expected to be the same as under Alternative A. Overall, the effect of Multiple Action would be beneficial, long-term, and minor to moderate. The increase in acreage and the amount of time used to achieve restoration objectives would have benefits that would last

longer and cause substantial change in community structure, composition, or fuels, compared to Alternative A.

Foothill Woodlands. More than 75% of foothill woodlands would occur in prescribed fire units under Passive Action, the same amount as under Alternative B, Aggressive Action. This would be nearly four times the acreage in prescribed fire units as under Alternative A. Fire effects would be expected to be the same as under Alternative A. Overall, the effects of Multiple Action would be the same as under Aggressive Action. The impacts of prescribed fire in foothill woodlands would be beneficial, long-term, and major. The increase in benefit intensity, compared to Alternative A, would be due to the increase in the amount of work and the time frame for achieving restoration.

Site Preparation Associated with Managed Wildland Fire and Prescribed Fire (hand line, snagging, mop-up)

Impacts would be the same as under Alternative A—adverse, short-term, and minor.

Fuel Reduction by Hand or Machine

Effects of Reducing or Removing Biomass from Sites

While the removal of cut trees and shrubs from treated sites can reduce the intensity of future fires, it can have other effects on ecosystems, such as a loss of nitrogen and other vital plant nutrients. Table IV-9 under Alternative B presents a comparison of methods used to remove cut trees and shrubs and a qualitative analysis of the movement and availability of nitrogen and other nutrients.

Aggressive Reduction Techniques

Mechanical Tree and Shrub Removal. These activities would occur primarily around the inner wildland/urban interface where plant community structure has been altered by years of fire exclusion and communities are at risk from catastrophic fire. Less than 1% of the park or 6,425 acres is within inner wildland/urban interface boundaries, of this approximately 1,100 acres would be treated with various fuel reduction techniques each year. These activities usually would be followed by prescribed fire (effects discussed above). To restore plant community structure to within its natural range of variability, mechanical means would be used. Only lower montane forest and meadows would be treated in large enough areas to have more than a local effect. Less than 5% of lower montane forest and less than 20% of meadows would be targeted for this treatment in Alternative D.

Effects of biomass removal would include the potential for trampling and burial of sensitive plants, disturbing sensitive ecosystems (e.g. riparian areas), the appearance of cut stumps, and the loss of fuel ladders (see also table IV-9). All of these impacts would be mitigated through project planning and coordination with resource management staff. Surface and soil disturbance and compaction would also be caused by tracked vehicles and cutting, dragging, or crushing materials (depending on the treatment used). This disturbance would provide potential sites for invasion of non-native species.

Trees up to 20” dbh (diameter breast height) in the six inner WUI areas would be removed mechanically according to the structural target conditions for density and frequency, by vegetation type (see table 2.3). This would alter tree density and canopy cover in the areas of treatment. Canopy cover reduction should change fire behavior so that a fire would be more likely to move on the ground rather than to move in the canopy (crown fire). This treatment would not reduce the surface fuel load, which can be greater than half the total down and dead fuel load on a site. In fact,

it would actually increase the surface fuel load until the area was broadcast burned, which would normally follow within two years. The intensity of fires would be greater due to this loading of fuels. Overall, the adverse effects of biomass removal by mechanical means would be short-term and minor to moderate. Long-term impacts would be beneficial and negligible to moderate, due to the lower potential for catastrophic fire in treated areas.

Conventional Tree and Shrub Removal. Under the Multiple Action alternative, skidders and grapplers would be used in the six inner WUI areas. Surface and soil disturbance and compaction would be associated with the use of wheeled and/or tracked vehicles and dragging materials. This would provide potential sites for the invasion of non-native species. Skidding would be used in some locations. Mitigation would include running the equipment over snow and restricting equipment use to certain areas and paths. Overall, the effect of skidding and grappling would be adverse, short to long-term, and minor to moderate, depending on the intensity of treatment.

Passive Reduction and Lower Profile Techniques.

Low-Impact Skidding. In Alternative D, this treatment would be used where it would be effective in restoring target conditions, such as in areas in the inner wildland/urban interface needing carefully managed fuel reduction treatment because of populations of non-native, noxious weed species. This technique would also be used where this equipment would be successful in removing downed trees. Draft animals and four wheel, all-terrain vehicles would be used, in combination with fetching arches, to skid trees of approximately 10 to 20" dbh. This treatment would cause localized compaction and scarification of the upper duff and topsoil layers, less than would occur with tracked vehicles; knobby tires and the feet of draft animals would have negligible to minor local effects on topsoil and duff layers. The most significant effect would be from dragging one end of the tree. Skid paths would create potential sites for invasion of non-native species, however fetching arches would mitigate soil disturbance. The extent of skidding would be apparent, but not so great as to result in changes in plant community structure. Species composition might be affected, through invasion of non-natives, if site rehabilitation is not completed and monitored. With rehabilitation and follow up monitoring or removal of non-natives, effects should be minor. Other mitigation, when needed, could include skidding over snow, frozen soil, or a bed of crushed vegetation, as with heavier equipment. Many areas would be burned subsequent to fuel reduction. Most projects would be relatively extensive, thus effects of use would be adverse, minor, and short-term. Note that when used in combination with heavier equipment, it should be possible to use this treatment to achieve restoration target conditions.

Hand Cutting. Types of effects would be the same as under Alternative A, but this activity would not be the predominant ones for restoring plant community structure in this alternative. This work is labor intensive, which would limit the amount of cutting that could be accomplished each year. In the inner wildland/urban interface, fuels would be reduced on about 1,100 acres annually. Hand-cutting work would focus on removing small diameter trees and ladder fuels which would help to reduce the risk of high-intensity fire and stand-replacing events. Combining machine thinning with hand cutting would lengthen the time needed to restore wildland/urban interface areas and reduce risks compared to Alternative B, but this would still be more restoration than would occur under Alternatives A or C. Thus, unless hand-thinned areas are also burned, the effects of hand thinning on lower montane forests would be adverse, short-term, and minor. If thinned areas are also broadcast burned under controlled conditions, the effects of hand thinning would be beneficial, long-term, and minor to moderate.

Pile Burning. Same as under Aggressive Action—adverse, short-term, and negligible to minor.

Chipping. Effects would be similar to those described under Alternative B. Overall, the impacts of chipping on vegetation would depend on whether chips were broadcast or removed from the site. If chips were broadcast, the impacts would be adverse, short-term, and negligible to minor, depending on the area treated. If chips were removed, the impacts on vegetation would be adverse, short-term, and negligible. Careful project planning and coordination with resource management staff would occur prior to project implementation, to select the appropriate treatment.

Girdling. The impact of girdling, to kill individual trees and create wildlife habitat, would be adverse, short-term, and negligible to minor.

Helibase Upgrades

Same as Alternative B

Cumulative Impacts

The past, present, and reasonably foreseeable projects effecting vegetation at Yosemite National Park would be the same as discussed under Alternative A. The overall effect of past activities on vegetative structure and composition and on fuel loads have been adverse, long-term, and major. Present and reasonably foreseeable future projects would have a beneficial, long-term, and minor to moderate effect on vegetation. When considered in combination with the minor to moderately beneficial impacts of projects on other lands in the area, the cumulative impacts of Alternative D would be beneficial, long-term, and moderate.

Conclusion

The effects of this alternative would be similar to Alternative B, Aggressive Action, but would include aspects of the approach taken under Alternative C, Passive Action. In aggregate, the actions of Multiple Action would have beneficial, long-term and moderate to major effects. The time required to restore park ecosystems (15 to 20 years) and to reduce risks to the six inner wildland/urban interface communities would be longer (6 to 8 years) than in Aggressive Action. The time frame for restoration is with in the normal range of fire return intervals for all but three vegetation types (ponderosa pine/mixed-conifer forest, ponderosa pine/bear clover forest, and dry montane meadows). This will significantly reduce the threat of large, high-intensity wildfire in all areas of the park over time. This would reduce the potential for type conversion of vegetation outside of the natural range of variability. Effects would revert from adverse to beneficial, compared with Alternative A. Large, high-severity fires would likely occur during the life of the plan, but the size and extent of the fires would be reduced when compared with Alternative A. There would be no impairment from the effects of this alternative.

The Mariposa Grove of Giant Sequoias is one of the resources specifically identified in the enabling legislation for Yosemite National Park. If catastrophic fire were to eliminate or severely damage this grove, the impact would be impairment.

Wetlands

Potential for Impacts from Catastrophic Fire

Alternative D would likely result in significant amounts of change over a moderate period of time. Effective implementation of this alternative would not eliminate the potential for catastrophic fire, but would significantly reduce the likelihood of fire events outside the range of tolerance for wetlands and associated species. This reduction in the potential for large or unusually intense fires would result in moderate to major ecological benefits for park wetlands. Use MIMT for fire management; identify sensitive wildlife resources to minimize adverse impacts; and apply mitigations identified during consultation with USFWS (see Appendix 9).

Fire Management Treatments

Managed Wildland Fire

Same as Alternative A, No Action—beneficial, long-term, and moderate.

Re-ignition clause. Same as Alternative B.

Holding Action and Monitoring Effects (water and retardant drops, helispots, and spike camps). Same as Alternative B—adverse, short-term, and negligible.

Prescribed Fire

Alternative D proposes a moderate to large amount of prescribed fire annually. Selected units would target wetlands for treatment, given concerns of tree invasion or changes in species composition (Yosemite Valley, for example). These treatments would provide significant ecological benefit. Although specific fire return intervals for Sierra Nevada wetlands are not well defined, the amount of prescribed fire acreage proposed in this alternative would not likely generate adverse impacts. Short-term fragmentation would be possible, but long-term benefits would also result.

Wildland/urban interface areas, such as El Portal and Yosemite West, would likely receive mechanical pretreatment, followed by prescribed fire. Treatments would be implemented with the intention of avoiding impacts to wetlands (see hand cutting, below). Specific impacts of treatments would differ little from the No Action Alternative, but the intensity would be expected to increase because of the increase in the number of acres treated.

Site Preparation Associated with Managed Wildland Fire and Prescribed Fire (hand line, snagging, mop-up)

Same as Alternative B—beneficial, minor to moderate, and short-term.

Fuel Reduction by Hand or Machine

Aggressive Reduction Techniques. These techniques would not occur in wetlands.

Passive Reduction and Lower Profile Techniques.

Low-Impact Skidding. These techniques would possibly be used in wetland areas. If for some reason fallen debris needed removal from meadows, attempts to move the material would be done when the water table had dropped and the surface was dry enough to support the use of a fetching

arch. This method would mitigate the possibility of material digging into the soil surface and causing soil disturbance. Impacts would be beneficial, short-term, and negligible.

Hand Cutting. Same as Alternative B—short-term, and minor to moderate.

Pile burning. Same as Alternative B—beneficial, short-term, and minor to moderate.

Cumulative Impacts

Cumulative effects to wetland and aquatic resources are based on analysis of additional wetlands activities within the Yosemite region and the potential effects of this alternative. The past, present, and reasonably foreseeable projects that would potentially effect local wetland patterns and large-scale or regional wetland patterns would be the same as evaluated in Alternative A.

These and park projects would result in both short-term and long-term adverse and beneficial impacts on wetlands in the areas. Overall, these beneficial, long-term, and moderate effects for reasonably foreseeable future projects, considered in combination with the beneficial, moderate to major and long-term impacts of Alternative D would result in beneficial, moderate and long-term cumulative impacts, due to the emphasis on restoration of vegetation structure and processes through fire and the moderately aggressive approach.

Conclusion

Alternative D would have little or no adverse impacts on wetland resources. This moderately aggressive approach would likely generate moderate to major, long-term, and beneficial ecological benefits from the reduction of catastrophic fire threat. The multi-strategy approach would also provide additional options for wetlands avoidance. There would be no impairment from the effects of this alternative.

Wildlife

Potential for Impacts from Catastrophic Fire

Under Alternative D, catastrophic fire would have the same effects as described under Alternative A, but the risk of such events would be substantially reduced, because of the 15 to 20 year goal for achieving target conditions in areas that have deviated from the median fire return interval by three or more intervals. Areas that deviate three or more intervals would be targeted for prescribed burning first, with 1,817 to 9,194 acres burned per year, depending upon the number of natural ignitions in the Fire Use Unit and the prevailing conditions that would allow prescribed or managed wildland fire. As a result, wildlife habitat would quickly be returned to a more natural condition, and the risk of catastrophic fire, and its adverse effects on wildlife, would be greatly reduced over a relatively short period of time. Because of this, implementation of Alternative D would result in beneficial, long-term, and major impact to wildlife and their habitat.

Fire Management Treatments

In Yosemite and in surrounding forests, many mid- to low-elevation forests are overgrown with dense shrubs and young trees because of a history of fire exclusion. At the same time, as explained above, some areas are at high risk of unnatural high-intensity fire events. These conditions affect

the abundance and diversity of wildlife species directly by creating unfavorable habitat conditions for some species. For example, dense understory growth may adversely affect habitat quality for California spotted owls and northern goshawks by limiting their access to prey (Weatherspoon et al. 1992, Maurer 2000, respectively). The combination of fire and fuel reduction proposed in this alternative would result in increased habitat and species diversity as gaps would be created in continuous forest and the edge along the forest/gap interface recovered with important understory plants that had been crowded out by shade tolerant species.

Managed Wildland Fire

Under Alternative D, the average annual number of acres burned by managed wildland fire would increase over current burning rates, in order to reach target conditions in 15 to 20 years. Under Alternative D, managed wildland fire would be a valuable tool in restoring natural, fire-influenced wildlife habitat. Conditions for wildland fires would vary among years, with little burning occurring in some years, and much burning occurring in others, in order to reach management goals. In years of high wildland fire activity, large areas of habitat would likely be affected, changing their suitability for species favored under the altered forest conditions created by a history of fire suppression.

Because natural ignitions are somewhat random events, areas burned would not be those of highest management priority (i.e., furthest from the natural fire regime). Also, some areas would likely burn at higher than natural intensities due to current levels of fuel accumulation, even when prescriptions were designed to minimize these effects. As a result, forest gaps and consumption of large woody debris (which provides habitat diversity), would be greater than typically found within the natural range of variation for an area. Potentially this would adversely affect species that favor dense forests, such as hermit thrush, northern flying squirrel, and marten. These effects would be greater under Alternative D, compared to Alternative A. Such impacts, however, must be weighed against the benefit of reduced risk of catastrophic fire that would cause much greater detriment to the park's wildlife habitat. Under Alternative D, impact to wildlife of managed wildland fire would be beneficial, long-term, and major due to the restoration of wildlife habitats and reduction in the threat of catastrophic fire. Mitigation: Use MIMT for fire management; identify sensitive wildlife resources to minimize adverse impacts.

Re-ignition. Effects would be the same as under Alternative B.

Prescribed Fire

The use of prescribed fire provides the greatest potential for focused work to restore wildlife habitat and reduce the threat of catastrophic fire. Areas furthest from the natural fire regime with identified threats to wildlife and habitat, can be targeted for treatment. Fire can be planned to occur under conditions that maximize benefit to resources, including wildlife and habitat, and minimize fire-related impacts to sensitive wildlife resources (e.g., spotted owl nesting sites).

