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CHAPTER 4

Environmental Consequences

Introduction

This chapter describes the environmental consequences of implementing the five alternatives discussed in Chapter 2. The environmental effects are listed by resource as presented in Chapter 3. This discussion forms the scientific and analytical basis for the comparison of alternatives.

Assumptions

The environmental consequences were prepared based on the following assumptions and predictions:

- The level of visitation and distribution of use would continue to fluctuate, with some areas increasing and other areas maintaining current use levels.
- Overall, use would remain similar to current levels.
- Demand for outfitter and guiding services would remain the same or may increase slightly.
- Applications for outfitter and guide permits would increase.
- Demographics of users would remain the same.
- Technologies for recreational equipment permissible in wilderness would not change significantly.
- Educational efforts can make moderate gains in changing visitors' behavior towards "Leave No Trace" ethics.
- In general, funding for trail maintenance and reconstruction would be at or below current levels.
- Forest Service staffing in wilderness management would be at or below current levels.
- In general, funding for wilderness management would be at or below current levels.

Physical Environment

Soils

Consequences Common to All Alternatives

Soil is perhaps one of the most important indicators of ecosystem health. Loss or destruction of soil invariably leads to environmental consequences. While some movement of soil is a natural phenomenon, damage caused by wilderness users can cause impact where it would not naturally occur.

Chemical analysis of soils that occur in the wilderness indicates that for deep soils (> 40 inches deep) over 40 percent of the nutrients are located in the top foot of soil. For shallow soils (<20 inches) over 75 percent of the nutrients are stored in the top foot of soil. Often most of these nutrients are concentrated in the first few inches. The sub-soils generally are very low in nutrients and organic matter (Taskey 1995). The loss of just a few inches of topsoil due to erosion or displacement therefore can have a significant negative effect on soil productivity.

Recovery and natural revegetation of disturbed sites is slow due to the colder temperatures, short growing season, and relatively poorer physical, chemical, and biological condition of the soils in the wilderness compared to soils at lower elevations.

Research has shown that temporarily closing campsites or portions of campsites results in little or no recovery or, in some cases, can cause an overall increase in resource damage. This is because recovery of campsites is generally very slow, taking as long as 100 years on harsh sites. If visitors are displaced to pristine areas, they may actually create new campsites with significant damage in only 8-10 nights of use (Cole, 1982). Campsite closure is normally only effective if the unwanted sites are closed permanently and the remaining open sites are in locations that are attractive and adequate to accommodate visitor use.

Wet areas tend to be more susceptible to physical damage during the spring when soil moisture is highest. However, these areas also tend to have more vigorous plant growth due to greater moisture and nutrient availability and therefore are able to recover faster than drier sites under light and moderate impacts. Where severe impacts occur, such as erosion or displacement of the topsoil, recovery is retarded regardless of soil moisture levels.

Various management tools are prescribed under the different alternatives to provide spatial and temporal controls on wilderness use. Some of these management actions are more direct such as quotas or closures of certain areas, and restrictions on certain activities. Other management tools are more subtle such as directing use through advertising, as part of the wilderness permit process, or managing the trail system so that some areas are more readily accessible than others. How and where these management tools are applied affects intensity of use in certain areas and may increase or decrease the potential for soil disturbance. Impacts to soils are expected to occur in all alternatives. The degree and severity of impacts varies with the types and intensities of use

and the standards and guidelines that may be used to minimize impacts. The following impacts are expected to occur to some degree in all alternatives.

Potential impacts caused by camping and campfires are vegetation loss, loss of soil duff and bare soil exposure, tree damage, root exposure, formation of social trails, removal of dead and downed wood (loss of nutrients and habitat for soil insects, microorganisms, and fungi and protective cover to minimize soil erosion), compaction, and reduced infiltration. Losses of organic matter on top of and within the soil, erosion, and compaction can lead to decreases in soil productivity. Development of social trails especially around and directly leading to streamsides and lakeshores can contribute to erosion and sediment production. Human foot traffic and associated campsites and user-created trails can lead to trampling of these sites which progress through a pattern of resource damage. Initially, the fine organic material and duff layer on the soil surface is lost resulting in exposure of mineral soil. Foot traffic and other activity on the bare soil can reduce the surface soil porosity decreasing the rate of water and air movement into the soil. When the water infiltration rate is decreased, runoff is increased, raising the potential for erosion on the site. Poor aeration and water availability also affect plant growth and soil biota such as insects, microorganisms, and mycorrhizal fungi.

Location, numbers, and frequency of stock use affect the potential soil impacts to campsites, trails, and riparian habitat, especially at stream crossings and grazed meadows. Research has indicated that stock use is associated with wider trails, much larger campsites, greater exposures of bare mineral soils, greater compaction, loss of organic matter, and slower infiltration rates (Cole 1985). Wetter sites are more sensitive to stock related impacts and may not be able to recover with continued livestock use (Strand 1979, page 92). However, certain areas can sustain stock use over many years and not display adverse long-term ecological effects (Strand 1979, page 86). Due to the long-term nature of soil recovery processes, temporary closures do not appear to be effective once damage has occurred (Taskey 1995, Strand 1979). The relatively greater degree of impacts compared to other uses sometimes requires additional management intervention to minimize impacts and prevent long-term resource damage.

On trails, and often at trailheads, soil cover is lacking because of the frequency of disturbance (except for natural rock fragments on the soil surface). Runoff can detach and carry soil particles off of the trail surface. The placement of cross ditches (water bars) and their maintenance becomes critical for controlling the rate of erosion from the trail surfaces. In addition the rate of erosion is influenced by trail design, slope, and drainage pattern. Well-constructed trails should be able to withstand use equal to the carrying capacity designed into the trail without resulting in unacceptable off-trail impacts.

Campfires impact soils in two major ways. The first is the effect of the actual fire, which removes organic matter. This results in changes to soil structure, causing leaching or mobilization of soil nutrients, and creates a very inhospitable environment for soil biota, thereby essentially sterilizing the soil. The second impact is the removal of organic material to use for firewood. In some areas, all woody material is stripped and even live trees are damaged in the search for firewood. The collection of fuel for campfires results in the removal of downed woody material that would otherwise serve as protective soil cover, recycle nutrients to the soil, and provide habitat for soil organisms and wildlife.

Research has shown that Sierran whitebark pine communities are particularly susceptible to impacts from firewood consumption. Due to the popularity of these areas productivity is relatively low and consumption is high (Cole 1989, Davilla 1977). The average lower elevation for whitebark pine communities is approximately 9890 feet in the northern portion of the study area and 10,210 feet in the southern portion (Bryant and Nelson 2000 – unpublished report submitted to the planning record).

A monitoring protocol was developed for campsites in the project area that includes a rating factor for firewood availability. Of the 665 campsites inventoried in 1999, 77 percent showed depletions of firewood for a distance of 200 yards or more and/or mutilations to trees to cut firewood. These inventories included campsites within areas currently closed to campfires as well as those open to campfires and in a range of proposed use levels. Of the areas still open to campfires, over 85 percent showed unacceptable levels of firewood availability (firewood ratings of 4 or 5). Almost all of these areas were above 10,400 feet (except 2-3 miles of the Taboose Pass Trail within the wilderness boundary). The use of an elevational closure would provide protection for these areas and allow recovery processes to begin.

Regional soil quality standards and Best Management Practices (BMP) for protection of water quality would be implemented for all alternatives.

Consequences by Alternative

As stated earlier, recovery of soil productivity after disturbance is very slow in the wilderness due to the extreme climate and the poor physical, chemical, and biological properties of the soils. When soil disturbance occurs it leaves evidence of impact that can last for decades or longer. Prevention of disturbance is therefore a more prudent management strategy than restoration of disturbance.

Therefore, the major criteria to evaluate the effects of the alternatives for soils is to compare the degree to which they:

- **Prevent new disturbance,**
- **Stabilize disturbance in current use areas,**
- **Promote recovery** of areas such as rehabilitating unneeded user-created trails and campsites.

Alternative 1 - Modified

This alternative establishes three categories of desired condition for recreation in order to manage recreational visitor use impacts more effectively. This is also included in Alternative 1; however Alternative 1 - Modified includes more areas that have been designated as Recreation Category 1 (the category with the lowest level of use). The three categories define the levels of acceptable social and ecological conditions affected by visitor use. The management strategy is to concentrate use and management in historically high use areas in order to reduce the overall impacts to the wilderness. By concentrating visitor use to certain areas, management actions can be more effectively implemented to minimize resource

damage. Areas outside the concentrated use areas tend to have lower intensities of use and therefore soil impacts tend to be less severe. Individual problem areas identified would be treated as appropriate.

This alternative establishes campsite density standards that are defined according to the three recreation use desired condition categories. Campsites would be monitored for density and condition class ratings to determine trends and changes. Among the numerous factors that would be monitored would be the total area of campsite, bare mineral soil area, camp development and associated social trails in (i.e. signs of soil disturbance). Some of the standards and guidelines for campsite density include considering destination quotas, establishing campsite requirements, or reducing use when occupied campsite, campsite condition, or campsite density standards are exceeded. Managing campsite density should result in fewer campsites in some areas and lead to the recovery of abandoned campsites.

This alternative would establish criteria to evaluate user-created trails and determine which are to be allowed, eliminated, stabilized or added to the forest system. This would provide consistent management direction that can be used to stop the proliferation of user-created trails, which tend to have high levels of soil and other resource impacts associated with them.

This alternative would prohibit wood campfires in areas above 10,000 feet in the northern portion of the planning area and 10,400 feet in the southern portion. This would help protect soils in these sensitive ecological types where firewood is being removed at unsustainable levels. It would encourage use in soil and vegetation communities at lower elevations that have higher productivity and can sustain firewood consumption. Also, criteria would be established for site-specific closures to provide consistent management direction that would help protect sensitive communities that may occur below the elevational closure zone.

This alternative would establish range readiness and grazing utilization levels to help provide protection to sensitive meadow soils and reduce trampling, compaction, and erosion.

Alternative 1

This alternative incorporates most of the same management strategy as Alternative 1-Modified with the following exceptions:

There is less area designated Recreation Category 1 (the category with the lowest level of use).

Quotas for wilderness permits are in effect year-round. The year-round quotas would reduce the risk of impact in the spring and fall when the soil is wet and more susceptible to damage. When there is snow cover there would be no potential risk to soils.

This alternative includes some criteria to evaluate user-created trails and determine which can be added to the forest system. However, it does not specifically establish criteria to determine which user trails can remain on the landscape with incidental maintenance or that need to be closed as proposed under Alternative 1-Modified. This provides less defined management direction to control user-created trails and increases the risk that some can cause soil impacts.

There would be one elevational campfire closure at 10,400 feet. This differs from Alternative 1-Modified, which has a two-tier elevational closure. Because whitebark pine occurs at lower elevations in the northern portion of the wilderness there is more potential risk that soils and vegetation in these sensitive ecological communities could be impacted.

Alternative 2

Like Alternative 1 - Modified this alternative includes a two-tier elevational fire closure to protect soils and vegetation in high elevation sensitive ecological types where firewood is being removed at unsustainable levels. It would encourage use in soil and vegetation communities at lower elevations that have higher productivity and can sustain firewood consumption. Also, criteria would be established for site-specific closures to provide consistent management direction that would help protect sensitive communities that may occur below the elevational closure.

Unlike Alternatives 1 and 1 – Modified, this alternative promotes a low density of use and high level of opportunity for solitude and unconfined recreation across the wilderness. This alternative establishes destination quotas when standards for occupied campsites are exceeded in more than 10 percent of a season's sample for more than two years in a row. If implemented this should result in fewer instances of new impacts to soils from new campsites and user-created trails.

This alternative has year round quotas which would reduce use in early spring and late fall when soil moisture is often higher and more susceptible to impacts. This alternative proposes to establish controls for day use, which can contribute to soil impacts through associated trailing impacts, especially around popular lakes and destination areas close to trailheads. This alternative also provides the highest level of protection for meadow soils through range readiness and utilization standards that would provide for vegetation communities in high seral status.

Alternative 3

Under this alternative, current management direction and use levels would not change appreciably in the short term. If use increases, new disturbance could be expected in the form of additional campsites and user-created trails. If use decreased then currently disturbed areas would slowly recover, but remain visible on the landscape for decades. Areas identified in the limiting factors worksheet (Appendix D) as red flags would continue to have resource damage until appropriate management action can be taken. Under the current permitting process spikes above the allowed quotas could occur and add to the intensity of use and potential for impact to soils relative to Alternatives 1, 1 - Modified, and 2.

Campsite management would be on a case-by-case basis with some areas managed with high density per wilderness ranger.

This alternative maintains the current trailhead quotas and does not identify criteria to evaluate user-created trails and determines which are to be allowed, eliminated, stabilized or added to the forest system.

High elevation soil and vegetation communities would not be protected from firewood gathering and campfire impacts under this alternative, with the exception of current campfire closures. Current campfire closures would continue to allow recovery where compliance is good. Areas without closures that are currently impacted would continue with downward trends in resource conditions until appropriate management actions were taken.

The lack of range readiness standards and protocols would leave some wet meadows or other sensitive areas unprotected. Trends of recovery or decline would continue depending upon local current condition and use. This alternative does not provide consistent management direction for grazing, which would have to be managed on a case-by-case basis. This is not as effective given current limited forest resources and the number of meadows to be monitored. This alternative does not restrict packstock use in the early season when the soil is moist and more susceptible to compaction and erosion.

Alternative 4

Under this alternative use would be allowed to grow and expand into areas that are not currently receiving high amounts of use. Natural dispersal of use through normal use patterns would be permitted. Limiting factors would still be used to direct use away from sensitive areas, but overall this alternative could result in more moderate impacts occurring over a larger portion of the wilderness. This is different from Alternatives 1 and 1 - Modified, which propose to concentrate use and control impacts in certain areas thus leaving a larger portion of the wilderness in a higher ecological status.

In trailed areas campsite density would be allowed up to 10 sites per acre, compared to Alternative 1-Modified, which only allows 4 sites per acre in Recreation Use Category 3 (the highest level of use). In trail-less areas, this alternative permits up to 4 sites per acre. The high level of campsite density that this alternative allows would result in greater soil disturbance and impact than any other alternative.

Day use would not be managed so its associated resource impacts would continue and may increase over time.

High elevation sites that are sensitive to campfire and firewood gathering impacts would not be designated. Firewood availability would be monitored for upward or downward trends. The effectiveness of this method, given limited forest resources, is doubtful and soil and vegetation impacts are expected to increase.

This alternative gives general direction regarding the management of user-created trails but does not specify criteria of how to evaluate them and determine which are to be allowed, eliminated, stabilized, or added to the forest trail system.