Under Alternative D, prescribed fire would be used mainly in the Suppression Unit where forests are furthest from the natural fire regime. Much of this area is in mid-elevation mixed conifer habitat, which is among the most productive and diverse wildlife habitat in the park. High levels of fuel loading would cause some prescribed fires to burn at higher than natural intensities, even when fire prescriptions were designed to minimize these effects. As a result, forest gaps and consumption of large woody debris (which provide habitat diversity) would be greater than might occur under the natural range of variability. This would adversely affect species such as hermit

thrush, northern flying squirrel, and marten. Such impacts, however, must be weighed against the benefit of reduced risk of catastrophic fire, which would be of much greater detriment to wildlife habitat. As described in Alternative B, burning in the shoulder season would have an adverse effect on some species of wildlife that are adapted to the natural timing of fires.

In habitats near developed areas, where protection of human-built structures and facilities is a concern, prescribed fire would be used to reduce fuel loads to the lower end of the natural variability. If forests became more open (less understory vegetation) and contained less down wood, the effect on animal species that depend on these features, such as salamanders, small mammals, and ground-nesting birds, would be adverse. However, overall a larger number of species would benefit from restoration of forests to a more natural condition.

Conditions for prescribed fires would vary among years so that little burning occurs in some years, and, when conditions were favorable, many prescribed burns take place. In years favorable to prescribed fire activity, large areas would likely be affected. Habitat would be no longer suitable to species that favor dense forest structure but would be more suitable to species that favor open forests and more diverse habitat. Under Alternative D, impact of prescribed fire on wildlife would be beneficial, long-term, and major due to the restoration of wildlife habitats and reduction in the threat of catastrophic fire. Mitigation: Use MIMT for fire management; identify sensitive wildlife resources to minimize adverse impacts; where possible, limit fire size and/or burn intensity heterogeneity and maintain wildlife species diversity.

Holding Action and Monitoring Effects (water and retardant drops, helispots, and spike camps) and Site Preparation Associated with Managed Wildland Fire and Prescribed Fire (hand line, snagging, mop-up)

Actions such as hand line construction, snagging, and water drops would be employed before and during prescribed fire and during management of wildland fires. Effects, concerns, and mitigations would be those described in Alternative A. Some adverse effects on wildlife would occur from these actions because of the increased use of prescribed fire under this alternative. These impacts, however, would be offset by the long-term benefits of fires on ecosystems. Impacts would be similar to Alternative B—adverse, short-term, and minor.

Water Drops: The types of impacts associated with water drops would be the same as described under Alternative A, but the increased use of wildland fire under this alternative could increase the need for water drops. Impacts to wildlife could therefore, be greater than under Alternative A. Adherence to mitigation measures would limit impacts. Actions would result in minor, adverse, long-term impacts. Mitigation: Avoid dipping from waters known to contain mountain yellow-legged frogs; avoid dipping from shallow bodies of water.

Helispot Construction: The types of impacts associated with helispot construction would be the same as under Alternative A, but the greater use of managed wildland fire under Alternative D could result in a greater chance of impacts on wildlife through habitat destruction and direct disturbance. Impact under this alternative would be adverse, long-term, and negligible. Mitigation: Limit helispot construction; site helispots away from sensitive resources; use natural clearings for helispots.

Spike Camps: Under Alternative D, the types of impacts associated with the establishment and use of spike camps would be the same as under Alternative A. The greater use of wildland fire,

however, could result in more spike camps to manage and monitor fires. Use of standard mitigation measures would result in negligible, adverse, short-term impacts to wildlife. Mitigation: site spike camps away from sensitive resources; maintain strict control over the availability of food to wildlife at camps.

Hand Lines. Impact from hand line construction under Alternative D would have the same types of impacts as under Alternative A, but given the greater use of prescribed fire the level of such impacts would likely be higher. Such impacts would have to be weighed against the reduction in the risk of high-intensity fire that would be achieved under Alternative D. This includes a likely reduction in the use of hand lines that would be necessary during suppression of unwanted wildland fires. Impact of hand line construction under Alternative D would be adverse, short-term, and minor. Impacts would be mitigated by use of MIMT, identification and avoidance of sensitive wildlife resources, and rehabilitation of areas disturbed by hand lines.

Snagging. Impacts from would be of the same type as in Alternative A. Because of the increase amount of prescribed fire, snagging would likely increase under Alternative D. This could have a local, adverse impact on species (i.e., bats and woodpeckers) that rely on snags. Prescribed fire, however, is likely to generate additional snags that in time would benefit snag reliant species. In addition, the reduction in threat from catastrophic fire from prescribed fire, would benefit a wide range of wildlife species. Impact would be adverse, minor, and short-term, due to the increased number of snags that would be cut but the relatively small area that is likely to be affected. Impacts would be mitigated through use of MIMT, limiting the removal of snags to those identified as a clear threat to human safety and fire line integrity, identifying and avoiding sensitive wildlife resources to the extent possible.

Mop-up. The impacts associated with mop-up are expected to be similar to those described in Alternative A although the greater use of prescribed fire would increase the areas of impact. The small, disperse areas that are likely to be affected would limit adverse impacts to wildlife. Impacts would be adverse, negligible, and short-term and would be mitigated by use of MIMT and identification and avoidance of sensitive wildlife resources to the extent possible.

Fuel Reduction by Hand or Machine

Fuel reduction under Alternative D, Multiple Action, would be a combination of techniques described in Alternatives B and C to achieve target habitat conditions in areas near the wildland/urban interface, roads, and utility corridors. It is proposed for less than 1% of the park. The aggressive actions of Alternative B, using heavy machinery would be used in close proximity to development, whereas, the more passive methods of Alternative C would be used further from these areas. Treatment acres in wildland/urban interface areas would be approximately 1,095 acres per year for 6 to 8 years.

To provide protection for developed areas, prescriptions for wildland/urban interface areas close to development would produce forest habitat at the higher end of the natural range of variability (for target values for tree density and fuel loading). This would affect the species composition of wildlife in these areas. For example, species that depend upon habitat complexity on the forest floor and in the understory, such as marten and some small mammals, would be adversely affected. The conditions achieved, however, would, benefit a larger number of species by restoring a forest structure that is within the range of natural variability for fire-influenced habitat. Farther out from

development, reliance primarily on hand thinning and other passive reduction techniques would maintain denser forest structure favorable to other species.

Aggressive Reduction Techniques
Effects of mechanical and conventional tree and shrub removal would be similar to that described in Alternative B, although aggressive reduction would be used in fewer areas.

Mechanical Tree and Shrub Removal. Heavy equipment would be used where critical fuel conditions demand immediate, efficient action, and where natural resources can acceptably withstand the impacts associated with this method. Feller-bunchers, and other tracked or wheeled vehicles in forest habitat would create ground disturbance that would affect animals that live in the forest litter, such as salamanders, reptiles, and small mammals. Adjacent habitat would remain unaffected, allowing recolonization. The noise of heavy machinery would cause some short-term disturbance of wildlife in treatment sites, and in adjacent areas.

Under Alternative D, biomass removal by feller-bunchers would result in minor, beneficial, long-term impact to wildlife due to the rapid return of forest structure to a more natural, open condition in the vicinity of developed areas. These areas would be relatively small on a landscape scale, and some adverse, short-term impacts would occur from use of heavy machinery. Mitigation: avoid use of machinery in wet areas, or during times of year when the forest floor is moist; identify sensitive wildlife resources in treatment areas and avoid impact to them; allow snag retention where possible.

Conventional Tree and Shrub Removal. Same as Alternative B—adverse, short-term, and minor. Mitigation: Avoid sensitive habitats, such as wetlands; identify and avoid sensitive wildlife resources.

Passive Reduction and Lower Profile Techniques.
Low-Impact Skidding. Low-impact skidding would be used to reduce fuels in wildland/urban interface areas and road corridors that would be less tolerant of heavy machinery use. Low-impact techniques cause less ground disturbance than is associated with use of heavier equipment described above. Under Alternative D, low-impact methods would be used in areas where there are wildlife concerns yet it is deemed beneficial to remove trees. Fewer large trees would be removed and those trees already on the ground would be partially or completely consumed when subsequent prescribed burns were conducted. Some drag paths would be created by low-impact skidding, but the use of fetching arches would reduce the impacts of logs being mechanically skidded across the ground. Drag trails and other disturbance would be raked out following the work. Few tire and track scars would be evident and the effects on small mammals and reptiles associated with the forest floor would be minor. Given the limited scope of area that will be treated, the impacts associated with these techniques, as the forest was brought closer to natural stand structure, would be beneficial, long-term, and minor.

Hand Cutting. Thinning of trees and other vegetation in wildland/urban interface areas and along road and utility corridors under Alternative D would be accomplished through a variety of methods, including hand cutting. This would allow the application of hand cutting in areas where damage to the forest floor associated with use of tracked or wheeled equipment is determined to be unacceptable. This would delay achievement of target habitat conditions in some areas, and limit the number of large trees removed. Such management would have different effects on wildlife. On one hand, delay in achieving target conditions would allow altered habitat conditions

to continue and extend the threat of high-intensity fire in those areas. On the other, retention of more large trees in treatment areas would keep these areas more in the middle-range of target conditions, and benefit species that prefer denser forest conditions, such as spotted owls.

Under Alternative D, the types of impacts to wildlife associated with hand cutting would be the same type as would occur under Alternative A. Because of the use of heavy machinery in some areas it would be used to a limited extent. Impact to wildlife from hand cutting would be beneficial, long-term, and minor, because habitat affected by fire suppression would be returned to a more natural condition, and threat of catastrophic fire would be reduced in these areas. Mitigation: Identify and avoid sensitive wildlife resources.

Pile Burning Same as Alternative B—adverse, short-term, and negligible. Mitigation: burn piles as soon as possible to minimize the number of animals living in them.

Chipping. Same as Alternative B—negligible; adverse, and short-term. Mitigation: Follow established protocols for limiting the depth of chips distributed on a site.

Girdling. Same as Alternative B—beneficial, long-term, and minor.

Peregrine Falcon

Same as Alternative A—adverse, short-term, and negligible

Helibase Upgrades

Same as Alternative B.

Cumulative Impacts

The past, present, and reasonably foreseeable projects that would have the most direct relationship to Alternative D, would be the same as listed under Alternative A. The impacts of these actions, considered in combination with the impacts of Alternative D, would result in cumulative effects on park wildlife and habitat that would be beneficial, long-term, and minor. This is because beneficial projects would affect large areas of habitat in the central Sierra Nevada in ways that would compliment the beneficial effects of the *Yosemite Fire Management Plan*. The Sierra Nevada Forest Plan Amendment would affect virtually all U.S. Forest Service land around the park by more ecosystem-based management. In comparison, projects with adverse impacts involve small areas and/or have minor effects over larger areas.

Conclusion

Alternative D would result in major, long-term, beneficial impacts to wildlife and habitat by rapidly restoring a more natural forest structure to areas of the park that have severely deviated from a natural fire return interval. The threat of catastrophic fire and its impacts on wildlife and habitat would be greatly and quickly reduced under this alternative. Use of a full range of fuel-reduction techniques would allow flexibility in achieving habitat restoration goals while minimizing adverse impacts. There would be no impairment from the effects of this alternative.

Special-Status Species – Plants

The four California rare plant species grow within the lower montane forest and foothill woodland vegetation zones, where fires frequently occur. These plants grow within the El Portal Administrative Site, although isolated populations of the Yosemite onion have been found within the park. Threats to these species are from suppression-related impacts and the establishment of non-native plant species in areas that have been severely burned (Hessl and Spackman 1995). As fire lines are tied into creek bottoms and moist areas, populations occurring in those sites may be affected. These impacts can be mitigated by avoidance of known populations and habitats of these species. Soil and substrate disturbance from line construction and trampling is especially harmful to perennial species—in this case Yosemite onion, Tompkin's sedge, and Congdon's lewisia.

Non-native plants have become established throughout the lower elevations of Yosemite and are concentrated in areas that receive constant disturbance and/or a constant influx of seed and plant material—e.g. along transportation corridors and drainages (Gerlach et al. 2001). As fires burn they open up habitat that may be taken over by non-native plant species. These plants are aggressive colonizers, have a phenology different than natives, and may be favored by fire-caused changes in the soil. Fires started in the shoulder seasons for hazard fuel reduction or other management reasons may actually exacerbate this problem, favoring non-native plants over the native suite of species. In addition, these fires may negatively affect the rare plants themselves, which are adapted to fires occurring during the normal fire season—May through October at these elevations. For example, Congdon's woolly-sunflower blooms into May and sometimes into June. Prescribed fires held earlier in the year will destroy mature plants and their potential to produce seed for the following season—thereby harming population size and viability. See Appendix 9 for mitigation developed in consultation with USFWS.

Potential for Impacts from Catastrophic Fire

Wildland/urban interface fuel reduction treatments around the El Portal Administrative Site would reduce the potential for high-intensity fire in areas where the California rare plants exist, and burning for ecological restoration would reduce the potential for high-intensity fire beyond the bounds of the administrative site. The probability of encroachment of exotic species into areas burned by catastrophic fires would be high under any of the alternatives because of the impacts on soils and understory and overstory vegetation caused by high-intensity burning. Regardless of treatment methods, if a catastrophic fire were to occur, there would be adverse impacts from non-native species encroachment. The probability of non-native species encroachment into sites burned by catastrophic fire would remain high, as in Alternative A, due to the impacts of high-intensity burning on soils and on understory and overstory vegetation. However, under this alternative, the potential for catastrophic fire would be reduced, therefore the amount of non-native species encroachment would likely be less. Compared to Alternative A, the impacts to special-status plant species would be adverse, long-term, and negligible to minor.

Fire Management Treatments

Managed Wildland Fire

Under the Multiple Action Alternative, all of the plant special-status species described in this document would occur within the Suppression Unit, and only isolated populations of Yosemite onion would occur in the Fire Use Unit. During fire events, input from a Resource Advisor would continue to be used to minimize or eliminate impacts to these species (see Chapter II, Mitigation

and Appendix 3). The departure from natural fire return intervals in areas inhabited by these species would quickly approach the natural range in variability over the landscape, and there would be a reduced potential for catastrophic fire events (with associated impacts – see above). Therefore, impacts associated with managed wildland fire to special-status species under this alternative would be the same as for Alternative B—beneficial, long-term, and minor.

Re-ignition clause. Re-ignition effects on special-status plants would only apply to isolated populations of Yosemite onion within the Fire Use Unit. This species neither would benefit nor be adversely affected by re-ignition, due to its isolated locations on sparsely vegetated outcrops. Actions during re-ignition procedures would adhere to mitigation measures and avoid these populations or habitats (see Chapter II, Mitigation Measures).

Holding Action and Monitoring Effects (water and retardant drops, helispots, and spike camps). These special-status species are in areas that would be minimally affected by the proposed actions. These actions would have effects similar to Alternative A, despite increased burning and associated activities. Mitigations would be as described in Alternative A (see also Chapter II, Mitigation Measures). Impacts of these actions taken in conjunction with mitigation measures would be adverse, short-term, and negligible.

Prescribed Fire

Under the Multiple Action alternative, potential effects to special-status species through prescribed burning would increase with the creation of a larger defensible perimeter around development areas (specifically El Portal). Species would be potentially affected by burning in the shoulder seasons and the probability of non-native species encroachment into sites burned out of season would remain high, as in Alternative A. Appropriate mitigation measures would be developed by the park Vegetation Ecologist and Fire Ecologist. Mitigation Measures Common to All Alternatives (Chapter II) discusses the common practices for dealing with these situations. Park vegetation personnel may recommend that some areas not be burned. Impacts would be adverse, long-term, and minor to moderate.

Site Preparation Associated with Managed Wildland Fire and Prescribed Fire (hand line, snagging, mop-up)

Same as Alternative A—adverse, short-term, and negligible to minor.

Fuel Reduction by Hand or Machine

Aggressive Reduction Techniques.

Mechanical Tree and Shrub Removal. Feller-buncher activities would not occur in the areas inhabited by special-status species, therefore there would be no effect.

Conventional Tree and Shrub Removal. Skidding and grappling activities would not occur in the areas inhabited by special-status species, therefore there would be no effect.

Passive Reduction and Lower Profile Techniques.

Low-Impact Skidding. Would not occur in areas inhabited by special-status plant species.

Hand Cutting. Hand cutting actions would be likely to affect special-status plant species only within the El Portal Administrative Site. Mitigations would remain the same as under the existing program. Yosemite onion and Congdon's lewisia would not be impacted by these activities due to

their locations. Both Tompkin's sedge and Congdon's woolly-sunflower would potentially have increased levels of impact under this alternative, due to treatments in wildland/urban interface with greater amounts of ground disturbance (through foot traffic, dragging cut materials) and subsequent changes in species composition if non-native species became established within rare plant populations. Therefore, the impact of hand cutting (with mitigations) would be adverse, long-term, and minor.

Pile burning. More pile burning would occur under this alternative than under Alternative A, thereby increasing the potential to affect both Tompkin's sedge and Congdon's woolly-sunflower, due to the location of some populations and individuals of these species. Yosemite onion and Congdon's lewisia would not be impacted by these activities due to their locations. The expanded area of intensively managed vegetation surrounding El Portal would result in increased levels of disturbance in sites that currently receive no management attention. Efforts would continue to be made to avoid individual plants and populations during planning for the activity, and piles would continue to be placed in sites that would be unlikely to support these species. Therefore, impacts of pile burning on plant special-status species under this alternative would be minor, adverse, and potentially long-term due to the larger area of disturbance and increased potential for spread and establishment of non-native plant species. Appropriate mitigations as described in Alternative A and Chapter II (Mitigation Measures) would be applied prior to execution of each project.

Chipping. Same as Alternative B—adverse, short-term, and negligible to minor.

Girdling. This action would not occur in the areas inhabited by special-status species, therefore there would be no effect.

Helibase Upgrades

Same as Alternative B.

Cumulative Impacts

Projects generating cumulative effects that would affect special-status plants would be the same at identified in Alternative A. Impacts of increased mechanical treatments within known and potential habitats for plant special-status species, as well as actions associated with implementation of the *Yosemite Valley Plan* in El Portal, would have increased impacts from non-native plant species introduction and alteration of native plant habitat. Overall, these effects, in combination with the effects of Alternative D, would result in adverse, long-term, and minor cumulative impacts.

Conclusion

Implementation of Alternative D, with increased mechanical thinning and removal, increased management of fuels around developed areas and increased burning would have an overall minimal effect on these species, due to their relative isolation, sparsely vegetated habitats, and occurrence beyond areas that would be managed aggressively. The effect of Alternative D would be adverse, long-term, and minor. There would be no impairment of the park's resources or values.

Special-Status Species – Animals

See Appendix 9 for mitigation developed in consultation with USFWS.

Sierra Nevada Bighorn Sheep *(Ovis canadensis sierrae)* - Federal Endangered

Potential for Impacts from Catastrophic Fire

Same as Alternative A, No Action—beneficial, long-term, and negligible.

Fire Management Treatments

Managed Wildland Fire

Although use of wildland fire would greatly increase under Alternative D, its application on bighorn habitat would be limited since these areas are well within the natural fire return interval. The impact would be the same as under Alternative A—beneficial, long-term, and negligible.

Prescribed Fire

Prescribed fire in bighorn sheep habitat would be unlikely as explained under Alternative A. The impact would be the same as under Alternative A—beneficial, long-term, and negligible.

Site Preparation Associated with Managed Wildland Fire and Prescribed Fire (hand line, snagging, mop-up)

Same as under Alternative A—adverse, short-term, and negligible.

Fuel Reduction by Hand or Machine

Aggressive Reduction Techniques. These activities not occur in bighorn sheep habitat.

Passive Reduction Techniques. These activities would not occur in bighorn sheep habitat.

Cumulative Impacts

Past, present and reasonably foreseeable future projects would be the same as considered in Alternative A. Impacts from present and reasonably foreseeable actions, considered in combination with the impacts of Alternative D would result in beneficial, long-term, and negligible cumulative impacts.

Conclusion

The impact of Alternative D on Sierra Nevada bighorn sheep would be beneficial, long-term, and negligible based primarily on the continued, though rare, influence of fire on their habitat.

Valley Elderberry Longhorn Beetle (*Desmocerus californicus dimorphus*) – Federal Threatened

Distribution of the valley elderberry longhorn beetle in the area administered by Yosemite National Park is restricted to the El Portal Administrative Site. The entire life cycle of the valley elderberry longhorn beetle is connected to the elderberry plant (*Sambucus sp.*). Adverse effects on elderberry plants would therefore have an adverse effect on this beetle. Current management of vegetation in El Portal follows U.S. Fish and Wildlife Service guidelines for protection of valley elderberry longhorn beetle and their host plants (USFWS 1999). See Appendix 9 for mitigation developed in consultation with USFWS.

Potential for Impacts from Catastrophic Fire

In the chaparral and oak woodland communities where elderberry plants are found, accumulations of fuel in some areas of El Portal could lead to high-intensity fires that would have an adverse effect on valley elderberry longhorn beetles and their host plants. Valley elderberry longhorn beetles and elderberry plants have existed under natural fire regimes for thousands of years, but fires of large extent and high intensity may result in high mortality of valley elderberry longhorn beetles and elderberry plants. Actions taken under Alternative D with a goal to treat wildland/urban interface areas within 6 to 8 years through mechanical fuel reduction and prescribed fire would greatly reduce the chance of catastrophic fire in El Portal. Impact of catastrophic fire would, therefore be beneficial, long-term, and moderate.

Fire Management Treatments

Managed Wildland Fire

Would not occur in valley elderberry longhorn beetle habitat. El Portal Administrative Site, where valley elderberry longhorn beetle habitat occurs, is entirely within the Suppression Unit.

Prescribed Fire

Effects of prescribed fire use, when used, would be similar to Alternative A, but under Alternative D prescribed fire use in El Portal would be greater, with a goal of achieving target conditions in all wildland/urban interface areas within 6 to 8 years. Its effect on the valley elderberry longhorn beetle would therefore be beneficial, long-term, and moderate through the reduction in the chance of catastrophic fire and because long-term benefit to elderberry plants through regeneration and reduced fuel loads would offset the unintentional, short-term impacts from beetle mortality. Mitigation: Follow U.S. Fish and Wildlife Service guidelines for protection of valley elderberry longhorn beetle and their host plants (e.g. see Alternative A).

Holding Action and Monitoring Effects (water and retardant drops, helispots, and spike camps) and Site Preparation Associated with Managed Wildland Fire and Prescribed Fire (hand line, snagging, mop-up)

With the greatly increased use of prescribed fires in areas of valley elderberry longhorn beetle under Alternative D, impacts associated with management of these fires is likely to increase, compared to Alternative A, No Action. Effects of Alternative D would be the same as under Alternative B—adverse, short-term, and negligible, based upon their increased use, and therefore, greater chance of inadvertent impacts, and the application of mitigation measures in accordance with U.S. Fish and Wildlife guidelines.

Fuel Reduction by Hand or Machine

Aggressive Reduction Techniques.

Mechanical Tree and Shrub Removal. Heavy machinery, such as feller-bunchers would be used to achieve target conditions near developed areas but would not be used in areas inhabited by valley elderberry longhorn beetles. Effects would be the same as under Alternative B—adverse, short-term, and minor.

Conventional Tree and Shrub Removal. After plant and fuel removal and reduction, cut and already down materials would be removed through skidding and grappling. Skidding would not be used in areas inhabited by valley elderberry longhorn beetles. Effects would be the same as in Alternative B—adverse, long-term, and negligible.

Passive Reduction and Lower Profile Techniques

Low-Impact Skidding. Would not be used in valley elderberry longhorn beetle habitat.

Hand Cutting. Effects and mitigation would be as in Alternative B. Overall, the reduction in fuels by hand cutting would help reduce the threat of catastrophic fire, which would help protect valley elderberry longhorn beetles and their host plants. Impact on valley elderberry longhorn beetles would be expected to be beneficial, long-term, and moderate.

Pile Burning. Cut materials would, in some cases, be piled and burned. Effects would be the same as described in Alternative B—adverse, short-term, and negligible.

Chipping. In some cases, cut materials would be chipped, when logistical, administrative, or ecological reasons made on-site burning unsuitable. Effects would be the same as described in Alternative B—adverse, long-term, and negligible.

Girdling. Effects of girdling trees would be the same as under Alternative B—beneficial, long-term, and negligible.

Cumulative Impacts

Specific past, present, and reasonably foreseeable projects that could adversely affect valley elderberry longhorn beetles in the vicinity of Yosemite National Park would be the same as in Alternative A. Impacts to valley elderberry longhorn beetle from present and reasonably foreseeable actions would be beneficial, long-term, and minor. Considered in combination with the effects of Alternative D, the cumulative impacts to valley elderberry longhorn beetle would be beneficial, long-term, and minor.

Conclusion

Impact of Alternative D on valley elderberry longhorn beetles would be expected to be beneficial, long-term, and minor due primarily to the reduction in the threat of catastrophic fire through an intensive program of prescribed fire and mechanical fuels management. See Appendix 9 for mitigation developed in consultation with USFWS.

California Red-Legged Frog (*Rana aurora draytonii*) - Federal Threatened

California red-legged frogs have disappeared from nearly the entire Sierra Nevada, including Yosemite National Park—only two populations are known to exist in the northern Sierra. The most significant cause of this decline is alteration and destruction of habitat from activities such as urban development, dams, sediment from roads and mines, grazing, and timber harvest. Pesticide contamination and non-native predators have also been implicated in the frog's demise. Predation by bullfrogs is thought to have caused the disappearance of red-legged frogs from Yosemite, where red-legged frogs were last seen in 1984. Recent surveys have found none (Knapp 2000). Red-legged frog habitat was identified through wildlife habitat relationships analysis (Mayer and Laudenslayer 1988).

Potential for Impacts from Catastrophic Fire

Same as Alternative B—beneficial, long-term, and negligible.

Fire Management Treatments

Managed Wildland Fire

Effects would be similar to those under Alternative B. Under Alternative D, managed wildland fire would have a minor, beneficial, long-term impact on California red-legged frog habitat by helping to restore the natural structure and fuel loading in riparian areas, and quickly reducing the threat of catastrophic fire.

Prescribed Fire
Same as Alternative B—beneficial, long-term, and minor.

Holding Action and Monitoring Effects (water and retardant drops, helispots, and spike camps) and Site Preparation Associated with Managed Wildland Fire and Prescribed Fire (hand line, snagging, mop-up)
Same as Alternative B—adverse, long-term, and minor. Mitigations would be the same as under Alternative A.

Fuel Reduction by Hand or Machine
Aggressive Reduction Techniques
Mechanical Tree and Shrub Removal. Under Alternative D, the use of feller bunchers and other heavy machinery would be used for achieving target conditions in inner wildland/urban interface areas through forest thinning. The effects on red-legged frog would be the same as described in Alternative B, beneficial, long-term, and negligible.

Conventional Tree and Shrub Removal. . Under Alternative D, cut and down materials would be removed from some treatment sites through the use of grappling and skidding equipment. Impact, however, would be negligible, because no red-legged frogs are known to occur in the park. The habitat would benefit from the reduction in fuel loading and restoration of a more natural forest structure. Impact of grappling and skidding on red-legged frogs under Alternative B would be beneficial, long-term, and negligible.

Passive Reduction and Lower Profile Techniques.
Low-Impact Skidding. Would not be used in red-legged frog habitat.

Hand Cutting. Same as Alternative B—beneficial, long-term, and minor.

Chipping. Same as Alternative B—negligible impacts.

Cumulative Impacts
The past, present, and reasonably foreseeable projects that would have a potential effect on red-legged frogs would be the same as in Alternative A. Beneficial impacts from present and reasonably foreseeable projects in combination with effects of Alternative D would result in beneficial, long-term, and minor cumulative impacts, due to implementation of land management plans that would protect habitat and species conservation plans that would protect the species.

Conclusion
Impact of Alternative D on California red-legged frogs would be beneficial, long-term, and minor, due primarily to a rapid reduction in the threat of catastrophic fire through liberal use of prescribed and wildland fires.

Bald Eagle *(Haliaeetus leucocephalus)* - Federal Threatened

Bald eagles are rare and transient in the Yosemite area, and while they have been seen in many areas of the park, they are most frequently seen near large rivers and lakes. Nesting by bald eagles is not known to occur in the park or El Portal. Fish are the primary prey of bald eagles in these areas, and large trees and snags for perching are important habitat components. Bald eagle habitat was identified through wildlife habitat relationships analysis (Mayer and Laudenslayer 1988).

Potential for Impacts from Catastrophic Fire

Impact of Alternative D would be similar to Alternative B—beneficial, long-term, and moderate.

Fire Management Treatments

Managed Wildland Fire

Similar effects as under Alternative B. Impact of managed wildland fire on bald eagles under Alternative D would be beneficial, long-term, and major, due to the relatively rapid rate at which the threat of catastrophic fire would be reduced.

Prescribed Fire

Same as Alternative B—beneficial, long-term, and major, due to the relatively rapid rate at which the threat of catastrophic fire would be reduced, and natural forest structure restored.

Holding Action and Monitoring Effects (water and retardant drops, helispots, and spike camps) and Site Preparation Associated with Managed Wildland Fire and Prescribed Fire (hand line, snagging, mop-up)

Same as Alternative B—adverse, short-term, and minor, primarily from actions that would potentially affect snags.

Fuel Reduction by Hand or Machine

Aggressive Reduction Techniques

Mechanical Tree and Shrub Removal. Use of tracked tree cutting machinery, such as feller-bunchers would be the method used for forest thinning in wildland/urban interface areas. Use of this technique would be restricted to areas of extreme stem density where no other tool was economically feasible. The effects would be the same as in Alternative B—negligible, adverse, long–term.

Conventional Tree and Shrub Removal. Impact of skidding and grappling on bald eagles under Alternative D would be the same as under Alternative B—beneficial, long-term, and negligible.