The lack of range readiness standards and protocols would leave some wet meadows or other sensitive areas unprotected and the trends of recovery or decline would continue depending upon local current condition and use. This alternative doesn't provide consistent management direction for grazing, which would have to be managed on a case-by-case basis. This is not as effective given current limited forest resources and the number of meadows to be monitored. This alternative does not restrict packstock use in the early season when the soil is moist and more susceptible to compaction and erosion.

Water Resources

Consequences Common to All Alternatives

Implementation of Region 5 soil quality standards, Best Management Practices (BMP), and management direction common to all alternatives is expected to adequately protect and maintain water quality. Each alternative, however, proposes a range of management activities and uses that may impact water quality to varying degrees. While project area waters are expected to meet water quality objectives identified for the protection of beneficial uses, there would be different degrees of risk and levels and types of management presence necessary to ensure protection. The following impacts and conditions are common to all alternatives.

Episodic atmospheric deposition would continue to impact wilderness resources at current levels, with possible slight increases or decreases depending on regional and local emissions of air pollutants and regional and local meteorology (Peterson et. al., 1992). Trails and campsites would continue to alter natural hydrologic processes (i.e., the timing, duration, and magnitude of flows) at the site-specific scale, although effects would vary somewhat by alternative. Introduced nutrients, bacteria, viruses, and protozoa may continue to be present in lakes, streams, and other aquatic areas (depending on human or animal presence). Sediment would continue to be introduced into streams and lakes, particularly where trails and campsites are in close proximity to water. Weather modification and wilderness snow measurement would continue.

Scientific studies have recognized a correlation between human occupancy near aquatic areas and water quality impacts (Suk, et. al., 1987; Varness, et. al., 1978). Low concentrations of use and greater distances from water generally have far fewer human related impacts to water quality. In areas with the lowest levels of dispersed use, the risk of water quality degradation is minimized. Areas with moderate to high use have a greater risk of water quality contamination. The primary water quality concerns in the project area are increased rates of sedimentation and microbiological contamination.

Potential water quality impacts can be mitigated in a variety of ways, including communication of rules and regulations to the users, the use of permanent and temporary improvement structures, increased site maintenance, and greater control over wilderness users (e.g., trailhead or destination quotas). Relative degrees of water quality impacts and general types of mitigations necessary to protect water quality are described below in the "Consequences by Alternatives".

No unacceptable cumulative off-site watershed effects to beneficial uses would occur as a result of the implementation of the alternatives.

Consequences by Alternatives

Alternative 1 - Modified (Preferred Alternative)

Implementation of Alternative 1 - Modified would use a combination of administrative controls and structural treatments when designing mitigations for resource impacts. The emphasis on administrative versus structural methods would vary depending upon the Recreation Category.

Under Alternative 1 - Modified, sites within 50 feet of water would be considered highest priority for removal and, if necessary, restoration. Active restoration would decrease direct and indirect impacts to water quality and improve watershed function at localized areas.

Relative to the Alternative 1, this alternative has 16 percent greater area in Recreation Category 1 and 14 percent less area in Recreation Category 2. There may be differences in how resource impacts would be addressed between the two categories due to differences in the desired condition of the recreation categories.

Trailhead quotas may indirectly control actual water quality impacts by limiting or controlling use, although the overall degree of water quality protection or improvement is difficult to predict.

System and user-created trail management as proposed under this alternative would reduce levels of sedimentation in lakes, streams, and other water bodies from current levels, and reduce alteration of natural hydrologic patterns relative to the existing condition. Management direction resulting in direct and/or indirect improvements to water quality include: giving emphasis to riparian and aquatic resources when making system trail maintenance, reconstruction, and relocation decisions; restoration of abandoned trails; improved management direction for user-created trails; and requirement for commercial packstock to stay on designated trails.

Establishing range readiness, forage utilization, and streambank disturbance standards would provide protection to meadow and aquatic habitats by reducing trampling, limiting areas of soil compaction, improving vegetation density and vigor, and reducing other direct and indirect impacts to meadow soils and streambanks. Lands used by recreation and commercial packstock that are currently in an ecologically functioning state should remain in properly functioning and satisfactory condition with minimum management intervention. At risk and degraded meadows should improve with time although recovery may be slow in some locations.

The proposed monitoring of campsite condition, system and user-created trails, BMP implementation and effectiveness, key benchmark ecological state, and limiting factors should increase the level of resource protection relative to the existing condition. As with all

alternatives, project-specific mitigations would undergo appropriate levels of the National Environmental Policy Act (NEPA) analysis.

The cumulative effects of past, present, and reasonably foreseeable future management actions are expected to result in an overall improvement of water quality and overall watershed condition. Improvements would not likely be dramatic except in isolated instances where substantial problems exist. The degree of improvement would depend largely upon the degree in which the environmental consequences described above are attained in the project area.

Alternative 1

The environmental consequences for water resources are the same as Alternative 1 – Modified, except for the following differences:

Management of system trails would not emphasize resource protection as stringently as in Alternative 1 - Modified. There may be more trails-related water quality and hydrology problems relative to Alternative 1 - Modified.

This alternative does not address the closure of user-created trails. Furthermore, it would have fewer user-created trails added to the trail system compared to Alternative 1 - Modified. Current user-created trails would receive less maintenance (because fewer would be incorporated into the system inventory) compared to Alternative 1 - Modified and may result in a greater risk of water quality contamination.

This alternative would have 16 percent less area in Recreation Category 1 and 14 percent greater area in Recreation Category 2 compared to Alternative 1 - Modified. The environmental consequences of this difference in recreation category area would likely be relatively small. There may, however, be a slightly greater acceptance of resource impacts and structural mitigations due to the larger area in Recreation Category 2.

The cumulative effects of past, present, and reasonably foreseeable future management actions are expected to result in an overall improvement of water quality and overall watershed condition. Improvements would not likely be dramatic except in isolated instances where substantial problems exist. The degree of improvement would depend largely upon the degree in which the environmental consequences described above are attained in the project area.

Alternative 2

Implementation of Alternative 2 would emphasize administrative control to manage resource impacts. Resource degradation would be mitigated through relatively low numbers of use and high dispersal. Preservation of overall ecological integrity is greatest under this alternative. The environmental consequences of this alternative are similar to, but slightly improved, relative to Alternative 1 - Modified due to the following measures:

All campsites within 100 feet of water would be removed and, over time, either restore themselves to a natural condition or be actively restored. This would impact a significant number of campsites (46 percent based on data collected in 1999). Scientific literature has determined a correlation between the level and proximity of human occupancy near aquatic areas and water quality impacts (Suk, et. al., 1987; Varness, et. al., 1978). As Alternative 2 would remove the largest number of campsites near aquatic areas, it is expected to result in the greatest improvement in water quality (sedimentation and microbiological contamination) compared to the other alternatives.

Alternative 2 controls resource impacts primarily through trailhead quotas that are significantly lower than the existing condition. Popular destination sites would likely receive less use and other less popular areas would likely receive increased use. As a general tendency, it is expected that high use area would become sites of lower water quality degradation risk. Similarly, sites currently receiving little to no use may experience increased levels of human presence and therefore would be expected to receive slightly higher levels of water quality contamination (primarily sediment and microbiological) than at present.

This alternative requires rehabilitation and closure of system and user-created trails that are resulting in resource impacts. Limits in cross-country party size and stock use would also help reduce the number of new user trails. Elimination of system and user trails causing resource impacts near streams, lakes, and other aquatic areas would improve water quality where it has been impacted.

Streambank disturbance criteria and maximum allowable forage utilization are more restrictive under Alternative 2 (20 percent streambank disturbance in Alternative 1 versus 10 percent in Alternative 2; maximum 40 percent forage utilization in Alternative 1 versus 20 percent in Alternative 2). There may be slight improvement in overall watershed condition due to the above differences in packstock grazing management, although the differences between Alternatives 1 and 2 are expected to be relatively minor.

The cumulative effects of past, present, and reasonably foreseeable future management actions are expected to result in an overall improvement of water quality and overall watershed condition. Improvements would not likely be dramatic except in isolated instances where substantial problems exist. The degree of improvement would depend largely upon the degree in which the environmental consequences described above are attained in the project area.

Alternative 3

Under this alternative, there would be no change in current management. Existing trends in water quality improvement or degradation would continue. Although users are encouraged to camp 100 feet from water, where terrain permits recreationists would be allowed to camp as close as 25 feet. There would continue to be direct and indirect water quality degradation at some sites due to increased erosion and improper disposal of waste. Sites within 25 feet of water would need to be closed and rehabilitated. It is unlikely that many new sites would be needed to accommodate use except in extremely popular areas. As a result, impacts to newly disturbed areas are not expected to significant.

Management of resource impacts associated with existing trails (both system and user-created) would occur as problem areas are identified. Treatment mitigations and successes in mitigating water quality impacts would likely vary between individual forest and wilderness managers.

The lack of range readiness criteria would leave some wet meadows and other sensitive areas unprotected. Trends of recovery or decline (depending in part upon climatic variables and future levels of use) would continue at current rates. There is limited information regarding meadow condition trends in the project area and it is uncertain how many meadows are currently in a state of improving or declining ecological conditions.

Alternative 3 would not provide consistent management direction for grazing. Packstock grazing would be managed on a case-by-case basis and would likely vary between Forests. Without implementation of the range-readiness criteria outlined in Alternative 1 - Modified, packstock grazing in the early season would result in greater soil compaction and erosion when soils are wet or moist. This in turn may lead to increased levels of sedimentation and water quality degradation.

The cumulative effects of past, present, and foreseeable future management actions are expected to result in no change from the existing condition of water quality and watershed condition. Existing sites of increased erosion, sedimentation, and contamination from human or animal waste would remain. Some areas are in an improving trend due to relatively low use or improved management practices and these areas would continue to reach desirable ecological states. Future trends are difficult to predict and depend largely upon levels of use and site-specific decisions made by managers and users.

Alternative 4

Alternative 4 allows the greatest level of visitor freedom and the least restriction for unconfined recreation. Structural controls are emphasized when mitigating resource concerns with less emphasis placed on administrative actions. Structural controls may result in short-term direct increases in sedimentation as structures are installed and possibly long-term indirect impacts depending on the level of maintenance they receive. Impacts to water resources would be greater than Alternative 3 (No Action) for some recreation uses and less in others. Differences in the environmental consequences for water resources between the no Alternatives 3 and 4 are described below.

Wilderness users would be allowed to camp as close as 25 feet from lakes, streams, and other water bodies more often than for the existing condition. Relative to the Alternative 3 there would be slightly increased direct and indirect sedimentation and microbiological water contamination due to increased human occupancy near aquatic areas. Additional new campsites constructed close to water may create additional impacts that are not occurring now, which would lead to isolated decreases in water quality impacts.

Areas within the trailed areas (one-half mile on each side of a trail) that are currently closed or not recommended for stock may have increased direct effects due to sediment contributions where new trails cross streams, springs and seeps, and other aquatic areas. The degree of

effect depends primarily on the level and location of use in these areas. Management of system and user-created trails would require greater structural control to mitigate water quality problems.

Rangeland packstock management is similar to Alternative 3 except for the streambank trampling standard of 20 percent (10 percent in habitats occupied by sensitive aquatic species). This difference would trigger a management action if these criteria were exceeded, which may slightly reduce water quality pollution relative to the existing condition in isolated instances.

The cumulative effects of past, present, and foreseeable future management actions are expected to result in no measurable change from the existing condition of water quality and watershed condition. Existing sites of increased erosion, sedimentation, and contamination from human or animal waste would remain. Areas currently in an improving trend due to relatively low use or improved management practices would continue to reach desirable ecological conditions. Future trends are difficult to predict and depend largely upon future levels of use and site-specific decisions made by managers and users.

Biological Environment

Wildlife, Fish, Aquatic Resources and Sensitive Plants; Management Indicator (MIS),
Threatened, Endangered and Sensitive Species (TES)

Wildlife

Consequences Common To All Alternatives

Disturbance and harassment of wildlife species by humans in wilderness is an unavoidable direct consequence of implementation of any of the alternatives. All alternatives would result in recreational activity being dispersed throughout the wilderness and would result in changes in the numbers of a wildlife species in an area, their intra- and inter-specific interactions, their movements and use of habitats, and their daily behavior patterns. Five considerations of how recreation affects wildlife species over a landscape such as wilderness are excerpted verbatim from one of the most recent textbooks entitled *Wildlife and Recreationists, coexistence through management and research* (Knight and Gutzwiller 1995):

- 1) There is no single predictable environmental or behavioral response of wildlife to recreational use. Instead, an interrelated set of impact indicators can be identified. Some forms of impact are more direct or obvious than others (e.g., displacement of wildlife species or altered visitor experiences). The direct impacts of recreation on wildlife are best described by the term “harassment,” and include the various responses of wildlife to interactions with people. Indirect impacts result from changes in vegetation, habitat, or other environmental variables. To understand how wildlife and the visitor’s experience in a given area are affected by recreational use, it is necessary to consider a range of possible impact variables.
- 2) The relationship between use levels and impact variables are neither simple nor uniform. Most impacts do not exhibit a direct linear relationship with user density. The number of people using an area appears to play a smaller role in human-wildlife relationships than selected characteristics of recreational use, such as frequency of use, type of use, and the behavior of visitors.
- 3) Different types of wildlife have differing tolerances for interactions with people. Some wildlife species have declined in response to increasing use levels, while other species have benefited. Animal responses to human intruders are often divergent even within a single species.
- 4) Some recreational activities create impacts faster or to a greater degree than other types of activity. Impacts can vary even within a given activity according to the type of transportation or equipment used and visitor characteristics such as party size and group behavior.
- 5) The impacts of recreation are influenced by a variety of site-specific and seasonal variables. Given a basic tolerance level of a wildlife species for a particular type of recreation the outcome of recreational use may still depend on the time and place of the human activity. Recreational users may create critical situations for given species during some seasons and have no effect on the same animals under other conditions.

Direct effects at the population level can include changes in distribution and movement patterns of wildlife species, as well as total numbers of animals moving throughout their range in wilderness. Birds and mammals are particularly likely to modify the way they utilize habitats within their home ranges. The magnitude of the effect of wilderness recreation on wildlife use of habitat within the three wilderness areas is unpredictable and highly variable and would change in response to human use patterns over time and space.

Wildlife and humans have been part of the wilderness landscape at varying densities for centuries, but for the last 100 years human density in wilderness has increased dramatically. Wildlife species in many wilderness areas, the classic being Yellowstone National Park, carry on their daily activities in front of non-threatening crowds of visitors. Such wildlife species can even be attracted to human presence, and at the very least neutral (habituated) to human presence. Wildlife species that continue to populate heavily used recreation zones in the three wilderness areas are likely to have habituated to current use levels of human activity and have modified their behaviors and uses of habitats in response. Examples of these species include songbirds, cavity nesting birds and mammals, some species of raptors, mule deer, and black bear. Implementation of any of the alternatives is unlikely to make any significant difference in the way these species utilize their wilderness habitats. Species that exhibit varying levels of intolerance to human presence probably have already abandoned or lowered their use of those portions of wilderness and now maintain potentially smaller populations in more remote areas of lower human use. An example of these latter species may include the California wolverine, Sierra Nevada red fox, and some raptor species such as the goshawk and great gray owl.