Passive Reduction and Lower Profile Techniques

Low-Impact Skidding. Effects from low-impact skidding would be similar to Alternative C but the techniques would be used to a smaller extent in Alternative D. Mitigations would be the same as well. These techniques are generally quieter, less intrusive then techniques described under Aggressive Reduction, above. Impacts associated with these techniques are minor, beneficial, and short- to long-term, if areas continue to be maintained with prescribed fire following initial thinning treatments.

Hand Cutting. Same as Alternative B—negligible, adverse, short-term.

Girdling. Same as Alternative B—negligible, beneficial and long-term.

Cumulative Impacts

Past, present, and reasonably foreseeable projects would be the same as under Alternative A. Impacts from these projects would be beneficial, long-term, and minor, based upon the continuing recovery of the species, and implementation of broad-ranging plans that would further benefit bald eagles. Considered in combination with the effects of Alternative D, cumulative impacts would be beneficial, long-term, and moderate.

Conclusion

Alternative D would have a moderate, beneficial, long-term effect on bald eagles, primarily from a rapid reduction in the threat of catastrophic fire that exists over much of their habitat.

Mountain Yellow-Legged Frog *(Rana muscosa*) - Under Review for Federal Listing

Potential for Impacts from Catastrophic Fire

Conditions would be the same as in Alternative A. Effects would be beneficial, short-term, and negligible, due to the gradual reduction in the risk of catastrophic fire.

Fire Management Treatments

Managed Wildland Fire

Same as Alternative B—beneficial, long-term, and minor.

Prescribed Fire

Same as Alternative B—beneficial, long-term, and minor.

Holding Action and Monitoring Effects (water and retardant drops, helispots, and spike camps) and Site Preparation Associated with Managed Wildland Fire and Prescribed Fire (hand line, snagging, mop-up)

Same as Alternative A—adverse, long-term, and minor, due primarily to the risk to remaining populations from water drops. Effects from water dipping and drops would be mitigated by avoiding dipping from waters containing mountain yellow-legged frogs or non-native fish and complying with established protocols to protect resources, identifying locations of sensitive resources to avoid impacts, and use of MIMT.

Fuel Reduction by Hand or Machine

Aggressive Reduction Techniques.

Mechanical Tree and Shrub Removal. Impacts would be adverse, short-term, and negligible but these techniques would not be used near mountain yellow-legged frog habitat.

Conventional Tree and Shrub Removal. These techniques would cause considerable ground disturbance, but would be unlikely to affect mountain yellow-legged frogs because they would not be used in wetland areas. Impact to mountain yellow-legged frogs from skidding and grappling under Alternative D would be adverse, short-term, and negligible.

Passive Reduction and Lower Profile Treatment.

Low-Impact Skidding. Would not be used in mountain yellow-legged frog habitat.

Hand Cutting. Same as Alternative A—no effect on mountain yellow-legged frogs.

Cumulative Impacts

Past, present, and reasonably foreseeable projects would be the same as in Alternative A. Impacts from these projects would be beneficial, long-term, and moderate, based primarily on active efforts to protect and restore the species, and the implementation of land management plans that would provide more ecosystem-based management of habitats. In combination with the effects of Alternative D, cumulative impacts would remain moderate, beneficial and long-term.

Conclusion

Impact to mountain yellow-legged frogs from Alternative D would be beneficial, long-term, and minor, due primarily to the return of a natural fire regime to the small area of habitat that has departed from a natural fire return interval.

Yosemite Toad (*Bufo canorus*) - Under Review for Federal Listing

Potential for Impacts from Catastrophic Fire

Same as Alternative B—beneficial, short-term, and negligible effects.

Fire Management Treatments

Managed Wildland Fire

Same as Alternative B—beneficial, long-term, and minor.

Prescribed Fire

Same as Alternative A—beneficial, long-term, and negligible.

Holding Action and Monitoring Effects (water and retardant drops, helispots, and spike camps) and Site Preparation Associated with Managed Wildland Fire and Prescribed Fire (hand line, snagging, mop-up)

Overall impact of prescribed and wildland fire management actions on toads under Alternative D would be the same as in Alternative B—adverse, long-term, and minor, due primarily to the risk to remaining populations from water drops and retardant contamination. Mitigation: Identify locations of Yosemite toad and mountain yellow-legged frog populations and avoid involvement of these areas in water and retardant drops.

Fuel Reduction by Hand or Machine

Aggressive Reduction Techniques. These techniques would not be used in Yosemite toad habitat.

Passive Reduction and Lower Profile Techniques.

Low-Impact Skidding. Would not be used in toad habitat.

Hand Cutting. Same as Alternative A—beneficial, long-term, and negligible.

Cumulative Impacts

Past, present, and reasonably foreseeable projects would be the same as under Alternative A. Impacts on Yosemite toad from these projects would be beneficial, long-term, and moderate, based primarily on active efforts to protect and restore the species, and the implementation of land management plans that would provide more ecosystem-based habitat management. Considered in combination with the impacts of Alternative D, cumulative impacts would be beneficial, long-term, and moderate.

Conclusion

Impact to Yosemite toads from Alternative D would be beneficial, long-term, and minor due primarily to the return of a natural fire regime to the area of habitat that has departed from a natural fire return interval, although the wet habitats of Yosemite toads would be unlikely to be directly affected.

California Spotted Owl (Strix occidentalis occidentalis)

California spotted owls are found throughout the Sierra Nevada, from lower elevation oak and ponderosa pine forests up to 7,600 feet elevation red fir forests. There are approximately 100 known and probable spotted owl sites in Yosemite National Park. While spotted owls can coexist with extensive fires of varying intensities within their habitats, severe wildland fire in mixed-conifer forests may represent the greatest threat to existing spotted owl habitat in Yosemite (Weatherspoon et al. 1992). California spotted owl habitat was identified through wildlife habitat relationships analysis (Mayer and Laudenslayer 1988).

Potential for Impacts from Catastrophic Fire

Effects would be similar to those described under Alternative B. Under Alternative D, these conditions would be rapidly reduced through prescribed and managed wildland fire, with a goal of reaching target conditions within 15 to 20 years. Effects of Alternative D in regards to catastrophic fire and California spotted owls would be beneficial, long-term, and moderate.

Fire Management Treatments

Managed Wildland Fire

Effects would be similar to those described in Alternative A, except under Alternative D, managed wildland fire would increase. Adverse effects from wildland fire could be minimized through reduction of fuel loading in known spotted owl nesting and roosting areas through the use of spring prescribed fires, which would disrupt fuel continuity and reduce the chance of stand-replacing fires in these areas (Weatherspoon et al. 1992).

The impact of managed wildland fire on California spotted owls under Alternative D would be beneficial, long-term, and moderate to major, based upon the mitigation of the threat of catastrophic fire, primarily through the use of managed wildland fire, over a 15 – 20-year period.

Prescribed Fire

The use of prescribed fire under Alternative D would be the same as in Alternative B, and would have moderate to major, beneficial, long-term impact on California spotted owls, primarily through the reduction in the threat of catastrophic fire and the restoration of a more natural forest structure over a 15 – 20-year period. Reduction of fuels in spotted owl roosting and nesting habitat through low-intensity burns or mechanical thinning at appropriate times of the year would minimize adverse impacts.

Holding Action and Monitoring Effects (water and retardant drops, helispots, and spike camps) and Site Preparation Associated with Managed Wildland Fire and Prescribed Fire (hand line, snagging, mop-up)

Same as Alternative A. Overall, actions taken to manage wildland and prescribed fire under Alternative D would have a minor, adverse, long-term effect on spotted owls through possible disturbance and habitat alteration in roosting and nesting sites. Such impacts would be mitigated by locating all spotted owl sites in a treatment area and avoiding impacts to them.

Fuel Reduction by Hand or Machine

Aggressive Reduction Techniques

Mechanical Tree and Shrub Removal. Under Alternative D, forests in wildland/urban interface areas and along road and utility corridors would be thinned and biomass would be reduced. The reduction in canopy cover and number of snags would affect the quality of these areas to spotted owls but these effects are small areas in relation to the park landscape. Effects of biomass removal on spotted owls under Alternative D would be the same as in Alternative B, with adverse, long-term, and minor impacts.

Conventional Tree and Shrub Removal. This technique utilizes tracked and rubber tired equipment to remove fresh cut and down and dead material from inner wildland/urban interface areas. Adverse effects on spotted owls would occur if many large, downed logs were removed from the forest, because this could result in a decrease in northern flying squirrel, an important prey of spotted owls. This is offset by the small area that work is performed and the benefits that result from reducing the risk of high intensity fire in developed areas. The impacts are minor, adverse and long-term.

Passive Reduction and Lower Profile Techniques.

Hand Cutting. Same as Alternative B. Impact of hand Cutting and burning on California spotted owls under Alternative D would be beneficial, long-term, and minor, based upon possible return of treated areas to a more natural forest structure.

Chipping. Same as Alternative B, the equipment used to chip material is extremely loud, and would potentially cause disturbance of any nearby spotted owls. Such impact, however, would be adverse, short-term, and negligible.

Girdling. Same as Alternative B, adverse effect if the snags were removed while the owls are using them.

Cumulative Impacts

Past, present, and reasonably foreseeable projects would be the same as described in Alternative A. Impacts from present and reasonably foreseeable projects would be beneficial, long-term, and moderate. Considered in combination with the effects of Alternative D, cumulative impacts would be beneficial, long-term, and moderate to major.

Conclusion

Alternative D would have moderate to major, beneficial, long-term impact on spotted owls from a rapid reduction in the threat of catastrophic fire and restoration of natural fire structure through liberal use of wildland and prescribed fire. Care, however, would have to be taken with fuels management in spotted owl roosting and nesting habitat to minimize adverse impacts. This would require extensive knowledge of the occurrence of spotted owls in the park.

Pacific Fisher *(Martes pennanti)* - Under Review for Federal Listing

Potential for Impacts from Catastrophic Fire

As in Alternative B, under Alternative D the potential for high-intensity fire would be reduced through the liberal application of managed wildland and prescribed fire to reduce critical fuel loading, restore natural forest structure over a 15 – 20-year period, and maintain a natural fire

regime. Impact of Alternative D from the threat or effects of catastrophic fire would be beneficial, long-term, and major.

Fire Management Treatments

Managed Wildland Fire

Effects would be similar to Alternative B. Under Alternative D, managed wildland fire would have a moderate to moderate to major, beneficial, long-term effect on fishers.

Prescribed Fire

Use of prescribed fire would greatly increase under Alternative D, with effects similar to Alternative B, but fewer acres would be treated. Impact of prescribed fire on fishers under Alternative D would be beneficial, long-term, and moderate to major, based upon a rapid reduction in the threat of catastrophic fire, and restoration of a more natural forest structure. Care, however, must be taken to preserve habitat features that are important to fishers.

Holding Action and Monitoring Effects (water and retardant drops, helispots, and spike camps) and Site Preparation Associated with Managed Wildland Fire and Prescribed Fire (hand line, snagging, mop-up)

Same as Alternative A. In total, actions taken to manage wildland and prescribed fire under Alternative D would have a minor, adverse, long-term effect on fishers, primarily from possible reduction in the number of snags.

Fuel Reduction by Hand or Machine

Aggressive Reduction Techniques.

Mechanical Tree and Shrub Removal. Same effects as in Alternative B. Biomass removal under Alternative D would have adverse, long-term, and minor effects on fishers.

Conventional Tree and Shrub Removal. The use of skidding and grappling machinery to remove large, woody debris would have an adverse effect on fishers by reducing habitat complexity; especially from the loss of large, down trees. There would also be a reduction in the threat of catastrophic fire from the resulting fuel reduction. Because the areas where this treatment is proposed in not suitable habitat due to human development the impacts would be adverse, long-term, and negligible.

Passive Reduction and Lower Profile techniques.

Low-Impact Skidding. These techniques are generally quieter, less intrusive then techniques described under Aggressive Reduction. Impacts would be similar to Alternative C yet these techniques would be used less often in this alternative. Impacts to fishers associated with these techniques are minor, beneficial, and short- to long-term, if areas continue to be maintained with prescribed fire following initial thinning treatments.

Hand Cutting. Same as Alternative A—adverse, long-term, and negligible.

Cumulative Impacts

Past, present, and reasonably foreseeable projects would be the same as in Alternative A. Impacts of reasonably foreseeable actions would be, beneficial, long-term, and moderate for Pacific fishers. Considered in combination with the impacts of Alternative D, the cumulative impact would be moderate to beneficial, long-term, and major.

Conclusion

Overall, Alternative D would have a moderate to major, beneficial, long-term effect on Pacific fishers by reducing the threat of catastrophic fire and restoring natural forest structure through the use of wildland and prescribed fires, especially in the southwest part of the park where fisher densities are believed to be highest, and fuel loading has reached critical levels. Fuel-reduction actions, however, would take into account preservation of habitat features that are important to fishers, such as snags and large down woody debris.

Great Gray Owl *(Strix nebulosa)* – California Endangered

Potential for Impacts from Catastrophic Fire

Effects would be similar to those in Alternative B. Through the use of prescribed and wildland fires, the treatment of accumulated fuels under Alternative D would reduce the threat of catastrophic fire over a 15 – 20-year period. The impact of Alternative D would be beneficial, long-term, and moderate, given the substantial portion of great gray owl habitat over which threat of catastrophic fire would be reduced.

Fire Management Treatments

Managed Wildland Fire

Effects would be similar to those in Alternative A, except under Alternative D managed wildland fire would be greatly increase. The effect of managed wildland fire on great gray owls under Alternative D would be beneficial, long-term, and moderate to major, based upon the amount of managed wildland fire that would occur, the large amount of great gray owl habitat that has deviated from the median fire return interval, and the treatment of this habitat that would occur.

Prescribed Fire

Effects would be similar to those described in Alternative B. Under Alternative D, use of prescribed fire would be substantial, and concentrate on areas that have most severely deviated from the natural fire cycle. Impact of prescribed fire on great gray owls under Alternative D would be beneficial, long-term, and moderate to major, based upon the improvement of habitat, and the reduction in the threat of catastrophic fire that would occur. Prescriptions for fires in great gray owl habitat must take into consideration the preservation of large, old snags that are important to the owls.

Holding Action and Monitoring Effects (water and retardant drops, helispots, and spike camps) and Site Preparation Associated with Managed Wildland Fire and Prescribed Fire (hand line, snagging, mop-up)

Same as in Alternative B. Overall, actions taken to manage wildland and prescribed fires would have a minor, adverse, long-term effect on great gray owls under Alternative D. This is primarily based upon possible impacts associated with snag removal, which would be mitigated to protect the owls through avoidance of snags used by great gray owls the extent possible.

Fuel Reduction by Hand or Machine

Aggressive Reduction Techniques

Mechanical Tree and Shrub Removal. The effects would be similar to those described under Alternative B although these techniques would be used less. Impacts would be adverse, short-term, and minor and would be mitigated to the extent possible through avoidance of great gray owl habitat, especially nesting snags.

Conventional Tree and Shrub Removal. The use of skidding and grappling equipment to reduce fuel loading would have an adverse effect on great gray owls if it were to occur in nesting and foraging habitat, where disturbance could cause reproductive failure. Before such operations were undertaken in potential great gray owl habitat, it would be necessary to determine if the owls are present. The potential for adverse effects on great gray owls would be most likely at Crane Flat, Hodgdon Meadow, Wawona Meadow, and along Glacier Point Road, where the species is known to occur. Given that these activities occur in relatively small areas in relation to great gray owl habitat, they would be somewhat minor. Impact to great gray owls from thinning by heavy machinery would be adverse, short-term, and minor if inhabited areas were avoided.

Passive Reduction and Lower Profile Techniques

Low-Impact Skidding. Effects would be similar to those described in Alternative C but in Alternative D the techniques would be used in conjunction with large machinery. As the areas for this proposal are limited to wildland/urban interface areas and road and utility corridors, the overall impact would be minor. The impacts from low-impact skidding would be adverse, short-term, and minor.

Hand Cutting. Effects would be similar to those in Alternative A, but would be in combination with other biomass removal activities. Impact of hand thinning on great gray owls under Alternative D would be adverse, long-term, and minor, based upon potential disturbance of hunting and nesting owls, and reduction in snag density.

Chipping. Same as Alternative A—adverse, short-term, and minor.

Girdling. Girdling would be used as a tool for maintaining snag density resulting in, beneficial, long-term, and minor to moderate impacts.

Cumulative Impacts

Past, present, and reasonably foreseeable projects that would affect great gray owls would be the same as in Alternative A. The effects of present and reasonably foreseeable projects would be beneficial, long-term, and moderate. Considered in combination with the effects of Alternative D, cumulative impacts would be beneficial, long-term, and moderate.

Conclusion

The impact of Alternative D on great gray owls would be beneficial, long-term, and moderate, based primarily on a reduction in the threat of catastrophic fire. Actions taken to manage wildland and prescribed fires, and mechanically manage fuels would have localized adverse effects on great gray owls if they reduced snag density or caused disturbance of nesting or hunting owls.

Willow Flycatcher *(Empidonax trailii)* – California Endangered

Potential for Impacts from Catastrophic Fire

Impacts would be similar to Alternative B. The risk of catastrophic fire would be reduced under Alternative D through the widespread use of wildland and prescribed fires over a 15 – 20-year period. Impact of Alternative D from the threat or effects of catastrophic fire would be beneficial, long-term, and minor, because of the inherent low fire frequency and intensity associated with meadow habitats.

Fire Management Treatments

Managed Wildland Fire

Same as Alternative B—minor, beneficial, long-term impact on willow flycatchers from reduction in the threat of catastrophic fire, and the return of fire to its role in maintenance of willow habitat. Fires that occur in habitat occupied by willow flycatchers would be managed to consider possible adverse effects associated with accumulation of fuels; steps would be taken to mitigate these effects. In meadows known to be occupied by willow flycatchers, protection measures will be taken to protect individual nests and local habitat, while also reducing the amount of decayed and decadent grown of willows in the immediate area. Re-ignitions would be timed to occur outside of nesting season.

Prescribed Fire

Effects would be similar to those of Alternative A, but the amount of prescribed fire activity would be greater. Impact of prescribed fire on willow flycatchers under Alternative D would be beneficial, long-term, and minor to moderate, due to the reduction in the threat of catastrophic fire and the regeneration of lightly singed or burned willows following prescribed burning. Prescribed fires likely to affect meadow habitats known to be occupied by willow flycatchers should be evaluated for potential adverse effects and managed to minimize impacts. Burning at specific sites would not occur during the period of nesting and fledging (May – September), and willows would be protected from intense fires by clearing dead and decadent fuels from around and within willow shrubs. If possible, meadow habitats with recent flycatcher nests would be burned in stages, so not all potential nest shrubs would be damaged at once. Surveys would be conducted to locate willow flycatchers in the park, so appropriate fire management actions can be taken.

Holding Action and Monitoring Effects (water and retardant drops, helispots, and spike camps) and Site Preparation Associated with Managed Wildland Fire and Prescribed Fire (hand line, snagging, mop-up)

Same as Alternative A—adverse, minor, and short-term effect on willow flycatchers, mostly from potential impacts of conducting helicopter operations out of Wawona Meadow.

Fuel Reduction by Hand or Machine

Aggressive Reduction Techniques

Mechanical Tree and Shrub Removal. Same as Alternative B—adverse, short-term, and negligible.

Conventional Tree and Shrub Removal. Effects would be similar to Alternative B. Impact of on willow flycatchers under Alternative C would be adverse, short-term, and negligible

Passive Reduction and Lower Profile Techniques

Low-Impact Skidding. Would not be used in willow flycatcher habitat.

Hand Cutting. Same as Alternative A. Hand thinning would have a negligible effect on willow flycatchers, because these operations would not usually occur in meadow habitats, where large fuels are already sparse, and the moist conditions would typically not carry fire.

Chipping. Chipping would occur, but well away from willow flycatcher habitat.

Cumulative Impacts

Past, present, and reasonably foreseeable projects would be the same as in Alternative A. In aggregate the effects of reasonably foreseeable future actions would be minor, beneficial and long-

term. Other foreseeable projects with adverse impacts would affect small areas and/or have minor effects over larger areas. The *Yosemite Fire Management Plan* under Alternative D would affect habitats influenced by years of fire suppression by reducing the risk of catastrophic fire in some areas. Considered in combination with the effects of Alternative D, the cumulative impacts would be beneficial, long-term, and minor.

Considered in combination with these effects, the impact of Alternative D would remain beneficial, long-term, and minor.

Conclusion

The impact of Alternative D on willow flycatchers would be beneficial, long-term, and moderate based primarily upon rapid reduction of the threat of catastrophic fire in some habitats through use of wildland and prescribed fires. These techniques, however, must be carefully applied to avoid adverse impacts on the few remaining willow flycatchers remaining in Yosemite.

Summary Conclusion, Special-Status Species – Animals

In almost all cases, the greatest threat to special-status species would be through catastrophic fire. This alternative would reduce the potential of catastrophic fire, compared to Alternative A. Mitigations and special measures, as identified, would be applied to limit impacts. There would be no impairment from the effects of this alternative. See Appendix 9 for mitigation developed in consultation with USFWS.

Physical Environment

Watersheds, Soils, and Water Quality

In the action alternatives, the majority of the park (621,059 acres) would be in the Fire Use Unit where natural processes would be at the core of the fire management program. Approximately 25% of the Merced River watershed and 19% of the Tuolumne River watershed show moderate to high departures from median fire return intervals. These are the areas with the greatest potential for catastrophic fire and thus the areas where ecosystem restoration and fuel reduction treatment may be needed to restore the natural fire regime and provide protection to people and developed areas. The Suppression Unit would comprise 76,664 acres of the Merced River watershed and 51,379 of the Tuolumne River watershed. Prescribed fire units, some of which are in the Fire Use Unit, would include 77,154 acres in the Merced River watershed and 79,094 acres in the Tuolumne River watershed.

Potential for Impacts from Catastrophic Fire

Because of aggressive actions that would be used in the burn units to reduce fuels, there is the potential for creating strategically located burns to break up the continuity of fuels and vegetation along the vertical gradients within the watersheds. These burned areas would not eliminate the potential for high-severity fires in the watershed, but they would reduce the potential for large fires burning from ridges, down through mid-slopes, and into bottom-slopes and riparian areas over large areas of a watershed. This strategy would reduce the potential for large, high-severity fires during the life of the plan.

Areas of hydrophobic soils would likely be created from unwanted fire, but with breaks in the vertical gradient, smaller increases in water yield and peak flows would result, compared to Alternative A. Likewise, the increase in sediment and nutrient yields would be less than in Alternative A, because of the smaller amounts of intrusion by fire into the lower slopes of the watershed. Fire intrusion could destabilize banks and channel margins, but the effects would be localized and less than under Alternative A. Stream channel response would not be as severe either and a quick recovery of riparian vegetation would stabilize stream systems. This would benefit water quality. The potential would continue to exist for high-severity fires with adverse, moderate, and potentially long-term effects, however, the overall effects of Alternative D on soil and watershed conditions in regards to catastrophic fire would be beneficial, long-term, and moderate.

Fire Management Treatments

Managed Wildland Fire

Fire in the duff layers would continue to spread within watersheds under variable conditions, ranging from generally light to locally severe, creating small patches of extremely hydrophobic soils. In areas of high fuel loading, soils would be exposed to longer resident time and higher temperature than would occur within the natural range of variability. Fire effects would not typically be on a watershed-wide scale as fire would typically burn along ridge tops and upper slopes, with only partial intrusion into slope bottoms and riparian areas. Water yield and peak flows would increase only slightly, over the short-term, and within a small range of variability, thus sediment and nutrient yield would generally only see short-term fluctuations. As a result, there would be negligible channel widening, with short-term recovery of riparian systems. Overall, the soil and watershed effects would be beneficial, short-term, and moderate, as in Alternative A.

Re-ignition clause. The effects under the re-ignition clause would be the same as described under managed wildland fire.

Holding Action and Monitoring Effects (water and retardant drops, helispots, and spike camps). Same as Alternative B—adverse, short-term, and negligible to minor.

Prescribed Fire

Prescribed fire would typically be used in areas that have missed three or more fires and in Special Management Areas. The total acreage in prescribed fire units is 77,154 acres in the Merced River watershed and 79,094 acres in the Tuolumne River watershed. This alternative would result in a more aggressive program of prescribed fire use (1,817 to 9,194 acres burned per year), but this would also accompany similarly aggressive actions to restore plant community structure through mechanical and hand thinning. Due to the controlled conditions of prescribed fire (fuel moisture, weather conditions, time of day, spatial pattern of ignition, and other factors), small scale effects of projects would be similar to those under Alternative A. However, because of the greater number of acres being treated through prescribed fire, Alternative D would reduce the potential for large, high-severity fires on a watershed scale. Burns would reduce the continuity of fuels on the vertical gradient in more areas throughout the watershed, compared to that of Alternative A. Fire in the duff layers would spread under variable conditions, but not with enough severity to cause extensive areas of hydrophobic soil. Consequently, wildland fire would have less of an effect on water yield, peak flows, sediment yield, and nutrient yield in this alternative than under Alternative A. Because of these treatments, the effects of prescribed fire on watershed conditions would be beneficial, long-term, and major.

Site Preparation Associated with Managed Wildland Fire and Prescribed Fire (hand line, snagging, mop-up)

These activities would have the potential to increase soil erosion, because vegetation and organic litter would be removed in order to stop or hold a fire. Erosion would be greatest along hand line that follows steep gradients. Both hand line and mop-up would cause some soil compaction and disturbance. Waterbars and check dams would be used to mitigate runoff and erosion. Downed snags would make locally heavy areas of fuel and would affect water temperature and residence time on very small scales. These actions potentially would be more widespread than under Alternative A, due to the increased use of prescribed fire. Impacts to soils and watersheds would be the same as in Alternative A—adverse, short-term, and minor.

Fuel Reduction by Hand or Machine

Aggressive Reduction Techniques.

Mechanical Tree and Shrub Removal. These activities would occur primarily around the inner wildland/urban interface, in areas where plant community structure has been altered because of the absence of fire. Of the approximately 1,100 acres of wildland/urban interface treated per year in this alternative, about half is slated for mechanical thinning. These activities generally would be followed by prescribed fire, as discussed above. The extensive use of tracked machinery in small areas would cause soil compaction. Second entries into WUI areas, to remove trees up to 20 inches in diameter if prescribed fire has failed to achieve desired results, could result in long-term compaction, unless mitigations are effectively utilized. Mitigation would include running the machinery over snow, frozen soil, or a bed of crushed vegetation. While aggressive reduction techniques would reduce the potential for high-severity fire, the impacts on soils would be adverse, long-term, and minor. Limiting activities within 150 feet of a stream to less than 5% of the total area should buffer the effects of ground disturbance on the aquatic community. In combination with the prescribed burn program, the effects of mechanical treatment, in terms of reducing the potential for watershed impacts (on water yield, peak flow, sediment yield, nutrient yield and stream system response) of large, high-severity fire over the long-term, would be beneficial and major

Conventional Tree and Shrub Removal. Skidding would be used in parts of the wildland/urban interface. The extensive use of tracked or rubber tired machinery in small areas would cause soil compaction. Second entries into WUI areas, to remove trees up to 20 inches in diameter if prescribed fire has failed to achieve desired results, could result in long-term compaction, unless mitigations are effectively utilized. Mitigation would include running the machinery over snow, frozen soil, or a bed of crushed vegetation. These activities and equipment-use combinations could disrupt the duff and topsoil layers, causing erosion and increasing sediment and nutrient yield, as well as affecting water quality. However, treatment areas would not combine ridges, mid-slopes, and bottom-slopes, thus these mitigating effects to adverse, short-term, and minor for watersheds. The impacts on soil would be adverse, long-term, and minor to moderate.

Passive Reduction and Lower Profile Techniques.

Low-Impact Skidding. This would include the use of draft animals and four wheel, all-terrain vehicles, in combination with fetching arches, to skid trees of approximately 10-20”dbh. In Alternative D, this technique would be used on a limited basis, in sensitive areas where use of heavy equipment was deemed inappropriate. Knobby tires and the feet of draft animals would have only negligible local effects on topsoil and duff layers. The most significant effect, from dragging one end of the tree, would be a skid trench typically less than a foot wide and a few inches deep. In

most locations, this scarification could be raked out with hand tools, to limit the amount of soil erosion, and thus limit the effect upon sediment and nutrient yield in the watershed. Waterbars would be built if needed. Other mitigation, when needed, could include running the machinery over snow, frozen soil, or a bed of crushed vegetation. Second entries into WUI areas, to remove trees up to 20 inches in diameter if prescribed fire has failed to achieve desired results, could result in long-term compaction, unless mitigations are effectively utilized. Some projects would be extensive enough that effects might be potentially greater than localized, but they would not typically occur on ridge, mid-slope, and bottom-slope combinations, thus effects of use would be adverse, short-term and minor for watersheds and soils.

Hand Cutting. These activities would be used in the Fire Use Unit and in some areas of the Suppression Unit and Special Management Areas. Because the work is labor-intensive, about 100 acres would be treated per year, although the amount would depend on how much was treated by other methods. Hand cutting activities would likely lead to soil compaction in small areas, but would have a negligible effect on duff and topsoil layers, resulting in negligible direct impacts upon watershed characteristics, including water yield, peak flows, sediment yield, nutrient yield, and stream system response. However, because of the small number of acres treated annually, the potential for large, high severity fires would remain high. Thus, the effects of hand thinning would be beneficial and potentially long-term, and minor.

Pile burning. Piles would burn under variable conditions, ranging from light to locally severe, creating only patches of extremely hydrophobic soils. These patches would be expected to have altered biological and physical characteristics. Because of the small size of the areas, the biological function would return very quickly. The impact of pile burning on soils would be adverse, short-term, and minor. Overall, the watershed effects within these areas would be beneficial, short-term, and minor to moderate. The effects would not be on a watershed-wide scale; projects would be limited in scale, with boundaries typically associated with only one portion of the slope (top, mid-slope, or bottom). Water yield and peak flows would increase only slightly, and within a small range of variability, thus sediment and nutrient yield would only see short-term fluctuations. As a result, there would be negligible channel response, with short-term effects, if any, in riparian systems. Compared to Alternative A, due to the increase in area treated, the impact of pile burning on soils would be adverse, short-term, and minor to moderate. Overall, the watershed effects within these areas would be beneficial, short-term, and minor to moderate.