Some of the direct responses wildlife can exhibit to disturbance and harassment by humans and dogs include increased heart rate and stress, varying distances of flight or movement from an area, failure or disruption of essential activities such as breeding, nesting and denning, young rearing, feeding and resting. The degree of effect on a species is highly variable by individual animal and influenced by factors such as type of human disturbance, time and place of this disturbance, weather, and degree of habituation an animal has developed to human presence. As an example, mule deer does and fawns that utilize the riparian habitats and their forested edges may be moved a short distance or be displaced temporarily from key fawn rearing habitats where humans set-up camp and recreate. These same animals may return to the area at night when human activity ceases. Goshawk attempting to nest in a lodgepole forest adjacent to camps may abandon their territory or move their nest location once the recreation season begins. Incidents have been recorded where humans purposely harass goshawk off their nests to force abandonment. On the other hand, some wildlife species become less wild, including deer, and some birds and small mammals. In the worst case, black bear seek out camps to raid food, habituate to human foods, and become a dangerous animal instead of a wild, wilderness species. Individual bears may have to be killed. Birds and small mammals similarly habituate and become nuisance camp robbers. While this habituation conflicts with the objective of keeping wildlife “wild” and subject to natural forces in wilderness, it does not significantly affect the viability of the majority of wildlife species.

Unrestrained and uncontrolled dogs can directly harass and chase wildlife such as deer, grouse, rabbits and hares, and small mammals. Ground and low shrub nesting birds and mammals can be chased from their nests or young separated from their parents. Dog presence in an area can evoke predator flight responses in some species such as deer and bighorn sheep where the animal may

leave an area temporarily. In the worst case, dogs can capture, injure or kill wildlife. Dogs also have the potential to transmit disease and ectoparasites to wildlife species. Disease transmission is a low probability since most dogs are vaccinated. While these effects occur they are unlikely to affect any wildlife species overall productivity and range in wilderness, except for concerns over the endangered Sierra Nevada bighorn sheep.

Numerous activities border these three wilderness areas. These include: 1) existing and future year-round motorized and non-motorized recreation activities; 2) recreational developments (i.e., ski areas and year-round resorts, campgrounds, pack stations); 3) subdivisions; 4) airport expansion; 5) roads; 6) livestock grazing; 7) timber harvest; 8) mining; 9) water diversion, and population growth would continue to result in habitat loss and fragmentation for some species of wildlife that migrate in and out of wilderness. This may adversely impact some wildlife populations other than overall range and numbers by affecting their ability to find key habitat components such as winter range, and dispersal and migration corridors that maintain connectivity of seasonal habitats and populations within the larger landscape. The continuation of fish stocking in landscapes where fish were not indigenous to the area would continue to have both positive and negative effects on different wildlife species.

Mandatory food storage using bear canisters would decrease the probability of bears and other wildlife from becoming habituated to human foods on both the east and west side of the Sierra. This would help keep bears wild and lower the adverse consequences to bears and humans.

Consequences by Alternative

Alternatives 1 - Modified and 1

Direct effects described above that are associated with human disturbance on wildlife species would remain similar to the existing situation. Recreation use patterns associated with trails and camp destinations and their indirect effects on wildlife habitat are likely to be similar to the existing situation as well. Localized habitat degradation to wildlife nesting cover, hiding cover and foraging habitat from vegetation loss, trampling and soil compaction and firewood collection would be evident in and adjacent to traditional camps, and the riparian areas associated with popular lakes and streams, primarily in recreation use categories 2 and 3. Changes are not likely to result in significant effects to wilderness wildlife populations, but impact local habitat suitability and local use by some wildlife species such as deer, songbirds, cavity nesters, small mammals, and hawks and owls. Light to moderate commercial and recreational packstock forage utilization standards for montane, subalpine, and alpine habitats would result in: 1) some reduction of habitat suitability for nesting cover, hiding cover and foraging habitat from vegetation loss; and 2) trampling and soil compaction for species like deer, small mammals such as voles, and songbirds such as the yellow warbler in riparian habitats. However, it should not adversely affect the viability of any wildlife species.

Potential nest parasitism of forest and riparian songbird species nests by brown-headed cowbirds would be similar to the existing situation since packstock use patterns would be similar to current use. Research in the Sierra documented only six percent of 266 songbird nests were found to be parasitized in one study in the Sierra (Verner and Rothstein 1986). The

potential effect would be greatest within six miles of existing pack stations, corrals, campgrounds and residences. There would be an unknown level of adverse impact on songbird nest success and productivity but it is not likely to significantly threaten the total population of any species except for the warbling vireo. Research has documented local reductions in density of this species in areas frequented by cowbirds.

The prohibition of fires above 10,000 to 10,400 feet would locally maintain high quality downed wood hiding cover and foraging substrate for some wildlife species. These include woodpeckers, grouse, rabbits and hares, and songbirds in areas of heavy to moderate recreation camping.

Implementation of occupied campsite, user-trail management direction and campsite setbacks (50 to 100 feet from water) may reduce human disturbance potential. As a result, habitat suitability for wildlife species that use riparian habitats may improve.

Alternative 2

The potential for human disturbance direct effects to wildlife in popular use areas may be reduced somewhat from the existing situation with the reduced service days allocated to all user groups. However this may be offset by the way in which user-groups would be distributed in a more dispersed fashion across the wilderness. Human disturbance effects related to wildlife may increase in areas where camping is currently low since recreationists may be steered to these areas when other trailhead quotas are filled. Indirect effects on wildlife habitat are likely to follow similar patterns.

Light to moderate commercial and recreational packstock forage utilization standards for montane, subalpine, and alpine habitats would result in: 1) a minor reduction of habitat suitability for nesting cover, hiding cover and foraging habitat from vegetation loss; and 2) trampling and soil compaction for species like deer, small mammals such as voles, and songbirds such as the yellow warbler in riparian habitats. However, it should not adversely affect the viability of any wildlife species. The potential for cowbird impacts to nesting songbirds would remain about the same.

The prohibition of fires above 10,000 to 10,400 feet would locally maintain high quality downed wood hiding cover and foraging substrate for some wildlife species (i.e., woodpeckers, grouse, rabbits, hares and songbirds) in areas of heavy to moderate recreation camping.

Implementation of occupied campsite, user-trail management direction and campsite setbacks of 100 feet from water may reduce human disturbance potential and improve habitat suitability for wildlife species that use riparian habitats.

Alternative 3

The potential for human disturbance related direct effects to wildlife have the potential to increase over time from the existing situation with roughly 11,500 increased service days allocated to packstock supported (5,436), and backpacking activities (5,951). Indirect effects on wildlife habitat are likely to follow similar patterns.

Moderate commercial and recreational packstock forage utilization standards for montane, subalpine, and alpine habitats would result in: 1) some reduction of habitat suitability for nesting cover, hiding cover and foraging habitat from vegetation loss; and 2) trampling and soil compaction for species like deer, small mammals such as voles, and songbirds such as the yellow warbler in riparian habitats. However, it should not adversely affect the viability of wildlife populations. The potential for cowbird impacts to nesting songbirds would remain about the same.

Firewood collection in habitats above 10,000 to 10,400 feet would produce localized reductions in downed wood hiding cover and foraging substrate for some wildlife species (i.e. woodpeckers, grouse, rabbits, hares, and songbirds) in areas of heavy to moderate recreation camping.

Implementation of specific campsite and user-trail management direction where degradation is unacceptable, and campsite setbacks of from 25 to 100 feet from water may reduce human disturbance potential and improve habitat suitability for wildlife species that use riparian habitats.

Alternative 4

The potential for human disturbance related direct effects to wildlife have the potential to increase over time from the existing situation with roughly 14,500 increased service days allocated to packstock supported (8,386), backpacking activities (3,920) and mountain guiding/winter guiding (2,117). Indirect effects on wildlife habitat are likely to follow similar patterns.

Moderate commercial and recreational packstock forage utilization standards for montane, subalpine, and alpine habitats would result in: 1) a minor reduction of habitat suitability for nesting cover, hiding cover and foraging habitat from vegetation loss; and 2) trampling and soil compaction for species like deer, small mammals such as voles, and songbirds such as the yellow warbler in riparian habitats. However, it should not adversely affect the viability of any wildlife species. The potential for cowbird impacts to nesting songbirds would remain about the same.

Firewood collection in habitats above 10,000 to 10,400 feet would produce localized reductions in downed wood hiding cover and foraging substrate for some wildlife species (i.e. woodpeckers, grouse, rabbits, hares, and songbirds) in areas of heavy to moderate recreation camping.

Implementation of occupied campsite, user-trail management direction may help to reduce human disturbance and wildlife habitat impacts described in effects common to all alternatives. A campsite setback of 25 feet from water is unlikely to have any beneficial reduction in human disturbance potential or improved habitat suitability for wildlife species that use riparian habitats.

Threatened, Endangered, and Petitioned for listing Sensitive Wildlife Species

The following analysis is taken from the Biological Assessment (Appendix J) prepared for consultation with the U. S. Fish and Wildlife Service under Section 7 requirements of the Endangered Species Act. It includes federally listed threatened and endangered species (Paiute cutthroat trout, Lahontan cutthroat trout, northern bald eagle, and the Sierra Nevada bighorn sheep). It also contains Forest Service Region 5 sensitive species that have recently been petitioned for federal listing (mountain yellow-legged frog, Yosemite toad, California spotted owl, and the Pacific fisher).

Compliance with Management Direction

1. All alternatives are consistent with the Recovery Plans for the Paiute cutthroat trout, Lahontan cutthroat trout, and bald eagle. They would comply with the recovery plan for the Sierra Nevada bighorn sheep when that plan is finalized. The potential effects described below, with mitigation, would not conflict with the goals of the recovery plans under consideration.
2. Concurrent implementation of the Sierra Nevada Forest Plan Amendment (Record of Decision signed 1/12/01) provides additional Standards and Guidelines for management of these species within the wilderness in addition to the management direction in this document.

Paiute Cutthroat Trout: (Threatened)

Consequences Common to All Alternatives

There would be no direct or indirect effects related to the Paiute cutthroat trout from implementation of any alternative. Loss of individual fish, loss of specific habitat features (i.e., undercut banks, spawning beds, etc), or localized reductions in habitat quality (i.e., sedimentation, loss of riparian vegetation, etc.) are not anticipated to occur.

None of the alternatives alter the current distribution and number of wilderness users, or the level and types of recreational and management activities taking place currently within the areas occupied by the Paiute cutthroat trout. Under all alternatives there should be no change to the light recreation camping use adjacent to Paiute cutthroat trout habitat currently evident that is associated with the user-created trail on Stairway Creek. Most use would continue to occur in the deer hunting season by a few hunters. No commercial or recreational packstock use is anticipated since there is little opportunity for camps and no forage for packstock along the creek. Habitat condition and population status of the Paiute cutthroat trout is currently rated as good. It should be unaffected by implementation of any alternative since recreational camping use would not change from the light use the creek now receives.

The increase in the minimum distance of campsite to water in Alternatives 1 - Modified, 1, and 2 may result in a slight decrease in sediment input and vegetation loss in riparian areas which would be of benefit to the trout's habitat. Since only a few dispersed campsites are located near Stairway Creek, and an unknown number of these may fall within the excluded buffer, the potential degree of impact reduction would likely be small.

Cattle grazing is not a major concern in Paiute cutthroat trout habitat since they do not access either creek. Stairway Creek is within the 77 Corral Allotment. This unit remains closed to commercial livestock grazing since 1964. Sharktooth Creek is within the Cassidy Allotment, an active grazing allotment. The Sheep Camp Unit, which contains Sharktooth Creek, remains closed in order to protect Paiute cutthroat trout habitat.

Standards and Guidelines in Riparian Conservation Areas implemented from the Sierra Nevada Forest Plan Amendment would provide additional habitat protection measures for this species (USFS 2001). These include RCA14, RCA18, RCA19, RCA39, RCA4, RCA40, RCA41, RCA6.

Air pollution could be an issue if chemical contaminants are being carried by the air mass from the San Joaquin Valley and deposited into wilderness water bodies. Currently the extent of this concern is not known regarding the populations of Paiute cutthroat trout but in other areas of the United States, similar air-borne contamination problems have resulted in detrimental effects to aquatic communities.

Fishing regulated by the California Department of Fish and Game (CDFG) has the potential to affect the Paiute cutthroat trout. Fish stocking both legal and illegal does not appear to be an

issue in these stream reaches. The streams are providing good habitat, with migration barriers that prevent introgression with other introduced trout species.

Lahontan Cutthroat Trout: (Threatened)

Consequences Common to All Alternatives

Since the Lahontan cutthroat trout does not occur within the analysis area, there would be no direct effects resulting from implementation of any alternative. Downstream habitat for the Lahontan cutthroat trout outside of the wilderness boundary could be indirectly affected by upstream recreational use in the headwaters of West Fork Portuguese Creek. This could result from potential increased sediment contribution into the stream from vegetation loss and soil compaction related to campsites and user trails. The level of this effect cannot be quantified, but it is expected to be small due to the lack of established camping areas adjacent to the headwaters of West Fork Portuguese Creek, and the lack of system trails accessing the area.

All alternatives would not increase or decrease the current, low level of recreational use in and around the headwaters of the West Fork of Portuguese Creek. The increase in minimum campsite distance to water under Alternatives 1 - Modified, 1, and 2 may result in a slight decrease in camping-related impacts to riparian areas and the water quality in adjacent stream courses, a benefit to the population's habitat.

Air pollution could be an issue if chemical contaminants are being carried by the air mass from the San Joaquin Valley and deposited into wilderness water bodies. Currently the extent of this concern is not known regarding the populations of Lahontan cutthroat trout, but in other areas of the United States, similar air-borne contamination problems have resulted in detrimental effects to aquatic communities.

Fish stocking both legal and illegal does not appear to be an issue in the West Fork of Portuguese Creek.

Bald Eagle: (Threatened)

Consequences Common to All Alternatives

Implementation of all alternatives would have no effect on nesting bald eagles since the only known nest near the planning area is on Edison Lake, which is located outside wilderness. The eagles have habituated to high levels of human presence by virtue that they have established a territory in a heavy recreational use lake environment. Nesting eagles are probably in view of heavy human recreational use on the Lake. No doubt they are exposed to high levels of disturbance within their foraging habitat by motorboats and heavy human recreational use outside the wilderness. Bald eagles throughout the northwest have demonstrated substantial tolerance to human presence when it is not a direct threat to the nest, or when the disturbance occurs away from the immediate nest zone. There are numerous examples of successfully nesting eagles around high use recreational reservoirs in Oregon and California outside wilderness where the

disturbance is dramatically greater, yet eagles remain highly productive year after year. Two other eagle nesting territories occur on the Sierra National Forest at lower elevation reservoirs outside wilderness at Bass Lake and Shaver Lake. Structural habitat characteristics, for nesting and roosting opportunities within the wilderness would not be affected since no management of vegetation is proposed.