Chipping. Chipping would be used to reduce fuels, promote nutrient cycling, and achieve air quality objectives. Fire in chipped fuels would be generally light to moderate in intensity and would be used in project areas with boundaries that would not be of watershed or landscape scale. Effects of chipping in this alternative would be beneficial, short-term, and minor or moderate. Chips would be applied up to 1” deep. This mitigation would make the effects of chipping on soils adverse, short-term, and negligible to minor.

Girdling. The intensive nature of the work necessary to complete this action would lead to soil compaction and disturbance in small areas. Girdling would have an adverse, short-term, and negligible to minor effect on soils, watersheds, and water quality.

Cumulative Impacts

The past, present and reasonably foreseeable projects effecting the Merced and Tuolumne River watersheds would be the same as discussed under Alternative A. While the actions would reduce

the potential for high severity fire, the impact on soils would be adverse. These actions would have net beneficial impacts on watershed values through either reducing the potential for high severity fire, or through reduction of watershed effects caused by restoration activities.

The cumulative effects of Alternative D, when considered in combination with the minor to moderately beneficial impacts of projects on lands administered by other agencies in the upper Tuolumne and Merced watersheds, would be beneficial, long-term, and moderate to major.

Conclusion

When looked at as a group, the actions of Alternative D would have beneficial, long-term, and major effects to watersheds, soils, and water quality. This is based upon a combination of beneficial, long-term, moderate to major impacts in Fire Use Units and the potential for areas of beneficial, long-term, and major impacts in Suppression Units. High-severity fires would likely occur during the life of the plan, but the treatments proposed would reduce the size and effects upon soils and watersheds, including the potential for adverse effects upon water yield, peak flow, nutrient yield, sediment yield, and stream system response. The potential for catastrophic fire would still exist, but the intent of the alternative would be to reduce the risk, thus there would be no impairment from the effects of Alternative D.

Air Quality

Emissions

Wildland and Prescribed Fire Emissions

Air emissions associated with the projected burning actions for Alternative D were estimated using the FOFEM model (see Methodology above). The results are summarized and compared to Alternative A in table IV-17. Separate estimates were made for the years 2003 to 2009 to analyze the trends in impacts over the years.

Prescribed Fire Summary. To compare the estimated emissions from the various alternatives, the emissions from prescribed burns were averaged for the 7-year period that was modeled, and these data are provided in table IV-18.

Table IV-17
Projected Air Emissions Associated with Various Fire Types in Yosemite National Park Under Alternative D (Alternative A emissions for comparison)

Alternative A (1991-2000 average)							
Fire Type	Acres	Fire Emissions (tons/yr) [a]					
		PM_{10}	$PM_{2.5}$	VOC	CO	NO_X	CO_2
Prescribed Burns [b]	1,495	1,087	917	719	12,945	370	58,557
Managed Wildland Fire [b]	2,152	1,564	1,321	1,034	18,637	532	84,305
Wildfire	5,759	6,920	5,864	3,529	76,930	2,198	387,446
Total	9,406	9,571	8,103	5,282	108,512	3,100	530,308

a PM_{10} = Suspended Particulate, $PM_{2.5}$ = Fine Particulate Matter, VOC = volatile organic compounds, CO = Carbon Monoxide, NOx = Nitrogen Oxides, CO_2 = Carbon Dioxide

b Based on composite emission factor for prescribed burning

Alternative D – 2003							
Fire Type	**Acres**	**Fire Emissions (tons/yr) [a]**					
		PM_{10}	**$PM_{2.5}$**	**VOC**	**CO**	**NO_X**	**CO_2**
Prescribed Burns [b]	9,835	7,143	6,053	3,656	79,876	2,282	373,988
Managed Wildland Fire [b]	6,832	4,967	4,194	3,285	59,180	1,691	267,698
Wildfire	5,759	6,920	5,864	3,529	76,930	2,198	387,446
Total	**22,426**	**19,030**	**16,111**	**10,470**	**215,986**	**6,171**	**1,029,132**

Alternative D – 2004							
Fire Type	**Acres**	**Fire Emissions (tons/yr) [a]**					
		PM_{10}	**$PM_{2.5}$**	**VOC**	**CO**	**NO_X**	**CO_2**
Prescribed Burns [b]	5,721	5,672	4,807	2,907	63,563	1,816	289,659
Managed Wildland Fire [b]	6,832	4,967	4,194	3,285	59,180	1,691	267,698
Wildfire	5,759	6,920	5,864	3,529	76,930	2,198	387,446
Total	**18,312**	**17,559**	**14,865**	**9,721**	**199,673**	**5,705**	**944,803**

Alternative D – 2005							
Fire Type	**Acres**	**Fire Emissions (tons/yr) [a]**					
		PM_{10}	**$PM_{2.5}$**	**VOC**	**CO**	**NO_X**	**CO_2**
Prescribed Burns [b]	9,366	11,797	9,996	6,030	131,669	3,762	631,073
Managed Wildland Fire [b]	6,832	4,967	4,194	3,285	59,180	1,691	267,698
Wildfire	5,759	6,920	5,864	3,529	76,930	2,198	387,446
Total	**21,957**	**23,684**	**20,054**	**12,844**	**267,779**	**7,651**	**1,286,217**

Alternative D – 2006							
Fire Type	**Acres**	**Fire Emissions (tons/yr) [a]**					
		PM_{10}	**$PM_{2.5}$**	**VOC**	**CO**	**NO_X**	**CO_2**
Prescribed Burns [b]	4,974	4,364	3,698	2,236	48,888	1,397	223,484
Managed Wildland Fire [b]	6,832	4,967	4,194	3,285	59,180	1,691	267,698
Wildfire	5,759	6,920	5,864	3,529	76,930	2,198	387,446
Total	**17,565**	**16,251**	**13,756**	**9,050**	**184,998**	**5,286**	**878,628**

Alternative D – 2007							
Fire Type	**Acres**	**Fire Emissions (tons/yr) [a]**					
		PM_{10}	**$PM_{2.5}$**	**VOC**	**CO**	**NO_X**	**CO_2**
Prescribed Burns [b]	9,653	6,470	5,483	3,308	72,221	2,063	346,492
Managed Wildland Fire [b]	6,832	4,967	4,194	3,285	59,180	1,691	267,698
Wildfire	5,759	6,920	5,864	3,529	76,930	2,198	387,446
Total	**22,244**	**18,357**	**15,541**	**10,122**	**208,331**	**5,952**	**1,001,636**

Alternative D – 2008							
Fire Type	Acres	Fire Emissions (tons/yr) [a]					
		PM_{10}	$PM_{2.5}$	VOC	CO	NO_X	CO_2
Prescribed Burns [b]	17,045	7,748	6,566	3,969	86.805	2,480	396,896
Managed Wildland Fire [b]	6,832	4,967	4,194	3,285	59,180	1,691	267,698
Wildfire	5,759	6,920	5,864	3,529	76,930	2,198	387,446
Total	**29,636**	**19,635**	**16,624**	**10,783**	**222,915**	**6,369**	**1,052,040**
Alternative D – 2009							
Fire Type	Acres	Fire Emissions (tons/yr)[a]					
		PM_{10}	$PM_{2.5}$	VOC	CO	NO_X	CO_2
Prescribed Burns [b]	11,743	10,889	9,165	8,655	136,485	3,900	625,037
Managed Wildland Fire [b]	6,832	4,967	4,194	3,285	59,180	1,691	267,698
Wildfire	5,759	6,920	5,864	3,529	76,930	2,198	387,446
Total	**24,334**	**22,776**	**19,223**	**15,469**	**272,595**	**7,789**	**1,280,181**

a PM_{10} = Suspended Particulate, $PM_{2.5}$ = Fine Particulate Matter, VOC = volatile organic compounds (as methane), CO = Carbon Monoxide, NOx = Nitrogen Oxides, CO_2 = Carbon Dioxide
b Based on composite emission factor for prescribed burning

Table IV-18
Average Prescribed Burn Estimated Emissions for Alternative D for the years 2003 – 2009

Alternative D						
	Acres Burned	Emissions (tons/year) [a]				
		PM_{10}	$PM_{2.5}$	VOC	CO	CO_2
Historical Average	1,495	1,087	917	719	12,945	58,557
Alternative D Average	9,762	7,726	6,538	4,394	88,501	412,376
Potential Increase in Alternative D	**8,267**	**6,639**	**5,621**	**3,675**	**75,556**	**353,819**

a PM_{10} = Suspended Particulate, $PM_{2.5}$ = Fine Particulate Matter, VOC = volatile organic compounds, CO = Carbon Monoxide, NOx = Nitrogen Oxides, CO_2 = Carbon Dioxide

Mechanical Thinning Emissions

Air emissions would be generated by motorized equipment used to reduce fuels and restore ecosystems. Equipment would include chainsaws, chippers, feller/bunchers, skidders, ATVs, and haul trucks. Emissions from the operation of these machines have been figured based on estimated operating hours by park personnel clearing an average of 1,100 acres per year, which is about ten times the existing annual average for machine use. The *Final Yosemite Fire Management Plan/EIS* would result in a smaller tree size thinned in WUI than was considered in the *Draft Yosemite Fire Management Plan/EIS*. Actual operating hours would potentially be less, but because of the possibility of second entry, the analysis in the Draft was retained as a worst-case analysis.

Estimated air emissions are summarized in table IV-19. Emissions from machines would be minor compared to fire emissions.

Table IV-19
Air Emissions Associated with Mechanical Thinning Activities

Alternative D							
Equipment	Operating Hours	Motorized Equipment Emissions (tons/yr) [a]					
		PM_{10}	$PM_{2.5}$	VOC	CO	NO_x	CO_2 [b]
Chainsaws	11,312	0.29	0.29	5.97	19.37	0.07	ND
Chippers	2,155	0.46	0.46	0.20	28.80	0.02	ND
Feller-Bunchers	259	0.07	0.07	0.12	0.57	0.38	ND
Skidders	259	0.07	0.07	0.12	0.57	0.38	ND
Haul Trucks	777	0.22	0.22	0.37	1.70	1.14	ND
ATV Skidders	150	0.0	0.0	0.03	2.29	0.02	ND
Total		**1.11**	**1.11**	**6.81**	**53.30**	**2.01**	**ND**

a PM_{10} = Suspended Particulate, $PM_{2.5}$ = Fine Particulate Matter, VOC = volatile organic compounds as methane, CO = Carbon Monoxide, NOx = Nitrogen Oxides, CO_2 = Carbon Dioxide
b No data

Mitigation Measures

Under Alternative D, mitigation measures, including use of the *Smoke Communications Strategy*, would be the same as those for Alternative B.

Agency Coordination

Agency coordination for Alternative D would be the same as Alternative B.

Cumulative Impacts

Past, present, and reasonably foreseeable projects in the area that might impact air quality would be the same as those for Alternative A. The cumulative impacts of Alternative D, considered with the moderate, adverse impact resulting from present and reasonably foreseeable future projects in the region, would be major, adverse, and short-term.

Conclusion

These data indicate that Alternative D would result in greater emissions relative to the No Action Alternative. In particular, Alternative D would generate greater quantities of emissions than Alternatives A and C, but less than Alternative B. The intensity of the impact of Alternative D relative to Alternative A would be major, adverse, and short-term, since the increases would be well above 50 percent of Alternative A. The effects of the fire management program would not represent an impairment of the park's resources or values.

Cultural Environment

Archeological Resources

Potential for Impacts from Catastrophic Fire

Compared with Alternative A, No Action, this alternative would reduce to a moderate extent the potential for catastrophic fire and its impacts. This would result in beneficial, short- and long-term, moderate impacts to archeological resources.

Fire Management Treatments

Managed Wildland Fire

Under all action alternatives 621,059 acres would be in the Fire Use Unit. Managed wildland fire would be the main focus of this unit although 48,912 acres (or 8%) would be designated as prescribed fire units. These could be burned either under managed wildland fire (natural ignition) or prescribed burns (management-ignited fires). Acres burned and effects would be similar to that of Alternative B. It is likely that minor to moderate, long-term, beneficial impacts would result from maintaining natural fuel loading on archeological sites. Adverse impacts would be reduced to the degree possible through mitigating measures (described under Methodology).

Re-ignition clause. The potential for impacts occurring as a result of re-igniting a controlled wildland fire would be identical to those described for managed wildland fire.

Holding Action and Monitoring Effects (water and retardant drops, helispots, and spike camps). The potential for impacts occurring as a result of holding and monitoring actions would be identical to those described under Alternative A, minor to moderate, adverse and long-term.

Prescribed Fire

Under all action alternatives 48,912 acres in the Fire Use Unit and 107,336 acres in the Suppression Unit would be slated for prescribed burning. This alternative would treat from 1,817 to 9,194 acres, compared to 1,442 acres per year under Alternative A. Projects would focus on areas of greater than three missed fire return intervals. Local effects resulting from prescribed fire under this alternative would be similar to those described under Alternative A, however the potential for adverse impacts is greater due to the increased acreage targeted for treatment, but so would the potential for benefits. Moderate, long-term, beneficial impacts would result from maintaining natural fuel loading on archeological sites. Adverse impacts would be reduced to the degree possible through mitigating measures (as described under Methodology).

Site Preparation Associated with Managed Wildland Fire and Prescribed Fire (hand line, snagging, mop-up)

The potential for impacts associated with site preparation is identical to that described for Alternative A—minor to moderate, adverse and long-term.

Fuel Reduction by Hand or Machine

Aggressive Reduction Techniques.

Mechanical Tree and Shrub Removal. Heavy equipment would be used under Alternatives B and D to cut, and either pile or crush, vegetation, in the inner wildland/urban interface areas. This

alternative relies to a moderate extent on use of heavy equipment to restore target vegetation conditions. Wildland/urban interface areas (and all other areas proposed for this treatment) would be surveyed for archeological resources prior to any treatment, but because heavy and ground-obscuring vegetation would reduce the visibility of archeological sites, it is likely that some resources would be missed during inventory. All known resources would be avoided during heavy equipment use and piling but this treatment would adversely impact archeological resources obscured by vegetation. Post-treatment inventory would be used to document and stabilize any sites inadvertently impacted. Second entries into WUI areas, to remove trees up to 20 inches in diameter if prescribed fire has failed to achieve desired results, would potentially result in site disturbance or long-term soil compaction, unless mitigations are effectively utilized. The intensity of impact would depend upon the nature and significance of the resource as well as the extent of soil disruption, but would be potentially moderate to major, adverse and long-term; mitigation (see Methodology) would be used.

Conventional Tree and Shrub Removal. Same as Alternative B, potentially moderate to major, adverse, and long-term impacts. Archeological monitoring would be used to reduce the potential for these impacts.

Passive Reduction and Lower Profile Techniques.

Low-Impact Skidding. Impacts would be similar to Alternative C although this technique would be used to a smaller extent.

Hand Cutting. The potential for impacts associated with hand thinning is identical to that described for Alternative A—beneficial, long-term, and minor.