Temporary displacement of eagles from foraging and roosting perches throughout the year may occur at any water body where fish or waterfowl provide a food source to eagles. This occurs predominantly in summer around lakes, streams, and rivers. This effect is of minimal consequence to the use of an area by eagles within the wilderness areas since use is likely to be by non-breeding, or post-breeding, individuals. Eagles may move to other perches, or leave the area temporarily depending on the nature of the encounter and degree of habituation of the eagle to human presence. Implementation of any of the alternatives would not substantially affect current patterns of human uses (hiking, riding, camping, and fishing) over the wilderness landscape that would likely alter the potential for disturbance from the existing situation.

There is no evidence that wintering eagles forage, or have communal winter roosts within the wilderness. It is not anticipated that implementation of any alternative would preclude eagles from wintering within wilderness.

Aerial fish stocking by the CDFG can alter forage availability for bald eagles on a yearly basis. Since use of the wilderness by eagles for foraging has been observed to be minimal this effect is of little consequence to the population.

Sierra Nevada Bighorn Sheep: (Endangered)

Consequences Common to All Alternatives

Anticipated cumulative effects within the planning area include the ongoing mountain lion control program to reduce mortality on Sierra Nevada bighorn sheep being implemented by the CDFG. Continued trapping, immobilization, radio collaring and monitoring of sheep herds by the CDFG also affect sheep. They are preparing to transplant sheep from individual herds to improve the population dynamics between herds.

Consequences by Alternative

Alternative 1 - Modified

Under this alternative, the Sierra Nevada bighorn herd ranges on Mt. Langley, Wheeler Ridge and Mt. Dana-Parker Pass Area would have trailhead quotas restricting overall overnight use. Use is anticipated to remain at approximately the same levels as the existing situation. Of the 79,932 acres of bighorn habitat within the John Muir and Ansel Adams Wildernesses, 74,607 acres (93 percent) is Recreation Use Category 1; 4,376 acres (6 percent) is Recreation Use Category 2; and 949 acres (1 percent) is Recreation Use Category 3.

Bighorn habitat would almost be entirely in Recreation Category 1. This alternative may result in somewhat fewer bighorn-human encounters and associated potential for disturbance to sheep in the high country. This assumes this lower level of human use dispersed across the landscape category equates to fewer overnight campers being able to access the high country bighorn inhabit.

Day use hiking and off-trail travel in the Mt. Langley, Wheeler Ridge and Mt. Dana-Parker herds range outside of the Bighorn Sheep Zoological Area and would not be controlled. This is in contrast to the existing seasonal restrictions inside the Zoological Area of the Mt. Baxter and Mt. Williamson herd ranges. Higher levels of encounters between humans and sheep, and subsequent disturbance potential, are anticipated for the Zoological Area herds. This is particularly the case on Mt. Langley and Mt. Dana since day use and overnight hikers have access to the high peaks and ridges where sheep are likely to be approached from above. However, since human use is not anticipated to increase in these areas, disturbance potential would remain the same. Most of the human disturbance in the Mt. Dana area would occur from hikers accessing the Yosemite National Park side of suitable habitat, since the Forest side is much more rugged and inaccessible. Site-specific monitoring of bighorn sheep and human use overlap in these areas outside of the Zoological Area has not indicated any adverse effects occurring to sheep movements, productivity or survival (Wehausen 2000).

Wehausen (2000), considered the expert for Sierra Nevada bighorn sheep, has concluded for all herds that while human-sheep encounters occur, bighorn have become habituated to predictable encounter areas with recreationists. The nature of the terrain provides bighorn with sufficient habitat easily accessed for escape, and carrying on daily activities so that human encounters do not adversely affect sheep survival.

Inyo National Forest Order # 04-00-01 has mitigated the potential for adverse effects on sheep from the presence of dogs. This order currently prohibits dogs from identified bighorn habitat. This order remains in effect until November 30, 2001. An environmental analysis would be conducted to determine if the order should remain in place, be revised, or terminated based on recommendations from the Bighorn Sheep Recovery Team.

Prior to the development of the Wehausen (2000) report, researchers debated the impact of human use in wilderness on bighorn within their habitat. A variety of bighorn sheep responses have been observed depending on the degree of disturbance. Bighorn sheep have been observed to stop whatever activity they are engaged in upon observation of humans, continue with their activity while observing the disturbance, move varying distances in a slow flight response, or flee rapidly (Hicks and Elder 1979). The degree of effect appears dependent on a variety of factors. These factors include: 1) herd size, 2) distance sheep were to the human encounter, 3) degree of habituation sheep have developed to human presence, 4) time of year of disturbance, 5) distance of sheep from escape terrain, 6) whether sheep encounter humans approaching from above or below, and 7) whether humans have dogs with them (Hicks and Elder 1979; MacArthur, et. al. 1982; Wehausen 1979). Bighorn sheep, and particularly ewes with lambs, can elicit strong flight responses when humans approach them from above or if they come between sheep and escape terrain (Wehausen, 1979).

Hicks and Elder (1979) concluded in their study in the John Muir Wilderness of human disturbance to bighorn sheep that foot trails through the Mt. Baxter summer range did not

adversely affect sheep movements. They observed ewe, lamb and yearling groups on Baxter Pass feeding and bedding along the edge of these footpaths. Ram groups frequently used hiking trails to traverse forest cover and move into areas of concurrent moderate to heavy human use. They concluded human and sheep were separated spatially on summer range with recreationists staying mainly on trails and around lakes and meadows. The bighorn sheep had many other areas to frequent and could find suitable undisturbed habitat if needed. In areas such as Baxter Pass where sheep came into contact with hikers, sheep appeared to not be adversely affected and had become conditioned to human presence. Hicks and Elder did recommend continuance of the Zoological Area restrictions on off-trail hiking and relocation of the trail away from areas intensely used by sheep.

Dunaway (1971) originally recommended the establishment of the California Bighorn Sheep Zoological Area for the Mt. Baxter and Mt. Williamson herds. Dunaway suggested disturbance by humans was the most important factor limiting populations of bighorn in the Sierra Nevada. Wehausen (1979) noted that, in summer, ewe-lamb groups at Baxter Pass were the most disturbed by human presence. However, no permanent displacement appeared to be occurring. The Mt. Williamson herd is thought to be substantially affected by human use of their summer range with a decrease in overall range of the bighorn sheep. Wehausen (1979) noted that conclusions about human disturbance with one bighorn herd could not be extrapolated to others. This is because of different affectors such as benign versus threatening stimuli that have elicited different learned behaviors over generations of sheep. There is a lack of specific testing of human disturbance for herds other than at Mt. Baxter and Mt. Williamson, as well as the reliance on preliminary conclusions drawn from very small numbers of observations.

The last 30 years of research and monitoring, concluding most recently with the Wehausen (2000) report, indicates that while disturbance does occur to Sierra Nevada bighorn from human presence the sheep have appeared to successfully adapt and habituate to where the effects are not considered adverse. His expert opinion is that no additional human restrictions are warranted in addition to the ban on dogs and goats, which have already been implemented.

The Zoological Areas for Mt. Baxter and Mt. Williamson would continue to have two seasonal restrictions; 1) a no-hiker-entry from June 1 through December 15 for high country above 10,000 feet on both herd ranges; and 2) a no-entry from December 15 through June 1 on winter and spring ranges. The National Park Service also adopted an off-trail summer hiking prohibition in adjacent west side habitat. The Zoological Area has a trailhead quota of no more than 8 people per day for the Baxter Pass trailhead

Recreational and commercial packstock grazing areas are not expected to overlap with areas that bighorn sheep currently forage in.

Alternative 1

Under this alternative effects would be similar except that less acreage of suitable bighorn habitat would be in Recreation Use Category 1 which may increase the potential for human disturbance of bighorns in Upper Tamarack and Upper little Lakes and Bloody Canyon. Out of 79,932 acres of bighorn habitat within the John Muir and Ansel Adams Wildernesses,

60,248 (75 percent) in Recreation Use Category 1; 18,735 acres (24 percent) in Recreation Use Category 2); and 949 acres (1 percent) in Recreation Use Category 3.

The potential for increased human travel into bighorn sheep habitat is unknown since trailhead quota assignments for overnight use in a watershed do not have a direct correlation with whether hikers choose to go up into bighorn habitat or not. It does however allow for increased probability of more hikers going into bighorn habitat over Alternative 1 - Modified. The probability is not expected to be measurably different from the existing situation. The alternative would maintain the existing dog/domestic goat and seasonal off-trail hiking restrictions currently in place in suitable bighorn habitat.

Recreational and commercial packstock grazing areas are not expected to overlap with areas bighorn currently forage in.

Alternative 2

This alternative may lower the probability of human use in bighorn sheep habitat since the quota for Cottonwood Lakes and Tamarack Lakes is substantially lower than all other alternatives. Since a correlation between trailhead quotas and off-trail hiking in bighorn habitat cannot be established this alternative simply decreases the number of overnight recreationists that can access bighorn habitat on any given day from a specific trailhead. The alternative would maintain the existing dog/domestic goat and seasonal off-trail hiking restrictions currently in place in suitable bighorn habitat.

Recreational and commercial packstock grazing areas are not expected to overlap with areas bighorn currently forage in.

Alternative 3

Under this alternative human use patterns and associated disturbance in bighorn habitat would remain the same. Monitoring by bighorn sheep researchers has shown the existing human use patterns in bighorn habitat are not adversely affecting the sheep. The alternative would maintain the existing dog/domestic goat and seasonal off-trail hiking restrictions currently in place in suitable bighorn habitat.

Recreational and commercial packstock grazing areas are not expected to overlap with areas bighorn currently forage in.

Alternative 4

This alternative would maintain the existing dog/domestic goat restrictions currently in place in suitable bighorn habitat.

Mountain Yellow-legged Frog (MYLF): (Sensitive, Petitioned for Listing)

Consequences Common to All Alternatives

Possible direct and indirect effects of implementation of all alternatives to MYLF include: 1) a low probability of trampling of egg masses and frogs by commercial and recreational stock; 2) disturbance of frogs from collecting and handling by recreationists; 3) a decrease in riparian hiding cover from grazing, trails and camps; and 4) potential spread of native and non-native diseases from fishing equipment.

Direct impacts of humans upon MYLF (i.e., trampling mortality, unauthorized collections, etc.) are rarely if ever documented by observation (C. Milliron, pers. comm.; R. Knapp, pers. comm.) or in the scientific literature. However, such events are possible within the planning area at a level insignificant to the viability of the species. The indirect impacts of humans upon MYLF (i.e., habitat trampling) is similarly not well understood or documented. The level of direct and indirect human impacts, however insignificant, is directly proportional to the level of use authorized under the trailhead quota by alternative.

The indirect impacts of disease transfer to MYLF could also be interpreted as human-related. It has been speculated that the potential exists for the transport of pathogens via stock, fishing equipment, etc. The conservative approach to the protection of MYLF from microbial pathogens (e.g., *Aeromonas* bacterium and the *Chytrid* fungus) should require some level of restrictions of human and stock use in the vicinity of MYLF habitat. However, the life history patterns and means of transfer of live pathogens between water bodies and/or MYLF populations are very poorly understood (G. Fellers, pers. comm.). In addition, the known distribution of disease pathogens of MYLF within the planning area is sparse and in need of inventory. It has been noted (G. Fellers pers. comm.) that the *Chytrid* fungus and MYLF are widely distributed sympatrically in the Sierra Nevada without evidence of frog die-off. Recommendations for curtailment of human use in the vicinity of frog habitat are likely premature. As such, Fellers cautions that the best approach to protecting MYLF from these diseases requires a more complete understanding of the mechanism(s) of infection and/or transport of each pathogen.

Implementation, monitoring, and enforcement of Best Management Practices (BMP) 4-10, 4-11, 5-4, 7-3, 7-5, 7-7, 8-2, and 8-3 (adopted regionally since 1979) by all alternatives should continue to provide protection to water quality and habitat condition for MYLF.

The impacts of campsite location and recreational grazing use may be interpreted as human-related, but are evaluated separately by alternative-specific standards and guidelines. The direct and indirect effects of stock upon MYLF include a limited set of important observations and studies. As an example, stock-trampling mortality of adult, toadlet, and larval stages of Yosemite toads (YT) has been observed in terrestrial, wetland, and shallow lentic habitats where these life stages of the toad are most commonly observed. As adult and larval MYLF generally prefer deeper water habitats, the probability of direct mortality by stock trampling is considerably lower than for YT, yet still a possible threat. In addition, direct mortality of egg masses may occur in shallow streams or ponds where trampling occurs. In the Sixty Lakes Basin of Kings Canyon National Park, concern for sensitive springs and spring brooks where MYLF egg laying is concentrated was described by V. Vredenberg (pers. comm.). Unrestricted packstock use (two

mules for two days) was observed during the summer of 2000 where trampling of sensitive spring habitat occurred and was not recovered by the end of the season. This trampling narrowly missed MYLF egg masses. Vredenberg hypothesized that MYLF, which typically use deep pond and lake habitat, are forced to use limited spring habitat as egg-laying sites as the result of habitat fragmentation/segregation by trout introduced into the historically secure habitats of nearby deep lakes and ponds. Given the indirect impact of habitat degradation and the importance of limited egg-laying habitat for MYLF, the Park Service signed a memorandum restricting stock to day use in the Sixty Lakes Basin. Studies by K. Matthews and K. Pope (pers. comm.) describe streamside and lakeside habitat preference of MYLF for willow during the month of August, which implies that grazing impacts to willow density and structure may have a negative impact upon MYLF. The potential of water quality impacts from livestock waste introduced into aquatic habitat of MYLF may reduce their resistance to bacterial and fungal diseases such as "red-legged disease" (*Aeromonas hydrophilla*) and chytrid fungus infection (R. Knapp, pers. comm.), and could lead to sub-lethal effects or even mortality. In summary, the risk of direct and indirect impacts of stock trampling and grazing to MYLF and their habitat could occur in the planning area under any of the alternatives.

The effects of introduced non-native fish upon native amphibians have emerged as one of the leading hypotheses to explain declines of ranid frogs in the American West (Hayes and Jennings 1986; Fisher and Shaffer 1996; Knapp 1996; Knapp and Matthews 2000). Predation on mountain yellow-legged frogs by introduced trout and charr is well documented (Needham and Vestal 1938, Bradford 1989, Knapp 1996). A number of recent studies in the Sierra Nevada and the Central Valley found that native amphibians are largely absent from sites with introduced fishes, and conversely in sites containing amphibians seldom have introduced fishes (Bradford 1989; Bradford *et al.* 1993; Fisher and Shaffer 1996; Knapp and Matthews 2000). Non-native trout and charr have been introduced throughout the Sierra Nevada in lakes and streams that were historically fishless (Christenson 1977; Knapp 1996) and as early as 1915, Grinnell and Storer (1924) noted that mountain yellow-legged frogs tended not to occur in lakes with fish. Since then, Bradford *et al.* (1993) showed that the spatial distribution of mountain yellow-legged frogs has become fragmented due to the presence of introduced trout and charr in streams that may have once served as dispersal and re-colonization routes. Predation by introduced fish may have eliminated frogs from many larger lakes, and made remaining small populations vulnerable to local extinction by preventing dispersal and re-colonization (Knapp and Matthews 2000). Indeed, frogs are now quite scarce in deep-water (≥ 2 meters) lakes which contain fishes, although this is the habitat that mountain yellow-legged frogs seem to frequent as adults in pristine habitats (Knapp and Matthews 2000). This scenario assumes that mountain yellow-legged frogs have metapopulation or source-sink population dynamics (Sjogren 1994), something that is currently under study (R. Knapp, K. Matthews, and V. Vredenburg, pers. comm.). As best can be observed, there have not been any habitat changes in Sierra Nevada lakes that have benefited introduced fishes over frogs (Knapp and Matthews 2000). However, the removal of fishes from high elevation lakes with the use of gill nets could be accomplished in up to 20 population of the lakes that currently contain fish (but lack suitable spawning habitat) with potentially positive effects on local frog populations (Knapp and Matthews 1998, 2000).

The decline of MYLF and Yosemite toads in apparently "pristine" habitat inside national parks has raised the possibility that airborne contaminants may be responsible (Drost and Fellers 1994), although Knapp and Matthews (2000) feel that the pattern of fish introductions is more

responsible for observed frog declines. Previous research by Cory *et al.* (1970) showed that airborne pesticides (largely DDT residues) were carried from the San Joaquin Valley to the Sierras where they were bioaccumulated by MYLF. With a number of new generations of pesticides now in widespread use in the Central Valley, their potential negative effects on the biota of the Sierra Nevada via pesticide drift cannot be dismissed (Aston and Sieber 1997; Datta *et al.* 1998; McConnell *et al.* 1998; Lenoir *et al.* 1999). Indeed, Davidson *et al.* (in review) found a significant correlation between airborne pesticide drift and the disappearance of MYLF populations, a result that has been previously documented with California red-legged frogs (*Rana aurora draytonii*) in the state (Davidson *et al.* 2001). The initial results of a study of the effects of synthetic pesticides and airborne pollutants on Pacific treefrog (*Hyla regilla*) (PTF) collected from the Sierra Nevada indicate that tadpoles from locations closer to the San Joaquin Valley have lower activity rates of the enzyme cholinesterase. This is an important enzyme in the function of the nervous system. Reduced cholinesterase activity can affect the respiratory system and lead to death. Similar but less significant trends were observed in adult PTF. In addition, 50 percent of adult and larval frogs collected within Yosemite National Park contained measurable levels of diazinon and chlorpyrifos, as compared to 9 percent of frogs collected from coastal reference sites. Toxicity tests of chlorpyrifos and diazinon indicate that they are two of the three most toxic pesticides to PTF. These results for PTF imply more severe effects for species such as MYLF, which are more closely associated to aquatic habitats, especially during their two to three year larval stage.

The hypothesis that amphibian declines may be caused by increases in ultraviolet (UV-B) radiation due to depletion of the ozone thinning in the atmosphere is consistent with the apparent global nature of declines (Blaustein and Wake 1990, Wake 1991). That many declines have taken place in “pristine” high mountain habitats (e.g., boreal toads) (*Bufo boreas boreas*) in the Rocky Mountains (Carey 1993), and YT and MYLF in the Sierra Nevada (Kagarise Sherman and Morton 1993; Bradford *et al.* 1994b). Blaustein *et al.* (1994) found reduced hatching success for boreal toad and Cascades frog eggs exposed to UV-B light (from roughly 80 percent hatching success with UV-B filtered out to 60 percent without the filter). However, it is unclear if the observed 25 percent reductions in hatching success are sufficient to cause population declines in species with such high fecundity. No differences between shielded and unshielded eggs were found for PCT. The three species were also found to have different levels of photolayse activity, a DNA repair enzyme, with PTF having higher levels than either the boreal toad or Cascades frog. Long, *et.al.* (1995) found synergistic effects of UV-B light and low pH on egg development in the northern leopard frog (*Rana pipiens*). Recent UV-B studies on MYLF in the field and in the laboratory show that developing embryos are not being affected by current UV-B levels under actual field conditions, but are negatively affected by artificially increased UV-B levels in the laboratory (V. Vredenburg, pers. comm.). Potential negative effects of UV-B are probably linked to a number of other anthropogenic factors and stressors.

Bradford, *et.al.* (1992) examined MYLF egg and larvae tolerances to low pH in the laboratory and compared the tolerances to the peak observed acidity in Sierra Nevada lakes of pH values of 5.0. They found that down to a pH of 5.0, there were no differences in egg development or larval survival (although there may have been sub-lethal stresses). In a related study, water chemistry was compared at sites with frogs and apparently suitable sites without frogs. The results showed that neither pH nor the acid neutralizing capacity was found to be statistically different (Bradford

et.al. 1994b). Thus, acid deposition is not a likely cause, per se, of the decline of MYLF in the Sierra Nevada.

The 1987-1992 drought, which was severe across the entire Sierra Nevada even by historic standards, has been discounted as a cause of decline because some declines preceded the drought (Bradford *et. al.* 1994a), and MYLF primarily use permanent bodies of water (Zweifel 1955; Mullally and Cunningham 1956). However, extended severe droughts may act synergistically with other factors. For example, Pounds and Crump (1994) hypothesized that the disappearance of the golden toad (*Bufo perigienes*) in Costa Rica may have been due to the combination of airborne contaminants and drought with resulted in higher toxic concentrations of contaminants than normally is the case.

Researchers may affect frog populations across the entire range by handling animals, marking individuals, attracting predators (such as Clark's nutcrackers and black bears), or spreading pathogens from water body to water body via clothing and equipment. However, in the Tablelands area where Bradford *et. al.* (1994a) found complete disappearance of frogs, only visual surveys were used that involved no direct contact with frogs or aquatic environments. Current research activities on frogs contain provisions to limit the spread of potential pathogens into frog environments (R. Knapp, pers. comm.; V. Vredenburg, pers. comm.).

Consequences by Alternative

Alternative 1 - Modified

Implementation of Alternative 1 - Modified entails relatively no change in recreational use quotas with minor changes in distribution of human use by trailhead. Recreational grazing standards in typical MYLF habitat (meadows and riparian areas) under Alternative 1 - Modified vary from 5-40 percent use by weight according to vegetation type (herbaceous and perennial; shrubs and trees) and seral state (high-seral; mid-seral). In all use types, the percent use is decreased under the proposed action by at least 25 percent from the previous management guidelines (Alternative 3, No Action).

The minimum campsite-to-water distance of 50 feet prescribed under the proposed action is double the previous standard. Combined with the Sierra Nevada Forest Plan Amendment Standards and Guidelines RCA-4, 14, and 40, this alternative should result in slightly reduced recreational use impacts to MYLF habitat.

Concurrent implementation of the Sierra Nevada Forest Plan Amendment Standard and Guideline RCA-41 prohibits pack and saddle stock grazing in standing water, saturated soils in wet meadows, and associated springs and streams occupied by the Yosemite toad (YT). As MYLF populations and habitat entails localized overlap with that of the YT, this Standard and Guideline would provide extra protection from grazing impacts to MYLF where populations and habitat of YT are concurrent. Standard and Guideline RCA-18 limits disturbance to meadow streambanks and lake and pond shorelines to 20 percent by length, providing further mitigation to the effects of stock upon MYLF and their habitat. The implementation of Critical Aquatic Refuges within the planning area where MYLF occur, in addition to Sierra

Nevada Forest Plan Amendment Standards and Guidelines RCA-4, 6, 12, 14, 19, 39, 40, 41b, FW-RCA-26, and FW-RCA-28 provide additional protection, monitoring, and mitigation for MYLF. Overall, Alternative 1 - Modified should result in a slight reduction of impacts by recreational stock use to MYLF and their habitat.

In areas currently experiencing high recreational use, the increase in minimum campsite to water distance and increased grazing standards would help to slightly improve MYLF habitat quality. Currently heavily used areas would remain so, and areas lightly used or not used by humans would remain refuges for the MYLF. The changes to recreational use quotas for overall use and/or use by trailhead in Alternative 1 - Modified do not present a level of direct and/or indirect human impacts upon MYLF that threaten the viability of the species.

Overall, Alternative 1 - Modified would result in reduced impacts to MYLF and their habitat. The consequence of reduced impacts to MYLF is secondary relative to primary factors limiting the conservation and restoration of MYLF (i.e., introduced fish and airborne pesticides). As past impacts of grazing and human uses to MYLF have not been quantified, the degree to which mitigation would be effectively measured and evaluated is less than optimal. A more complete understanding of the infective mechanism and routes of infection than currently exists is needed before creating issues of human and stock contact with MYLF individuals and populations within the planning area.

Alternative 1

Implementation of this alternative entails relatively no change in recreational use quotas with minor changes in distribution of human use by trailhead. The minimum campsite-to-water distance of 50 feet prescribed under the proposed action is double the previous standard. Combined with the Sierra Nevada Forest Plan Amendment Standards and Guidelines RCA-4, 14, and 40, this alternative should result in slightly reduced recreational use impacts to the quality of MYLF habitat.

In areas currently experiencing high recreational use, the increase in minimum campsite to water distance and increased grazing standards would help to slightly improve MYLF habitat quality. Currently heavily used areas would remain so, and areas lightly used or not used by humans would remain refuges for the MYLF. The changes to recreational use quotas for overall use and/or use by trailhead in Alternative 1 do not present a level of direct and/or indirect human impacts upon MYLF that threaten the viability of the species.

Recreational grazing standards in typical MYLF habitat (meadows and riparian areas) under this alternative vary from 5-40 percent use by weight according to vegetation type (herbaceous and perennial; shrubs and trees) and seral state (high-seral; mid-seral). In all use types, the percent use is decreased under the proposed action by at least 25 percent from the previous management guidelines (Alternative 3, No Action).

Concurrent implementation of the Sierra Nevada Forest Plan Amendment Standard and Guideline RCA-41 prohibits pack and saddle stock grazing in standing water, saturated soils in wet meadows, and associated springs and streams occupied by the Yosemite toad (YT). As MYLF populations and habitat entails localized overlap with that of the YT, this Standard and

Guideline would provide extra protection from grazing impacts to MYLF where populations and habitat of YT are concurrent. Standard and Guideline RCA-18 limits disturbance to meadow streambanks and lake and pond shorelines to 20 percent by length, providing further mitigation to the effects of stock upon MYLF and their habitat. The implementation of Critical Aquatic Refuges within the planning area where MYLF occur, in addition to Sierra Nevada Forest Plan Amendment Standards and Guidelines RCA-4, 6, 12, 14, 19, 39, 40, 41b, FW-RCA-26, and FW-RCA-28 provide additional protection, monitoring, and mitigation for MYLF. Overall, Alternative 1 should result in a slight reduction of impacts by recreational stock use to MYLF and their habitat.

Overall, this alternative would result in reduced impacts to MYLF and their habitat. The consequence of reduced impacts to MYLF is secondary relative to primary factors limiting the conservation and restoration of MYLF (i.e., introduced fish and airborne pesticides). As past impacts of grazing and human uses to MYLF have not been quantified, the degree to which mitigation would be effectively measured and evaluated is less than optimal. A more complete understanding of the infective mechanism and routes of infection than currently exists is needed before creating issues of human and stock contact with MYLF individuals and populations within the planning area.

Alternative 2

Implementation of Alternative 2 entails a considerable reduction in overall recreational use quotas, including an even distribution across all trailheads. In areas with historically high recreational use, it should decrease to meet the goal of "equal use" among all areas. Conversely, in areas with historically low recreational use, it should increase to meet the goal of "equal use". This would result in a reduction in impacts to MYLF and their habitat.

The minimum campsite-to-water distance of 100 feet prescribed under the proposed action is four times the previous standard. Combined with the Sierra Nevada Forest Plan Amendment Standards and Guidelines RCA-4, 14, and 40, this alternative should result in reduced recreational use impacts to the quality of MYLF habitat.

Recreational grazing standards in typical MYLF habitat (meadows and riparian areas) under Alternative 2 vary from 5-20 percent use by weight according to vegetation type (herbaceous and perennial; shrubs and trees) and seral state (high-seral; mid-seral). In all use types, the percent use is decreased under the proposed action by at least 30 percent from the previous management guidelines (Alternative 3, No Action).

In addition, concurrent implementation of the Sierra Nevada Forest Plan Amendment Standard and Guideline RCA-41 prohibits pack and saddle stock grazing in standing water, saturated soils in wet meadows, and associated springs and streams occupied by the YT. As MYLF populations and habitat entails localized overlap with that of the YT, this Standard and Guideline would provide extra protection from grazing impacts to MYLF where populations and habitat of YT are concurrent. Standard and Guideline RCA-18 limits disturbance to meadow streambanks and lake and pond shorelines to 20 percent by length, providing further mitigation to the effects of stock upon MYLF and their habitat. The implementation of Critical Aquatic Refuges within the planning area where MYLF occur, in addition to Sierra

Nevada Forest Plan Amendment Standards and Guidelines RCA-4, 6, 12, 14, 19, 39, 40, 41b, FW-RCA-26, and FW-RCA-28 provide additional protection, monitoring, and mitigation for MYLF. Overall, Alternative 2 should result in reduced impacts by recreational stock use to MYLF and their habitat.

The increase in minimum campsite to water distance and increased grazing standards would help to improve MYLF habitat quality. The changes to recreational use quotas for overall use and/or use by trailhead in this alternative do not present a level of direct and/or indirect human impacts upon MYLF that threaten the viability of the species.

Overall, Alternative 2 would result in reduced impacts to MYLF and their habitat. The consequence of reduced impacts to MYLF is secondary relative to primary factors limiting the conservation and restoration of MYLF (i.e., introduced fish and airborne pesticides). As past impacts of grazing and human uses to MYLF have not been quantified, the degree to which mitigation would be effectively measured and evaluated is less than optimal. A more complete understanding of the infective mechanism and routes of infection than currently exists is needed before creating issues of human and stock contact with MYLF individuals and populations within the planning area.