Pile burning. The potential for impacts associated with pile burning is identical to that described for Alternative A—minor to moderate, adverse, and long-term.

Chipping. The potential impacts associated with chipping would be identical to those described under Alternative A—negligible.

Girdling. Same as Alternative B—negligible.

Helibase Upgrades

Same as Alternative B.

Cumulative Impacts

The cumulative impacts that would result from implementation of this alternative, in conjunction with other past, present, and past, present, and reasonably foreseeable future actions, would be the same as Alternative A. Implementation of this alternative would moderately reduce the potential for catastrophic fire and associated emergency response actions. The adverse impacts associated with other present, and reasonably foreseeable future projects would be minor to moderate. Considered in combination with the impacts to archeological resources from Alternative D, cumulative impacts would be beneficial, long-term, and minor.

Therefore the cumulative impact would be minor, beneficial and long-term.

Conclusion

Implementation of this alternative would result in adverse impacts to archeological resources mostly due to the increased potential for high-intensity fires in areas of three or more missed fire return intervals and the use of heavy equipment to reduce heavy fuel loads. These impacts would be reduced or avoided to the extent possible through use of mitigating measures (described under Methodology). Compared with Alternative A, implementation of this alternative would reduce to a moderate extent the potential for catastrophic fire and its impacts. Of all fire management situations and treatments, catastrophic fire and emergency response actions result in the most frequent and severe impacts to archeological resources. Overall, the effect of this alternative would be beneficial, moderate and long-term. The intent of the alternative would be to reduce the risk of catastrophic fire, thus there would be no impairment from the effects of this alternative.

Ethnographic Resources

Potential for Impacts from Catastrophic Fire

Compared with Alternative A, No Action, this alternative would reduce to a moderate extent the potential for catastrophic fire and its impacts. This would result in beneficial, short- and long-term, moderate impacts to ethnographic resources.

Fire Management Treatments

Managed Wildland Fire

Potential impacts resulting from managed wildland fire under this alternative are similar to those described under Alternative A, however the potential for adverse impacts is greater due to the increased acreage targeted for treatment. Overall, it is likely that minor to moderate, long-term, beneficial impacts would result from maintaining natural fuel load and plant community conditions near ethnographic resources. Adverse impacts would be reduced to the degree possible through the mitigating measures (described under Methodology).

Re-ignition clause. The potential for impacts occurring as a result of re-igniting a controlled wildland fire would be identical to those described for managed wildland fire.

Holding Action and Monitoring Effects (water and retardant drops, helispots, and spike camps). The potential for impacts occurring as a result of holding and monitoring actions would be identical to those described under Alternative A, potentially minor to moderate, adverse and short to long-term. These impacts would be avoided or reduced as much as possible through mitigating measures.

Prescribed Fire

Impacts resulting from prescribed fire under this alternative are similar to those described under Alternative A. The potential for adverse impacts would be greater, due to the increased acreage targeted for treatment, but so would the potential for benefits. Moderate, long-term, beneficial impacts would result from maintaining natural fuel load and plant community conditions near ethnographic resources. Adverse impacts would be reduced to the degree possible through mitigating measures (described under Methodology).

Site Preparation Associated with Managed Wildland Fire and Prescribed Fire (hand line, snagging, mop-up)

The impact associated with site preparation would be identical to that described for Alternative A, potentially minor to moderate, adverse and long-term.

Fuel Reduction by Hand or Machine

Aggressive Reduction Techniques.

Mechanical Tree and Shrub Removal. Same as Alternative B, Effects would be potentially moderate to major, adverse and long-term, but avoidance and mitigation (see Methodology) would be used. Long-term beneficial impacts would include restoration of more natural vegetation patterning. These effects would be minor to moderate, and short to long-term. The NPS would continue to consult with park-associated tribal groups to identify concerns and implement the most appropriate mitigating measures.

Conventional Tree and Shrub Removal. Same as Alternative B, potentially moderate to major, adverse and long-term, but these potential impacts would be reduced to the extent possible through mitigating measures.

Passive Reduction and Lower Profile Techniques.

Low-Impact Skidding. Effects would be similar to Alternative C although the techniques would be used to a smaller extent.

Hand Cutting. The impact associated with hand cutting would be identical to that described for Alternative A—potentially beneficial, short-term, and minor to moderate.

Pile burning. The impact associated with pile burning would be identical to that described for Alternative A—negligible to moderate, adverse, and short-term, but these impacts would be mitigated by avoiding traditionally used plants.

Chipping. The potential impacts associated with chipping would be identical to those described under Alternative A—negligible.

Girdling. Same as Alternative B—negligible.

Cumulative Impacts

The cumulative impacts that would result from implementation of this alternative, in conjunction with other past, present, and reasonably foreseeable future actions, would be the same as Alternative A except that implementation of this alternative would moderately reduce the potential for catastrophic fire and associated emergency response actions. Considered in conjunction with the minor to moderate, adverse, and long-term effects of present and reasonably foreseeable projects, and the effects of Alternative D, the cumulative effects upon ethnographic resources would be beneficial, long-term, and minor to moderate.

Conclusion

Implementation of this alternative would result in beneficial, long-term, and moderate effects upon ethnographic resources, but the potential for major, adverse and long-term impacts would remain, due to the potential for high-intensity fires in areas of three or more missed fire return intervals

and the use of heavy equipment to reduce heavy fuel loads. These impacts would be reduced or avoided to the extent possible through use of mitigating measures (described under Methodology). However this alternative would reduce, compared with Alternative A, the potential for catastrophic fire and its impacts. Of all fire management situations and treatments, catastrophic fire and emergency response actions would result in the most frequent and severe impacts to ethnographic resources. The potential for catastrophic fire would still exist, but the intent of the alternative would be to reduce the risk, thus there would be no impairment from the effects of this alternative.

Cultural Landscape Resources, Including Individually Significant Historic Structures

Potential for Impacts from Catastrophic Fire

Compared with Alternative A, No Action, this alternative would reduce to a moderate extent the potential for catastrophic fire and its impacts. This would result in beneficial, short- and long-term, moderate impacts to cultural landscape resources.

Fire Management Treatments

Managed Wildland Fire

Same as Alternative B, minor to moderate, long-term, beneficial impacts would result from maintaining natural fuel load and plant community conditions in cultural landscapes. Adverse impacts would be reduced to the degree possible through the mitigating measures described above.

Re-ignition clause. The potential for impacts occurring as a result of re-igniting a controlled wildland fire would be identical to those described for managed wildland fire.

Holding Action and Monitoring Effects (water and retardant drops, helispots, and spike camps). The potential for impacts occurring as a result of holding and monitoring actions would be identical to those described under Alternative A, potentially minor to moderate, adverse and long-term. These impacts would be avoided or reduced as much as possible through mitigating measures (described under Methodolgy, Cultural Resources).

Prescribed Fire

Impacts resulting from prescribed fire under this alternative are similar to those described under Alternative A, however the potential for adverse impacts is greater due to the increased acreage targeted for treatment. Moderate, long-term, beneficial impacts would result from maintaining natural fuel load and plant community conditions in cultural landscapes. Adverse impacts would be reduced to the degree possible through mitigating measures (described under Methodology).

Site Preparation Associated with Managed Wildland Fire and Prescribed Fire (hand line, snagging, mop-up)

The potential for impacts associated with site preparation is identical to that described for Alternative A, negligible, adverse and short-term. Effects would be avoided or reduced through mitigating measures.

Fuel Reduction by Hand or Machine

Aggressive Reduction Techniques

Mechanical Tree and Shrub Removal. Same as Alternative B. The effects would be moderate to major, adverse and long-term if the work is not guided by cultural resource management specialists.

Conventional Tree and Shrub Removal. Same as Alternative B, potentially moderate to major, adverse and long-term. These potential impacts would be reduced through avoidance, and, to the extent possible, through mitigating measures.

Passive Reduction and Lower Profile Techniques

Low-Impact Skidding. The impacts from these techniques would be the same as in Alternative C but in this alternative, the technique would be used in fewer areas. Potential impacts would be minor, long term, and adverse.

Hand Cutting. The potential for impacts associated with hand thinning is identical to that described for Alternative A. Potentially moderate, adverse and long-term impacts would be avoided by prescribing a target condition for these areas that would protect and enhance the cultural resource.

Pile burning. The potential for impacts associated with pile burning is identical to that described for Alternative A—negligible.

Chipping. The potential impacts associated with chipping would be identical to those described under Alternative A—minor, short-term, and adverse.

Girdling. Same as Alternative B—negligible. The potential adverse impacts associated with girdling would include removal of contributing elements (trees) of historic sites or cultural landscapes, and disruption of features through tree falls and use of heavy equipment. These impacts would be avoided by precluding their use, where necessary, and as determined through application of mitigating measures (described under Methodology).

Cumulative Impacts

The cumulative impacts that would result from implementation of this alternative, in conjunction with other past, present, and reasonably foreseeable future actions, would be the same as under Alternative A, Implementation of this alternative would significantly reduce the potential for catastrophic fire and associated emergency response actions. The adverse impacts associated with present and reasonably foreseeable future projects would be minor to moderate and long-term. Considered in combination with the impacts to cultural landscape resources from Alternative D, cumulative effects would be beneficial, long-term, and minor.

Conclusion

Implementation of this alternative would result in moderate, beneficial and long-term effects upon cultural landscape resources. This would be mostly due to the increased potential for high-intensity fires in areas of three or more missed fire return intervals and the use of heavy equipment to reduce heavy fuel loads. These impacts would be reduced or avoided to the extent possible through use of mitigating measures (described under Methodology). Compared with Alternative

A, implementation of this alternative moderately reduces the potential for catastrophic fire and its impacts. Of all fire management situations and treatments, catastrophic fire and emergency response actions result in the most frequent and severe impacts to cultural landscape resources. The intent of the alternative is to reduce the risk of catastrophic fire, thus there would be no impairment from the effects of this alternative.

Section 106 Summary

Under regulations of the Advisory Council on Historic Preservation (36 CFR 800.9) addressing the criteria of effect and adverse effect, implementation of this alternative would have the potential to adversely affect significant historic properties. Archeological sites, ethnographic resources, and cultural landscape resources (including historic sites and structures) would likely be adversely affected by high-intensity fires and emergency response actions associated with catastrophic fire. The number and significance of resources that would be affected cannot be projected since inventory and evaluation data are lacking for broad tracts of lands. These impacts would be mitigated to the extent possible by some pre-burn inventory for resources of concern and by avoiding known resources when feasible, reducing hazardous fuels at significant resources, documentation and protection of significant resources, post-burn inventory and stabilization, and fire-effects research.

Social Environment

Recreation

Potential for Impacts from Catastrophic Fire

Large catastrophic fires are most likely to occur in the Suppression Unit, where fires have been and will continue to be suppressed, contributing to fuel buildup and changes in plant community structure. The moderate increase in the number of acres burned annually with prescribed fire would help reduce the potential for large and catastrophic fires in this unit. Fuel reduction in the wildland/urban interface, where communities, visitor facilities, and park operations buildings are located, and where the most aggressive suppression activities have historically taken place, would also reduce the threat of catastrophic fire. The potential for large, catastrophic fires like the A-Rock Fire, would be reduced under this alternative. Consequently, this alternative would reduce the potential for fire-related park-wide closures, although, during fires, closures in areas of the park would continue. During these closures, the effects will be adverse, short-term, and minor, affecting only the visitors within or wishing to enter that portion of the park. These effects would be less than under Alternative A, but closures and restrictions would still be likely since the fire season and the peak visitation period overlap.

Fire Management Treatments

This alternative would be mid-range in terms of the amount of prescribed fire and wildland/urban interface treatment among the action alternatives. However, the treatment acreages would be greater than under Alternative A. The effects upon recreation would be similar to that of Alternative B, except in the case of the following treatment:

Fuel Reduction by Hand or Machine

Aggressive Reduction Techniques

Effects of equipment use would occur in Suppression Unit in the six inner wildland/urban interface areas, with equipment not being extensively used except where less impacting methods proved unsuccessful. Biomass removal would affect visitors through localized safety closures and equipment noise. Visitors would however, be able to partake in their activity, including hiking, nature study and scenic touring, in another, nearby location, with limited or no restrictions. Some visitors would have concerns about equipment use in the park, while others would understand the rationale for its use and would be supportive. Work would be performed during periods of low visitation whenever possible. Overall, the effects upon recreation would be adverse, short-term, and minor.

Passive Reduction and Lower Profile Techniques.

Low-Impact Skidding. Draft animals and four-wheel, all terrain vehicles, in combination with fetching arches, would be used to skid trees approximately 10 to 20 inches in diameter. Low-impact skidding would be used to a limited extent only in the wildland/urban interface and along road corridors. Low-impact skidding would require safety closures in the immediate area of work. Closures and noise would affect visitors, who would, however, be able to partake in their activity, including hiking, nature study and scenic touring, in nearby areas. Some visitors would have concerns about equipment use in the park, but probably less so than with heavier equipment; other people would understand the rationale for its use and would be supportive. Overall, the effects of low-impact skidding upon recreation, due to the amount of use in this alternative, would be adverse, short-term, and minor to moderate.

Cumulative Impacts

As in Alternative B, the impacts of other projects in the region, in combination with the adverse, short-term, and minor impacts of this alternative, would result in beneficial , long-term, and major cumulative impacts upon recreation.

Conclusion

The effects of this alternative upon recreation would be adverse, short-term and minor. The potential for large, catastrophic fire events and its likely effect upon recreation would be the same as in Alternative B. There would be no impairment from the effects of this alternative.

Scenic Resources

Summary

The effects of Alternative D on scenic resources would be similar to that of Alternative B.

Cumulative Impacts

Past, present, and reasonably foreseeable projects would be the same as described in Alternative A. The effects would be adverse to beneficial, long-term, and minor. Considered in combination with the impact of Alternative D on scenic resources, cumulative impact would remain beneficial, long-term, and major.

Conclusion

Fire management activities would affect scenic resources in generally beneficial ways, through actions that would contribute to restoring and maintaining open vistas and natural forest structure. The effects in the Suppression Unit would be substantially greater in this alternative, compared to Alternative A, due to the larger amount of annual accomplishment in prescribed fire and biomass treatment. Overall, these effects would be beneficial, long-term, and major, especially if projects in some areas (Yosemite Valley, for example) included objectives related to the restoration and maintenance of open vistas. Under this alternative, there would be a smaller likelihood of having large, high intensity, catastrophic fires with effects like the A-Rock Fire, than under Alternative A. There would be no impairment from the effects of this alternative.

Noise

Potential for Impacts from Catastrophic Fire

Under this alternative, the potential for large, high-intensity fire would decrease compared to Alternative A, due to the amount of fuel treatment and prescribed fire, especially in the Suppression Unit. With the diminishing potential for large-scale fires, the likelihood and frequency of having to deploy large-scale fire suppression efforts would also diminish, thereby reducing the size and duration of fire operations. When large fire organizations were needed, the noise effects would be similar to under Alternative A, except the duration of operations would likely be shorter. Under Alternative D the threat of catastrophic fire would diminish, therefore the effect would be beneficial, long-term, and moderate.

Fire Management Treatments

The noise impacts during wildland and prescribed fire and other fire management activities under Alternative D would be similar to that of Alternative B.