Alternative 3

Implementation of this alternative entails no change in recreational use quotas or in the distribution of use at individual trailheads. In areas currently experiencing high recreational use, no changes to the quality of MYLF habitat would occur. Currently heavily used areas would remain so, and areas lightly used or not used by humans would remain refuges for the MYLF. The minimum campsite-to-water distance of 25 feet prescribed is the same as the previous standard. The trailhead quota for does not present a level of direct and indirect human impacts upon MYLF that threaten the viability of the species. Combined with the Sierra Nevada Forest Plan Amendment Standards and Guidelines RCA-4, 14, and 40, this should result in a slight reduction in human impacts to the quality of MYLF habitat.

Recreational grazing standards in typical MYLF habitat (meadows and riparian areas) under this alternative vary from 35-55 percent use by weight according to vegetation type (herbaceous and perennial; shrubs and trees) and seral state (high-seral; mid-seral). In all use types, the percent use is unchanged under this alternative.

Concurrent implementation of the Sierra Nevada Forest Plan Amendment Standard and Guideline RCA-41 prohibits pack and saddle stock grazing in standing water, saturated soils in wet meadows, and associated springs and streams occupied by the YT. As MYLF populations and habitat entails localized overlap with that of the YT, this Standard and Guideline would provide extra protection from grazing impacts to MYLF where populations and habitat of YT are concurrent. Standard and Guideline RCA-18 limits disturbance to meadow streambanks and lake and pond shorelines to 20 percent by length, providing further mitigation to the effects of stock upon MYLF and their habitat. The implementation of Critical Aquatic Refuges within the planning area where MYLF occur, in addition to Sierra Nevada Forest Plan Amendment Standards and Guidelines RCA-4, 6, 12, 14, 19, 39, 40, 41b,

FW-RCA-26, and FW-RCA-28 provide additional protection, monitoring, and mitigation for MYLF.

Alternative 4

Implementation of this alternative entails no change in recreational use quotas or in the distribution of use at individual trailheads. Increased use may occur on a case-by-case basis. The prescribed campsite standard provides no new direction to buffer aquatic habitats from camping areas, hence any additional protection for MYLF from camping impacts. When combined with the Sierra Nevada Forest Plan Amendment Standards and Guidelines RCA-4, 14, and 40, Alternative 4 should result in slight reduction to no change in impacts to the quality of MYLF habitat.

In areas currently experiencing high recreational use, increased grazing standards would help to slightly improve MYLF habitat quality. Currently heavily used areas would remain so, and areas lightly used or not used by humans should remain refuges for the MYLF. The trailhead quota for Alternative 4 does not present a level of direct and indirect human impacts upon MYLF that threaten the viability of the species.

Yosemite Toad: (Sensitive, Petitioned for Listing)

Consequences Common to All Alternatives

Direct mortality of eggs, larvae or adults from trampling by recreational packstock is decreased with the implementation of the Sierra Nevada Forest Plan Amendment Standard and Guidelines. RCA-41 prohibits pack and saddle stock grazing in standing water and saturated soils in wet meadows, and associated springs and streams occupied by the Yosemite toad (YT). Habitat suitability would improve since adverse effects (i.e., entrapment of toadlets in livestock hoof punches, modification of pool or wet meadow flooded shallows) would not occur. Elimination of grazing would also improve vegetative cover for toads to decrease the probability of predation events by birds and other predators.

Adverse effects of poor trail location such as diverting hiker and packstock traffic through YT breeding areas would be mitigated through a trail relocation program specifically designed to reroute traffic away from the breeding areas. Additional adverse effects on YT breeding areas associated with trails (i.e., increased sediment transport and water quality) would be mitigated. This would be accomplished through improving trail design and implementation of the Sierra Nevada Forest Plan Amendment Standards and Guidelines for Riparian Conservation Areas (RCA-6 and RCA-40).

There remains the potential for humans and dogs to accidentally trample, capture or handle toads under any of the alternatives. Trailhead quotas under Alternatives 1, 1 - Modified, and 2 may help by limiting the number of humans accessing toad breeding and rearing habitats. Additional monitoring is needed to more accurately assess these affectors and whether additional mitigation measures are needed. Public education is needed and may be more effective to build wilderness users awareness concerning these issues.

Fish stocking, acid rain and snowmelt, ultraviolet radiation, and pesticide drift from agricultural areas are also likely to affect YT populations. Since this species can breed in shallow, ephemeral pools unsuitable for fish, and the adults spend most of their time outside of water, predation by fish is not as much of a concern as it is with the MYLF. YT can reproduce in the shallow margins of lakes; therefore these areas may be more important in drought years when other habitats are dry. Trout predation on toad eggs or larvae remains uninvestigated.

California Spotted Owl: (Sensitive, Petitioned for Listing)

Consequences Common to All Alternatives

California spotted owl habitat would not be altered by this proposal. The majority of designated spotted owl areas within the wilderness occur in areas of moderate to low use. Implementation of recreation use categories would not change the current levels or patterns of human use substantially in spotted owl habitat in the wilderness from the existing situation. Spotted owls are tolerant of human presence particularly since much of their activity is nocturnal, hence the potential for disturbance from recreational activities is low.

No cumulative effects are thought to present any substantial impact to the spotted owl within the planning area.

Pacific Fisher: (Sensitive, Petitioned for Listing)

Consequences Common to All Alternatives

The planning area represents the upper limit of suitable habitat for the Pacific fisher. Very few fisher sightings are recorded within wilderness. Since the activities proposed would not modify fisher habitat, and current human disturbance impacts from recreational use are thought to be low, direct effects are minimal. Some level of human disturbance to fisher may be occurring in the planning area. The Sierra Nevada Forest Plan Amendment Standard and Guideline (PAC-RO3D) would be implemented if den sites are located.

Of the potential cumulative effects listed, only substantially increased human presence is likely to be of concern to the fisher within the planning area. Outside of the planning area, timber harvest and road densities are factors that can reduce habitat suitability. The analysis area has very little suitable habitat and probably very few fishers. They are much more likely to be found at lower elevations in the general forest.

Any monitoring conducted would be part of an effort identified in the Sierra Nevada Forest Plan Amendment.

Forest Service Region 5 Sensitive Wildlife Species

The following analysis is taken from the Biological Evaluation found in Appendix J. It includes all Forest Service Region 5 sensitive wildlife species that occur within the planning area.

Willow Flycatcher:

Consequences Common to All Alternatives

Only two meadows on the Inyo National Forest at low elevation within the Ansel Adams Wilderness have been determined as suitable non-occupied, non-emphasis habitat with no records of willow flycatcher in either meadow. Both would remain in excellent condition with no livestock grazing likely under these alternatives. Recreation use would remain light and be mostly fishing and hiking along the adjacent trails. Additional habitat may be present which has not been identified and may have commercial and recreational packstock grazing associated with it. However these areas are expected to be very few as most meadows are above the elevation limits suitable for willow flycatcher nesting habitat.

On the Sierra National Forest, Statum and Spanish Meadow within the John Muir Wilderness have been determined as emphasis willow flycatcher habitats that would continue to be surveyed to protocol. No recreational or commercial livestock grazing would likely occur at Statum Meadow, as it is close to the trailhead where people are not likely to camp. Spanish Meadow may receive light recreational packstock use. Packstock grazing use of this meadow under any of the alternatives is anticipated to be light since past use has demonstrated relatively low numbers of packstock using the trail. Alternatives 1 and 1- Modified would designate the trailhead for low recreation use. A low use pattern is not expected to change under any of the alternatives.

Maximum allowable grazing standards for recreational packstock for the different alternatives have different potentials to maintain meadows as suitable willow flycatcher habitat.

The majority of suitable nesting willow flycatcher habitat lies outside the three wildernesses. The suitable nesting habitat adjacent to the wilderness boundaries is subject to impacts from commercial livestock grazing operations along with pack station corrals and pastures where grazing and trampling could degrade the willow structural component similar to the descriptions for Alternatives 3 and 4. In addition areas with livestock (i.e., corrals) that attract brown-headed cowbirds create a hub from which cowbirds can parasitize willow flycatcher nests up to five miles from the feeding area. Suitable wilderness nesting habitat may be within this five-mile radius. Developed campgrounds, picnic areas and summer homes, as well as nearby subdivisions and rural communities, create similar feeding opportunities for cowbirds. In addition recreation areas that may be suitable willow flycatcher nesting habitat draw people near the willows to fish, hike and enjoy the day. Inadvertently, human presence may disturb the breeding and young rearing activities of the birds as well as attract nest predators such as jays, ravens or mammalian predators. Habitat loss can also occur from rural sprawl and community development, meadow drainage and fill, willow eradication and home construction in meadows. All of these factors may be contributing to the decline of willow flycatchers from habitat degradation, loss, and

fragmentation, as well as and small population isolation, and ultimately may prevent recruitment into other suitable areas (i.e., wilderness).

Consequences by Alternative

Alternatives 1 - Modified and 1

Allowable forage utilization grazing standards would likely maintain willow flycatcher nesting structural habitat. This includes the characteristics of mature bushy willows with dense foliage to ground level, young willow recruitment and a good herbaceous substrate for insect production in meadows that may be suitable habitat.

Alternative 2

Maximum allowable forage utilization grazing Standard and Guideline of 20 percent herbaceous, 10 percent shrubs in montane and subalpine meadows would likely maintain highly suitable willow flycatcher nesting structural habitat. This includes the characteristics of mature bushy willows with dense foliage to ground level, young willow recruitment and a good herbaceous substrate for insect production in meadows that may be suitable habitat.

Alternative 3

Maximum forage utilization standards would likely result in degraded nesting structural habitat conditions of the herbaceous and willow shrub component. Further, reduced shrub and herbaceous substrate for insect production, and lower young willow recruitment and survival in meadows that may be suitable habitat may result. Allowable forage utilization standards of 45 percent shrub leader utilization and 55 percent herbaceous in montane and subalpine meadows could inhibit bushy willow development with dense foliage to the ground and likely result in seedling mortality and inhibition of young shrub development. Insect production may be adversely affected from trampling and removal of herbaceous and shrub substrate.

Alternative 4

Maximum forage utilization standards would likely result in degraded nesting structural habitat conditions of the herbaceous and willow shrub component. Further, reduced shrub and herbaceous substrate for insect production, and lower young willow recruitment and survival in meadows that may be suitable habitat may result. Allowable forage utilization standards of 35 percent shrub leader utilization and 45 percent herbaceous in montane and subalpine meadows could inhibit bushy willow development with dense foliage to the ground and likely result in seedling mortality and inhibition of young shrub development. Insect production may be adversely affected from trampling and removal of herbaceous and shrub substrate.

Nest parasitism impact of brown-headed cowbirds on willow flycatcher in wilderness associated with livestock presence appears not to be an issue at present since no willow flycatchers are known to be nesting.

Peregrine Falcon:

Consequences Common to All Alternatives

The only recreational activity occurring within wilderness that could affect the peregrine falcon is rock climbing. Under all alternatives, known aeries are protected by a limited operating period that closes these areas to rock climbing while nesting activities are taking place. Implementation of any of the alternatives does not promote nor hinder the existing level of wilderness rock climbing.

Peregrine falcon nest site disturbance from increasing human recreational use near aeries could be a cumulative effect in wilderness if left unmanaged.

Northern Goshawk

Consequences Common to All Alternatives

Implementation of any of the alternatives would not alter the current habitat condition or prey base for the northern goshawk. Recreational uses currently taking place in the wilderness do not alter the structure or composition of forested stands to a measurable degree at the stand or patch scale. Very localized campsite impacts may occur at traditional hiker and packer camps such as soil compaction, vegetation loss, de-limbing of trees, and gathering of downed wood for campfires. These activities result in minor changes in habitat quality for prey species. Abundant habitat is available away from camp areas. Goshawks prey opportunistically on a wide variety of prey species found outside of camp areas.

A direct effect associated with any of the alternatives is disturbance to goshawk nests, roost sites, or favored foraging areas caused by humans recreating in proximity. The alternatives could potentially change the numbers and destinations of humans using wilderness; however it is impossible to predict how these changes may affect the probability of nest site disturbance or flushing of goshawk from perches. The level of this disturbance currently occurring is unknown since only one goshawk nest is known in wilderness at this time. It is reasonable to assume some level of habituation to human presence has occurred where goshawks nest adjacent to camps. The one known nest in close proximity to a camp has produced young two out of three years that it has been monitored. Nests monitored outside wilderness in human recreation use areas, or along forest roads, have also shown some goshawk to maintain territories and produce young in spite of human disturbance. It is also reasonable to assume that some goshawk move their nests to areas of fewer disturbances within their suitable habitat if too much human disturbance takes place directly adjacent to the nest. The threshold of disturbance that would cause nest failure or movement is unknown and variable by individual bird, and somewhat tied to whether the bird was raised near human activity. No formal surveys within the wilderness area have been

conducted however a cursory review of wilderness habitats of lodgepole pine, mixed conifer and red fir forests suggests many more nesting goshawk pairs are probably using wilderness. Many of these areas are in prime human use areas along riparian corridors with trails and campsites. These areas are probably less suitable as nesting habitat today than in earlier times of low human use. The unknown factors of how human recreational activities are affecting goshawk in wilderness are the habituation and tolerance capabilities of the individual goshawks to human presence, and the variability in human responses to encounters with goshawk.

The one known nest, and any future nests found, would be reviewed through the Biological Evaluation process to determine if recreation activities need to be curtailed in any way under Sierra Nevada Forest Plan Amendment Standard and Guideline (FW-B13).

In wilderness areas currently experiencing low or no use, the likelihood that goshawks would be impacted by human disturbance is far lower than in other areas of the general forest where the majority of goshawks now occur.

Cumulative adverse effects on goshawks in wilderness are the increasing human disturbance in nesting territories associated with recreational use, and lower nest productivity associated with taking of young for falconry. Both effects can be managed through site-specific recreational closures or restrictions where impacts are determined to be unacceptable, and by enforcement of falconry take regulations.

Great Gray Owl:

Consequences Common to All Alternatives

The effects of implementation of any of the alternatives are conjectural since there are no historical or current records of great gray owls in the three wilderness areas. No surveys have been conducted nor is there an inventory of suitable habitat that may exist. In addition the effects of activities such as light to moderate grazing by recreational livestock are poorly understood in terms of their effects on great gray owls and their prey. If this species does exist within the planning area, the number of great gray owls is assumed to be few since they are not common anywhere in this southern-most portion of their overall range.

Livestock grazing, both recreational and commercial, below 9,000 feet has the potential to seasonally lower vole populations in meadows where great gray owls may exist and forage. This could impact the great gray owl's ability to provide sufficient food to rear its young during the nesting season. Human disturbance to nesting owls may occur in these same areas and could potentially cause owls to abandon a nest as previously discussed.

Consequences by Alternative

Alternatives 1 - Modified and 1

It is unknown if a grazing utilization standard in montane meadows of 40 percent in high seral ecological condition, and 30 percent in mid and early seral would adversely affect great gray owl potential foraging habitat where prey species (i.e., montane vole) exist. Moderate forage utilization such as this has not been studied in the Sierra to determine its effect on vole densities in meadows. However research in other parts of the country has shown seasonal vole population reductions or temporary extirpations at higher grazing levels. One mitigating aspect could be that great gray owls rear young in June and by the end of June young are fledged when stock grazing has only begun to utilize forage and adversely affect vole densities.

Recreational camps and trails within 850 feet of suitable owl foraging habitat (i.e., montane meadows bordered by forest from the lowest elevations of the wilderness up to 9,000 feet) may cause potential disturbance to great gray owls nesting, or attempting to nest, in these areas. Nest abandonment is possible if recreation use occurred around the nest site during the breeding or egg laying period. The breeding and egg laying/incubation period occurs in April and May when wilderness recreation is light. It is at this time that human disturbance is less likely than during the young rearing phase in June when owls have much higher commitment to their young with abandonment much less likely.

If any great gray owls are found nesting in the wilderness, the Sierra Nevada Forest Plan Amendment Standards and Guidelines (FW-B15 and B16) would be applied to the nesting territory. These Standards and Guidelines are designed to evaluate trail and recreational uses as well as grazing through a site-specific biological evaluation process to determine if seasonal closures or additional mitigation measures are necessary.

Alternative 2

A grazing utilization standard of 20 percent in montane meadows may be light enough to allow vole populations to persist in meadows where great grays might hunt. Light forage utilization such as this has not been studied in the Sierra to determine its effect on vole densities in meadows, however research in other parts of the country has shown seasonal vole population reductions or temporary extirpations at higher grazing levels. One mitigating aspect could be that great grays rear young in June and by the end of June young are fledged when stock grazing has only begun to utilize forage and adversely affect vole densities.

Recreation impacts are the same as Alternatives 1 - Modified and 1.

If any great gray owls are found nesting in the wilderness Sierra Nevada Forest Plan Amendment Standards and Guidelines (FW-B15 and B16) would be applied to the nesting territory. These Standards and Guidelines are designed to evaluate trail and recreational uses through a site-specific biological evaluation process to determine if seasonal closures or additional mitigation measures are necessary.

Alternatives 3 and 4

Moderate grazing standards from 45 to 55 percent in montane meadows could reduce cover sufficiently to adversely modify habitat suitable for voles. This may reduce vole density enough to affect owl foraging and nest success during the nesting and rearing season in meadows below 9,000 feet elevation. Moderate forage utilization such as this has not been studied in the Sierra to determine its effect on vole densities in meadows, however research in other parts of the country has shown seasonal vole population reductions or temporary extirpations at these grazing levels. One mitigating aspect could be that great gray owls rear young in June and by the end of June young are fledged when stock grazing has only begun to utilize forage and adversely affect vole densities.

Recreation impacts are the same as Alternatives 1 - Modified and 1.

If any great gray owls are found nesting in the wilderness Sierra Nevada Forest Plan Amendment Standards and Guidelines (FW-B15 and B16) would be applied to the nesting territory. These Standards and Guidelines are designed to evaluate trail and recreational uses through a site-specific biological evaluation process to determine if seasonal closures or additional mitigation measures are necessary.

California Wolverine:

Consequences Common to All Alternatives

None of the alternatives adversely affect wolverine structural habitat characteristics. It is unknown how the wolverine might be affected by the distribution of human use in wilderness under the five alternatives. It might be said that Alternative 2 with the lowest trailhead quotas would be the most beneficial, however it may also disperse more recreation into areas currently experiencing less use. This could increase the potential for human disturbance to wolverine in areas that are currently more isolated. Alternatives 1 - Modified and 1 create Recreation Use Category 1 of low levels of use dispersed across the landscape along with associated trailhead quotas. While they identify areas of lower human density it is unknown if that lower level of use really equates to better habitat for the wolverine since these areas may be fragmented by areas of heavy human use and main trail corridors. All alternatives may be adversely affecting the use of the wilderness by wolverine if the species still exists, which has yet to be determined. Since the status of the wolverine population within the planning area is not known, and the most recent surveys have not detected any wolverines, any presumed population may be very low in numbers and isolated to the most unused portions of the wilderness.

The Sierra Nevada Forest Plan Amendment's analysis of consequences of implementing the preferred alternative stated two findings that pertain to impacts of human recreation use in wolverine habitat:

1. Wolverine Environment outcome. Suitable environments are highly isolated or they exist at very low abundance, or both. While some sub-populations associated with these environments may be self-sustaining, there is limited or no opportunity for population interaction. There has likely been a reduction in overall species range from historical conditions, except for some rare, local endemics that may have persisted in this condition since the historical period.
2. Wolverine Population Outcome. Suitable environments are highly isolated and exist at very low abundance. Populations have little or no interaction, resulting in strong potential for local or regional extirpation, and low likelihood of re-colonization.

Since the current pattern of human use has been fairly stable over the past few decades, any remaining wolverines are likely to have established home ranges where they best can avoid human interaction, especially during denning. Some of the primary routes overlap trading routes used by Native Americans for hundreds, if not thousands of years. Human use on system trails can get fairly heavy during the summer season. These recreational corridors may serve as movement barriers to wolverines, limiting their home range size and ability to interact with neighboring wolverines. The ability of young wolverines to seek out unoccupied home ranges, or colonize new areas, is also presumably very limited by human use, alteration of habitat, and development outside of the wilderness areas and adjacent National Parks.

None of the alternatives measurably alter the current levels and patterns of use by recreating humans and their livestock. It is unknown if this current level of use may be having an adverse effect on the ability of the southern Sierra population of wolverine to persist. A profound lack of research information for the Sierra makes any prediction of effect very speculative. However, the lack of sightings in the last few decades, coupled with what is known of the historic (pre-trapping) population levels in and near the analysis area, does not paint an encouraging picture.

Increases in human presence in wolverine habitat in and adjacent to wilderness may be causing wolverine to avoid areas of habitat they may have once used. Recreation developments and facilities such as campgrounds, day use and picnic areas, resorts, pack stations, together with rural sprawl close to the wilderness boundary may be fragmenting suitable wolverine habitat and cutting off travel and dispersal corridors for the species and result in isolation of individual wolverines.

Sierra Nevada Red Fox:

Consequences Common to All Alternatives

Like the wolverine, none of the alternatives adversely affect red fox structural habitat characteristics.

The Sierra Nevada Forest Plan Amendment states that little is known about the current distribution and abundance of the Sierra Nevada red fox population. It further states to assess the risk of various management strategies to Sierra Nevada red fox persistence; scientists and managers must learn more about the distribution of this species and its habitat.

Virtually nothing is known about the red fox in wilderness to adequately assess effects. The red fox appears to be more tolerant of human disturbance than the wolverine, but does shy away from human presence. It also appears to spend considerable time foraging in and around meadows and riparian habitats where humans tend to recreate and camp. It forages in meadows for rodents where livestock grazing may change rodent species composition and densities.

With these assumptions in mind Alternative 2, with light grazing and the lowest trailhead quotas in wilderness, probably best provides the highest probability for undisturbed habitat. Alternatives 3 and 4 provide the least probability while Alternatives 1 - Modified and 1 are somewhere in the middle. Under all alternatives human recreation use, particularly around riparian habitats would continue to lower the wilderness habitat suitability for the red fox though it is unknown if this would be detrimental to the populations persistence and viability.

The Sierra Nevada Forest Plan Amendment summary of consequences states: “Alternatives that protect meadow systems, provide mature open forest conditions, and reduce impacts associated with human presence present the greatest benefit to the Sierra Nevada red fox.” Increases in human presence in red fox habitat in and adjacent to wilderness may be causing foxes to avoid areas of habitat they may have once used. Recreation developments and facilities such as campgrounds, day use and picnic areas, resorts, pack stations, together with rural sprawl close to the wilderness boundary may be fragmenting suitable red fox habitat and cutting off travel and dispersal corridors for the species and result in isolation of individual red foxes.

American marten:

Consequences Common to All Alternatives

Martens appear to occupy all suitable habitats in the analysis area. None of the alternatives adversely affect marten structural habitat characteristics. Their wilderness habitat is in excellent condition with an abundance of mature forest and downed woody material for denning, and production of small mammal prey. They forage opportunistically and can utilize a variety of prey species that may benefit one way or the other from the various alternatives. Marten are tolerant of human disturbance that is not directly threatening such as wilderness recreation. The species is not expected to be adversely affected by any of the alternatives. Alternatives 1 - Modified, 1 and

2 provide better riparian habitat conditions for marten to forage in since they provide for improved riparian habitats with lower forage utilization standards for livestock.

Increasing recreational use of wilderness may be causing marten to change behavior within their home ranges, or shift their diets where prey species composition and density have been affected around major camps and trails.

Wong's Spring Snail:

Consequences Common to All Alternatives

There would be no direct or indirect effects of implementation of any of the alternatives on this species. All known populations are on the southern end of the John Muir Wilderness on the Inyo National Forest, either outside wilderness, or if they exist in wilderness, at the very margins of the boundary and on steep slopes in spring areas that remain unaffected by human presence.

Outside of the analysis area, development of springs and fire may contribute to habitat degradation. The level of water development activity has lessened considerably in the last decade, whereas the incidence of fire has remained stable or slightly increased. There are no cumulative effects on these species in the three wilderness areas.

Pallid bat and Townsend's big-eared bats

Consequences Common to All Alternatives

There would be no direct or indirect effects to either species with implementation of any of the alternatives. No adverse effects are anticipated to either species foraging or roosting habitats within wilderness. The majority of important roosts for the Townsend's big-eared bats are not located within these three wilderness areas.

There are no cumulative effects on these species in the three wilderness areas.

Sensitive Plants

The Biological Evaluation (BE) prepared for the FEIS has determined that implementation of any alternative may affect individual sensitive plants, but would not result in a trend toward Federal listing as Threatened or Endangered or result in a loss of viability for any species. A more detailed account of the affected environment and environmental consequences for sensitive plants can be found in the BE (Appendix J).

Very little research has been conducted on any of the sensitive plant species being analyzed for this management plan. Therefore the review below of the effects of trampling, grazing, and weed invasion on individual plants and vegetation communities in general is intended to provide background for the sensitive species effects analysis that follows.

Numerous effects from hiker or stock trampling and grazing on individual plants, as well as on vegetation communities, have been documented. These include effects associated with removal of leaf tissue or other plant parts, as well as effects associated with trampling induced changes in the plant's environment, particularly soil compaction and erosion. Removal of leaf tissue and the subsequent reduction in the amount of photosynthetic area available to the plant can result in a reduction in biomass production, plant size and seed output, and depletion of carbohydrate reserves (Cole 1987; Cole 1993; Douglass, *et.al.* 1999; McClaran and Cole 1993; Platts 1990). In addition to mechanical injury to aboveground plant parts, plant roots can be severed, killing plant material, by the soil shearing action of hooves or boots, particularly when soils are wet (McClaran and Cole 1993). These effects can lead to a decline in plant survival and reproductive success.

Soil compaction can also adversely affect plant survival, growth, and reproduction. Compaction of soils can cause decreased water infiltration rates into the soil, and lower oxygen diffusion rates, as well as decreased heterogeneity of soils, reducing the availability of favorable germination sites. Root elongation and seed germination can be inhibited in compacted soils due to the increased mechanical resistance of the soil. Soil erosion and compaction can also lead to root exposure, eventually killing the affected roots (Cole 1987; McClaran and Cole 1993; Douglass, *et.al.* 1999). The lowering of water tables, resulting from soil erosion, can have a profound effect on the composition of the vegetation communities utilizing the water table (McClaran and Cole 1993; Platts 1990).

Increases in bare ground resulting from soil compaction or the loss or reduction of less tolerant native plants can also allow for the establishment of weed species (Douglass *et.al.* 1999). This change in environmental conditions, coupled with the potential importation of weed seeds in boots, hay, and packstock excrement, can result in an increased potential for the invasion and spread of weeds, which could in turn affect available habitat for sensitive plant species (Asher and Harmon 1995; Huenneke 1995).

Differences in the amount and frequency of use, the type and behavior of users, the season and time of use, and the environmental conditions where the use occurs, can all affect the amount of impact to be expected from trampling or grazing (Cole 1987). Additionally, there are differences between plant species in their response to trampling, based on their morphological and physiological characteristics. These differential effects are evident in changes in species richness and species composition within a community. Those species with a higher tolerance of the effects of trampling or grazing can, over time, gain dominance in a community, while other less tolerant species may decline or drop out entirely. Cole (1993) notes that in most vegetation types, species were lost more rapidly than the composition changed, i.e., species richness can decline rapidly before any noticeable change occurs in the dominant vegetation of the community. Trampling may quickly eliminate relatively uncommon species (e.g., sensitive plant species) while their loss has little effect on the overall composition of the vegetation community.

The removal of dead woody material (e.g., for use as firewood) can potentially affect sensitive plant species, resulting in a decrease in suitable germination sites for some species, or a reduction in nutrient availability.

Rock climbing activities could potentially affect those species that inhabit rock ledges, crevices, cliffs, and similar habitats. The placement of climbing equipment, in addition to climber's hands and feet, has the potential to displace or crush sensitive plants.

All of the effects discussed above have the potential to be especially significant to rare plant species, whose numbers or distribution are already limited, particularly where human uses and management activities are more prevalent in the landscape.

Known populations of sensitive plants are widely scattered throughout the planning area. It is possible there are many additional undiscovered populations, particularly in less accessible and less traveled areas where sensitive plant surveys have not yet been performed. Many of the known sensitive plant occurrences that occur in the more heavily visited drainages within this planning area were monitored for impacts during the 2000 field season. These populations were observed to be in good condition, with relatively few of the potential impacts outlined above occurring at this time. Those species occurring in rocky habitats were especially well protected, due to the unsuitability of these areas for campsites, and the infrequent off trail travel in these areas. Plants found in riparian and meadow habitats may be at greater risk of impact since these areas generally receive the greatest use from visitors. The effects discussed above appear to be very limited in extent and severity on sensitive plant species within this planning area.

Consequences Common to All Alternatives

In general, direct impacts to sensitive plants such as collection, trampling, uprooting, and grazing by packstock can occur under any alternative. Possible indirect and cumulative effects under any alternative include changes in hydrology and sedimentation rates in meadow habitat, soil compaction, and competition from invasive exotic plants that are introduced by visitors and stock. The degree of impact and potential for effects to any given population are what would vary by alternative. In general, none of the currently known sensitive plant species have been observed to experience severe negative impacts from existing wilderness uses.

The potential for the establishment of noxious weed populations would be somewhat reduced under all alternatives compared to past conditions. This is based upon management direction to encourage the use of weed free forage. It is also based on the assumption that education efforts would result in an increase in wilderness users' awareness of weed issues and their willingness to take preventive measures (i.e., removing plant material from boots, socks, and hooves prior to entering the wilderness).