Cumulative Impacts

Past, present, and reasonably foreseeable projects would be the same as described in Alternative A. Cumulative effects under Alternative D would be the same as under Alternative B—adverse, short-term, and major.

Conclusion

Fire management activities would have the potential to introduce noises that have a short-term, adverse, and major effect on ambient noise levels near wildland/urban interface areas. The noise events would be similar to that found under Alternative A, but the number of events and the duration of operations would be substantially greater. Over time, noise associated with large, catastrophic fire events would be less than under Alternative A. In Wilderness, helicopter and chainsaw noises would continue to introduce short-term intrusions, with adverse and major effects, the same as under Alternative A. There would be no impairment from the effects of this alternative.

Local Communities

This alternative would have an intermediate amount of prescribed fire and wildland/urban interface treatment per year. An average of 1,095 acres of wildland/urban interface would be treated by prescribed fire and mechanical fuel reduction. This would be greater than under Alternative A, reducing the effects upon and risk levels for local communities. If ecosystem restoration objectives were met within 15 years, the level of risk from the effects of catastrophic fire would be similar to that of Alternative B. The amount of annual accomplishment would meet objectives for protecting wildland/urban interface areas within 6 to 8 years, greatly improving the opportunity to protect communities in and near the park from fire.

Potential for Impacts from Catastrophic Fire

These effects would be similar to Alternative B. Any direct effects in wildland/urban interface that would occur because of catastrophic fire would still likely be adverse, long-term, and major. Potential indirect economic effects of a closure would be adverse, short-term and minor, less than under a scenario similar to the A-Rock fire under Alternative A. However, the potential of these effects occurring would be greatly reduced under this alternative thus a beneficial, long-term, and moderate effect.

Fire Management Treatments

Managed Wildland Fire

The effects under this alternative would be similar to Alternative A—adverse, short-term, and negligible.

Re-ignition clause. The effects of this alternative would be similar to Alternative B—adverse, short-term, and negligible.

Holding Action and Monitoring Effects (water and retardant drops, helispots and spike camps). The effects under this alternative would be similar to Alternative B—negligible.

Prescribed Fire

Between 1,817 and 9,194 acres would be restored through prescribed burning in an average year, compared to 1,442 acres per year under Alternative A. Effects of prescribed burning on local communities would be beneficial, long-term, and major. Other effects of prescribed fire would be similar to those under Alternative B.

Site Preparation Associated with Managed Wildland Fire and Prescribed Fire (hand line, snagging, mop-up)

The effects under this alternative would be similar to Alternative A—negligible.

Fuel Reduction by Hand or Machine

Aggressive Reduction Techniques.

Mechanical Tree and Shrub Removal. Using large machinery and other techniques, approximately 1,100 acres per year of fuel reduction work would be completed in the six inner wildland/urban interface areas. This would accomplish wildland/urban interface objectives for protection and ecosystem restoration in 6 to 8 years, reducing risks near communities compared to Alternative A. Although potential for large fires would remain, the opportunity to protect these

communities would be improved compared to Alternative A. The effects of biomass removal would be beneficial, long-term, and major. The effects of equipment use on local communities would be similar to Alternative B.

Conventional Tree and Shrub Removal. The effects of this alternative would be similar to Alternative B—beneficial, long-term, and moderate to major.

Passive Reduction and Lower Profile Techniques.
Low-Impact Skidding. Under this alternative, use of low-impact skidding would be emphasized where it would be most efficient and effective (in areas with large concentrations of smaller trees, that could be easily removed with this technology). Wildland/urban interface treatment and ecological restoration work near local communities would be completed in about 6 to 8 years, and would reduce risks and potential for catastrophic fire. Effects of low-impact skidding on local communities would be beneficial, long-term, and moderate to major.

Hand Cutting. The effects under this alternative would be similar to Alternative A—beneficial, long-term, and minor.

Pile burning, chipping, and girdling. The effects under this alternative would be similar to Alternative B—beneficial, long-term, and major.

Cumulative Impacts

As in Alternative A, a variety of projects in the five county area would have diverse effects upon local communities. These projects include: Lodging and service projects: utility and infrastructure projects; and other projects of the type described in the proposed action, e.g., projects dealing with fire, fuels and vegetation management matters. The same reasonable foreseeable projects evaluated in Alternative A would apply under Alternative D.

The long-term, beneficial, and moderate effects of these actions, considered with the impacts of Alternative D, would result in cumulative effects in Yosemite's six wildland/urban interface areas that would be beneficial, long-term, and moderate to major.

Conclusion

The risks associated with large, catastrophic fires would be reduced in this alternative, compared to Alternative A. The risk in Alternative D for direct effects (loss of property during fires) and indirect effects (loss of business during fire-related closures) would be greatly reduced compared to Alternative A, and would be intermediate among the action alternatives. This is because of the amount of annual prescribed fire and mechanical thinning accomplishment. The potential for fire-related closures and other effects would also be lower than under Alternative A. As a result, the overall affect of this alternative on local communities would be beneficial, long-term and moderate to major.

Environmental Justice

Under this alternative, fire management activities would continue to be directed toward reducing risks in all of the wildland/urban interface areas in the park. Because of the greater amount of prescribed burning and fuel treatment, compared to Alternative A, the benefits for each

community would be greater under Alternative D. Effects would be less than but similar to Alternative B. The risks in each of the wildland/urban interface areas would be lower compared the existing program. In that risks in each of the communities would be targeted, the effects upon minority and low-income populations in those communities would be beneficial, long-term and moderate to major, the same as effects described under Local Communities above.

Cumulative Impacts

Cumulative effects upon minority and low income populations, as represented in the wildland/urban interface areas, would be the same as described under Local Communities above.

Conclusion

Prescribed fire and fuel treatment would be focused upon the most immediate risks associated with each of the wildland/urban interface areas. The effects upon minority and low income populations in those communities would be beneficial, long-term and moderate to major.

Special Designations

Wild and Scenic Rivers

The Wild and Scenic River Act of 1968 requires agencies to protect and enhance the outstandingly remarkable values (ORV) of Wild and Scenic Rivers in Yosemite National Park and the El Portal Administrative Site. Chapter V discusses the potential for achieving this end, in light of the actions proposed in the *Yosemite Fire Management Plan*. Impacts of this alternative on river related attributes are discussed in the representative sections (for example, in watersheds, water quality and soils; plant communities and fire ecology; etc.).

Wilderness

All wildland fire management activities within designated Wilderness inside the boundaries of Yosemite National Park will adhere to "minimum tool" requirements of the 1964 Wilderness Act (16 USC 1 1 21). About 704,624 acres or 94% of the park is designated Wilderness. Most of this is in the Fire Use Unit where allowing natural processes of fire to occur has been part of Yosemite's fire management program since 1972. Some areas of Wilderness, however, are in the Suppression Unit because years of fire exclusion have created fuel accumulations that would burn at unnaturally high-intensities were wildland fire to occur. These areas would be restored before being considered for inclusion in the Fire Use Unit. Some areas, because of their proximity to populated areas, buildings, roads and utility lines, or historical resources, would never be included in the Fire Use Unit.

Summary

The effects on Wilderness of actions under Alternative D would be similar to Alternative B.

Cumulative Impacts

Past, present and reasonably foreseeable future projects would be the same as those listed in Alternative A. These effects, considered in combination with the effects of Alternative D, would result in beneficial, long-term, and moderate to major cumulative impacts.

Conclusion

Fire management activities would affect Wilderness resources in generally beneficial ways, through actions that would maintain plant communities within their natural range of variability, and thus maintain Wilderness values, especially in the Fire Use Unit. Benefits in the Suppression Unit would be greater than under Alternative A, due to the large amount of fuel reduction and prescribed fire, which would reduce the potential for large, high-intensity fires. In Wilderness, helicopter and chainsaw noises would continue to introduce short-term intrusions, with adverse and major effects, the same as under Alternative A. Overall, the effect of Alternative D would be beneficial, long-term, and moderate to major. There would be no impairment from the effects of this alternative.

Energy Consumption

The energy consumption associated with fire management activities is difficult to calculate, because of the great number of variables involved, including the size and complexity of projects. Fire management activities, including monitoring of managed wildland fire, prescribed fire and hand thinning, are considered in the analysis; fire suppression and administrative activities are not. The treatments listed in table 2.6 would be used in Alternative D. The number of acres that would be treated, and related energy that would be consumed, is estimated in table IV-20 below.

Cumulative Impacts

For the *Yosemite Valley Plan* alone, projections included an estimated reduction of 1,341,800 gallons of gasoline consumption per year, and an increase of 335,500 gallons of diesel fuel consumption (for a total of 549,300 gallons per year by 2015), a decrease of 1,006,300 gallons to a total of 1,688,300 gallons of fuel, and a moderate, long-term, beneficial impact. Combined with Alternative D, the cumulative effects would be beneficial, long-term, and moderate.

Conclusion

Energy would be consumed during fire monitoring and reconnaissance, prescribed fire operations, and fuel reduction activity. Typically more than 147,000 gallons of various fuels per year would be consumed, compared to over 9,000 gallons under Alternative A. The effects of the fire management program's energy demand would be adverse, long-term, and major, compared to Alternative A, No Action. Equipment use during biomass removal operations would be the greatest new source of fuel consumption.

Table IV-20
Projected Energy Consumption Under Alternative D

Fire Management Treatment	Acres Treated per year	Equipment Used	Treatment Rate or Equipment Use	Fuel Use Rate	Fuel Use
Managed Wildland Fire	16,000	Aircraft (recon, water drops, transport)	2 hour per recon flight; est. 180 recon hours per year.	60 gallons of fuel per hour	10,800 gallons of fuel
Prescribed Fire[a]	5,505 (1,817 to 9,194)	a) Drip Torches [OR in aerial ignition, ignition balls and helicopter]	Approx. 1 acre per hour per torch, 8 acres per day in an 8 hour shift. [OR in aerial ignition, approx. 150 acres per day by aerial ignition; 2 hours flight time per day.]	Approx. 2 gallons per acre burned. [OR approx. one box (1000 balls) per 150 acres, plus 60 gallons of fuel per hour of flight time, plus ground crews.]	11,010 gallons of drip torch fuel [OR 36,700 ignition balls,. 4,440 gallons of aviation fuel; plus 250 gallons drip torch fuel for ground crews.]
		b) Engines	3 to 6 engines/ plus 1 to 2 water tenders per day (5 on average), an average of 50 project days per year; 12 hour shifts.	8 miles per gallon diesel fuel, at least 50 miles out and back to station per vehicle per day.	1,562 gallons
		c) Chainsaws for site prep.	Crew with 5 saws can treat 5 acres per day, for approx. 330 acres.	2 gallons per day per saw; 10 gallons per crew per day	660 gallons
Hand Cutting	300	Chainsaws	Crew with 5 saws can treat 5 acres per day.	2 gallons per day per saw; 10 gallons per crew per day	600 gallons
Biomass Removal	600	Tracked vehicle	20 acres per day	72 gallons per acre, median (16 to 128 gal/acre, depending on terrain and workload).	43,200 gallons
Skidding/ Grappling	1,095	Grappler	8 to 30 acres per day, for 1131 acres	72 gallons per acre, median (16 to 128 gal/acre, depending on terrain and workload	78,840 gallons
ATV Skidders		All Terrain Vehicle	150 hours per year	19 days at 10 gallons fuel per day	190 gallons
Chipping	300	Chipper	5 acres per day	Approx.10 gallons per work day.	600 gallons
Total: 147,462 gallons of various fuels					

a Total fuel includes drip torches, chainsaws, and vehicles, not aerial ignition techniques.

Sustainability and Long-Term Management

Relationship of Short-Term Uses and the Maintenance and Enhancement of Long-term Productivity

Alternative D would not result in new development, thus it would not take lands out of productivity as natural ecosystems. However, fires would continue to effect ecosystem integrity, particularly in the Suppression Unit. Compared to Alternative A, this alternative would include an amount of prescribed burning and fuel reduction that would reduce significantly unnatural changes in forest structure and increases in fuel load conditions. This would greatly reduce the potential for large, catastrophic fires. Actions would be most influential in upper and lower montane areas. Actions would likely reverse trends toward vegetation type conversion (change over time to a different vegetation type and fire regime) and reduce the potential of returning large areas of the park to early seral stages of ecosystem development, as happened during the A-Rock Fire.

Use of biomass removal, prescribed burning, and other treatments would not degrade long-term productivity, because restoration of target conditions would be based upon the natural range of variability for park ecosystems.

Irreversible or Irretrievable Commitments of Resources

Implementation of Alternative D would reduce the potential of large, catastrophic fire, compared to Alternative A. The amount of prescribed fire and fuel treatment, particularly in the Suppression Unit and in the wildland/urban interface, would likely restore target conditions in such a timeframe as to reduce the potential for irreversible or irretrievable loss of resources, except in the early years of program implementation. Fire of the magnitude and effect of A-Rock Fire would still be a possibility but the course of action in Alternative D, compared to Alternative A, would not be likely to sustain an irreversible or irretrievable commitment of resources.

The three giant sequoia groves in Yosemite have been the focus of past fuel treatments and prescribed fire. These actions have and will assist in protecting them. The increase in prescribed fire in this alternative would reduce the potential for large, high-intensity fires along the margins of these areas, which, over time, would reduce the risk of losing a sequoia grove. The loss of the Mariposa Grove of Giant Sequoias would be considered an irretrievable loss of resources, and impairment, under the definition in National Park Service Management Policies 1.4.5, but the potential for this is reduced in this alternative.

Historic resources in Yosemite Valley, Wawona, and in other areas, if burned during catastrophic fire, would be irreversibly and irretrievably lost. However, the potential for such a loss is reduced under this alternative.

As in Alternative A, No Action, the effects of managed wildland fire upon wildlife and other park values would generally not be considered irreversible or irretrievable, in that their effects would typically be within the natural range of variability for park ecosystems and wildlife habitat. Adverse effects generally would be short-term while beneficial effects would be long-term. Habitat would typically become suitable to wildlife shortly after a fire.

Under this alternative, no appreciable irreversible or irretrievable commitments of resources would be associated with air quality.

Adverse Impacts that Could Not be Avoided if the Action were Implemented

The potential for large, high-intensity fires would be less than under Alternative A. This would be because of the large amount of prescribed fire and fuel reduction work that would occur under this alternative. Treatments would attempt to restore plant community structure and reduce the risk of catastrophic fire. This would reduce the potential for adverse effects from both unwanted wildland fire and fire exclusion.

Biomass removal and other fuel treatments would not be considered adverse in that target conditions would be based on the natural range of variability for those systems. The adverse effects of treatments would be short-term while beneficial effects, such as ecosystem restoration, would be long-term.

Under this alternative, there would be short-term, unavoidable, adverse impacts to air quality due to the increase in prescribed burning in areas where fuel loads are high from decades of fire exclusion. As park forests are restored to their natural vegetative state and natural fire regime, fuel loads will be lighter and thus less smoke will be produced when forests burn. The need to burn in the park's forests through prescribed and managed wildland fire will never go away, however, adverse impacts on air quality would decrease over the long-term as forests fuels are reduced.