Consequences by Alternative

Alternative 1 - Modified

Overall visitor use levels and patterns would remain similar to the existing situation under this alternative. Trampling impacts would likely remain similar to current levels. Adjustments may be made on a site-specific basis, based on the limiting factors analysis, potentially providing additional protection for those areas currently assessed to be in unacceptable

ecological condition. This alternative provides for a decrease in allowable stock forage utilization rates and managing for high similarity to potential natural condition. It provides improved range readiness standards based on the soil and plant resources, an increase in the minimum acceptable campsite distance from water, and an elevational fire restriction to preserve soil quality at high elevations. These standards would provide for an improvement in habitat quality for sensitive plants, particularly riparian species. The result would be improved soil conditions, and a reduction in the risk of known or unknown occurrences suffering any more than low levels of impacts from trampling, soil compaction, erosion, or other use associated effects. In addition, the improvement in the condition of soil and vegetation resources would help to prevent establishment of noxious weed species in the planning area. The effects on sensitive plant species or their habitat from implementation of this alternative are expected to be minimal.

Alternative 1

Effects of this alternative on sensitive plant species and their habitat are similar to those in Alternative 1 - Modified. However, this alternative relies on a more user determined, less ecologically based implementation of packstock utilization rates in comparison. This could in turn result in less meaningful improvements in habitat conditions for sensitive plant species, particularly riparian species, under this alternative as compared to Alternative 1 - Modified.

Alternative 2

This alternative should provide the best conditions overall for sensitive plant species and their habitat. With implementation of this alternative, visitor use levels would be decreased overall, potentially resulting in fewer trampling impacts to sensitive plant occurrences or habitat. However, areas that are currently receiving very light use may experience an increase in use, as wilderness users are displaced from areas where acceptable use limits have been lowered. This could result in an increase in trampling impacts in some areas, and a decrease in others. It is uncertain what the overall effects of this shift would be on these species. There is insufficient information on the location of all occurrences, and it is difficult to predict where the shifts in use may occur. However, it is not likely to result in a significant effect on these species or their habitat, given the lower use levels overall under this alternative. The stricter standards applied throughout the planning area should provide for the best overall protection of any of the alternatives for the habitat or any occurrences of sensitive plant species. Specifically: 1) stock utilization rates; 2) a 100 foot water setback; 3) range readiness standards that are based on soil and plant resources; 4) caps on use levels throughout the planning area; 5) elimination of all impacts from user-created trails; 6) meadows managed for a very high similarity to the potential natural community; and 7) an elevational fire restriction to preserve soil quality at high elevations. Opportunities for the introduction or establishment of noxious weed populations would be lowest under this alternative, due to the lower overall use and better condition of soil and vegetation resources. The effects on sensitive plant species or their habitat from implementation of this alternative are expected to be negligible, and would be less than for any other alternative.

Alternative 3

Wilderness management would remain unchanged from the current situation under this alternative. Effects on sensitive plant species under the current management system include: 1) a reduction in soil productivity; 2) susceptibility to weed invasion; 3) a reduction of down woody material and duff that provides soil protection, nutrient cycling, and may provide germination sites for sensitive species; and 4) trampling impacts around campsites and trails, including user-created trails. Overall, severe or extensive damage to sensitive plants or their habitats appears to be limited or nonexistent within the planning area. This conclusion is based on personal observations, soil reports, and campsite data. However, where low level to moderate impacts to habitats are occurring (e.g., trampling, soil compaction, erosion, etc.), these would likely continue at a similar level, though site-specific corrective actions may help to alleviate some of these impacts.

Potential for the establishment of noxious weed populations would be somewhat reduced under this alternative compared to past conditions, but would be greater than under Alternatives 1 - Modified, 1, or 2, due to the greater availability of suitable germination sites for weeds. All of these effects are most pronounced in the more heavily used drainages. However, they tend to be localized in relatively small areas, leaving ample unaffected areas of potential habitat in a high quality condition. Nowhere have they been observed to be severe enough to cause a concern for the viability of any sensitive plant species.

Alternative 4

In terms of providing protection for sensitive plants from impacts associated with wilderness use, this alternative is better in some ways than Alternative 3 and worse in others. The lack of range readiness criteria (other than being able to access an area) would allow for soil compaction and erosion in some areas, similar to the existing condition in Alternative 3. The 25 foot water setbacks, and potential for overall increases in visitor use levels, could lead to an increase in impacts to occurrences or to habitat for sensitive plants. This is of particular concern to riparian species, compared to all other alternatives. However, the stricter stock utilization standard in this alternative should result in a slight improvement in the condition of riparian habitats in the planning area over Alternative 3, and a slight reduction in the risk of trampling damage to riparian dependent sensitive plants.

Potential for the establishment of noxious weed populations would be somewhat reduced under this alternative compared to past conditions. It would be greater than the other alternatives, however, due to the potential for increased use, and the greater availability of suitable germination sites for weeds. Overall, the impacts to sensitive plant species under this alternative are not expected to be severe, due to the localized nature of the impacts, and availability of unaffected potential habitat.

Human Environment

Recreation

Consequences Common to All Alternatives

In all alternatives wilderness permits would be required for all overnight use and for day hiking on the Mt. Whitney trail. All alternatives continue implementation of a limited, entry-point rationing system. In all alternatives there would be higher demand than supply for overnight entry into the popular locations on weekends and during the month of August. This would have a positive effect in all alternatives of maintaining quality wilderness travel experiences.

Camping closures in effect by Forest Order would continue in all alternatives. This would prohibit camping in areas that have experienced a high level of impact and require recovery. No new camping closures are imposed in any of the alternatives.

In all alternatives, visitor use impacts would continue. Biophysical impacts associated with campsites and travel corridors would continue as long as visitor use continues. Management of biophysical impacts varies by alternative.

Consequences by Alternative

Alternative 1 - Modified

Visitor Use

This alternative establishes three distinct desired conditions for managerial purposes. It allows for a range of experiences, predominately low density, high challenge, and risk. Impacts would be kept within identified Standards and Guidelines for each desired condition category.

Approximately 57 percent of the landscape is identified for Category 1; 40 percent for Category 2; and 3 percent for Category 3.

The largest part of the landscape is designated as Category 1 (57 percent). This provides for very low densities, low disturbances and widely distributed visitor use. With minimal human disturbances and presence, the majority of the landscape would have strong wilderness character and high opportunities for solitude.

Managing the landscape in this manner has the effect of concentrating visitor use and impacts in a very small percentage of the landscape. Concentrated visitor use areas would be contained and low use areas would be capped to ensure that growth of visitor use in these areas does not occur. With the exception of the occasional commercial spikes in use, this is no different than how use disperses itself under the current rationing system. Trends in use indicate that areas of low use have gradually experienced increases in visitation and impact (Appendix I). This

management scheme would protect all areas from degrading in character. Overall there would be an improvement and enhancement to the areas of high use with higher management presence and potentially frequent mitigation measures.

The cost of management in the Category 3 areas would be higher, due to the intensity of containing and mitigating impacts. This would include intensive site management, including restoration, containment and hardening of sites to ensure the impacts do not degrade the quality and character of the natural resources. Costs in Category 1 and 2 would be primarily for monitoring and site management. With a tendency for these areas to be the more remote areas, the costs would reflect this.

Camping

In this alternative campsites would be allowed in higher densities in Category 3 areas. In these areas, campsites would likely be identified and delineated, and visitor freedom to choose a site would be limited to existing sites. In most of these places this is already the case. Most people camp in established sites because they are in the best locations. Sites would be managed in ways not visible to the public (i.e., natural barriers would be placed to contain the site and the site would be modified or restructured to meet acceptable setbacks from water or the trail). In Category 1 and 2 areas camping would be allowed and more dispersed. There would be little management of campsites that would provide greater visitor freedom to choose sites.

Currently the overall density of campsites at 7 lake basins in the Ansel Adams Wilderness is within the proposed density standards for the appropriate zone. The one exception is Staniford (west), which exceeds the standard by 0.4 campsites per acre.

With an elevational restriction on campfires of 10,000 feet in the north and 10,400 in the south, there would be limitations for those that desire to have a campfire. This might result in more camping in the areas below the elevational closure. This could result in impacts at new destinations as patterns change and people adjust camping locales so that they can have a campfire. However, lower elevation sites generally have more wood and are more resilient than the high elevation sites.

This alternative allows for the establishment of designated campsites combined with destination quotas when standards are exceeded. Designating campsites and implementing destination quotas would have the following effects:

- Necessity to designate stock camps.
- Increase in localized impacts at the designated site in Category 3 predominately and some limited Category 2 areas.
- Reduction of widespread impacts as people concentrate at designated sites.
- Reduction in the proliferation of sites in Category 3 areas.
- Restoration of non-designated impacted sites.

- Resistance from some visitors to greater regulations and loss of freedom of choice, balanced by some visitors who would enjoy the reduced crowding.
- Increased enforcement effort, and confusion by visitors until system is understood.

Day Use

In this alternative, baseline data on day use would be acquired in preparation for future analysis. Analysis would be driven by a 20 percent increase from baseline as one indicator and when impacts become noticeable and there is a demonstrated public desire to limit this activity. It is likely that when the numbers of day users begin to intrude with a perceived wilderness experience by the majority of wilderness visitors, then use would be addressed. This would have the effect of meeting a desired wilderness condition of some of level of solitude. When limits are put in place, some users may object to the intrusion by management, but this would be limited to a few places and would be driven by public demand for restrictions.

Dinkey Lakes Wilderness is an area that is frequently used by day hikers. It is likely that day use restrictions could be implemented for the area.

Riding and Packstock

The visitor that utilizes recreational stock would not be limited differently than other visitors. However, temporal and spatial limits on stock grazing would occur either by use of grazing start dates (temporal limit) and/or by forage utilization standards on key grazing areas (spatial limit).

Trail Restrictions

There are two trails currently closed to stock use; the Mt. Whitney and Meysan Lakes trails. Many other trails are identified as not maintained or recommended for stock. Determinations on trail maintenance levels, in regard to trails used and maintained for stock use, are made on a case-by-case basis. Consideration is given for terrain, trail conditions, cost of upgrades to riding standards and long-term maintenance feasibility. There are no foreseeable changes that would occur under this alternative. Moderate limitations on opportunities for high trail standards.

Grazing Start Dates

Authorized grazing seasons would be determined based on range readiness monitoring and establishment of grazing start dates. These dates would be established for wet, normal and dry precipitation years, depending on snowpack and prevailing weather. During normal years, start dates could be anticipated to begin by July 15th at 9,000 feet elevation and August 15th at 10,000 feet elevation (2210 Range Readiness Stations, Sierra NF). Pack trip itineraries during the months of June and early July in normal years would likely be affected by the restriction on forage use and need to pack supplemental feeds. However, with most use occurring in late July through October, required start dates in normal years are not expected to change current grazing practices to any appreciable extent.

During wet years, grazing start dates could be delayed fifteen to thirty days. Pack trip itineraries during the months of June, July and August in these wet years may be affected by delayed grazing start dates and the need to pack supplemental feeds. Early season pack trips may shift to lower elevation areas in these wet years. Pack trip itineraries in late summer and fall would not change the current grazing practices appreciably.

In dry years, grazing start dates could be fifteen days earlier than normal years. Pack trip itineraries during the months of June, July and August in these dry years would be unaffected by grazing start dates and the need to pack supplemental feed. Early season pack trips could shift to higher elevation areas in these dry years. Pack trip itineraries in late summer and fall would not change the current grazing practices appreciably unless availability of forage was a limiting factor.

Forage Utilization Standards

Grazing would be managed by implementation of utilization standards. Limited grazing use in popular key use grazing areas, from moderate and heavy use levels down to light and moderate use levels could have the effect of shifting use patterns into areas which are currently receiving little or no use. In areas or situations where these shifts in grazing patterns are not practical or feasible, there would be an increased dependence on supplemental feed.

Closures

Annual or long-term closures would likely be needed for restoration of key grazing areas, which are in unsatisfactory condition and have visually obvious soil disturbance. More extensive and frequent use of annual closures would require proactive and timely administration of Forest Service Grazing Guides similar to those currently used by Sequoia National Park (US Park Service 1994). Commercial and private packers would need well-organized pack trip itineraries, which take into account travel time and availability of forage and destination camps. Closures would be less prevalent than in Alternative 2 and more prevalent than Alternatives 2 and 3.

Rock Climbing and Mountaineering

There would be no effects on rock climbing and mountaineering activities that are different than those that affect the general visitor. With these activities continuing, and with improvements in climbing and mountaineering gear, there may incur continued impacts associated with fixed anchor placement and the use pattern that develops by the pioneering of new routes into areas that currently experience low levels or no visitor use. These impacts would need to be monitored and mitigated on a case-by-case basis to ensure impacts do not degrade the wilderness character and quality.

Winter Use

Winter use would be allowed to continue at current levels. Significant growth would be conditioned by the recreation categories that provide low levels of winter visitor use across most of the landscape. If winter use grows significantly, winter quotas may need to go into effect to meet the intent of low and moderate use levels.

Commercial Activities

This alternative would affect commercial operators by: 1) maintaining their overall use to current use levels; 2) limiting the growth in commercial services, including commercial operators in temporal and spatial controls on entry; and 3) changing their access to wilderness permits. In areas where commercial use is diverse and/or at a relatively high level, there would be separate quotas for commercial and non-commercial use.

In areas where there is low commercial use there would be a single quota. In some areas, case-by case decisions on commercial use would be required. These are areas where there has been very little or no commercial use historically and/or there is no compelling need for commercial services in these areas. The effect would be that operators must conform to daily limits and compete for access with other operators. Competition amongst operators is not perceived to be significant given the lack of overlap of commercial operators in the single quota areas.

In reviewing data from individual pack stations from 1996 to 1999, it was determined how many days the pack station would have exceeded the quota had one been in effect. This does not conclusive because there may be an occasional day when more than one pack station was operating out of the same trailhead. This would likely only occur in the Hilton Lakes area and to a much lesser extent, Shepherd Pass. However, even in these places the occasions are rare and exceptions. If a year were not listed, there would have been no days where the quota was exceeded.

Table 4.1. Number of days the proposed commercial ceiling would have been exceeded in past years for quota trailheads (east side).

Trailhead	Number of days quotas would have been exceeded	Year
Fish Creek	3	98
Fish Creek	5	96
Shadow	2	98
Shadow	2	96
High Trail	2	98
High Trail	7	96
River	3	98
River	3	96
Minaret	1	98
JMT North	2	96
Fern Lake	2	98
Fern Lake	3	96
Beck	1	96
Mono Pass	1	99
Mono Pass	6	97
Hilton	5	99
Hilton	3	97
Tamarack	2	99
Kearsarge	1	98
Kearsarge	1	96
Shepherd	1	96

On the west side operators using the Isberg, Norris Jackass, Devils Graveyard, Florence and Maxon, Bear Ridge, Fernandez, would have been affected more than five times a year. With Maxon and Isberg more than ten times a year. Walton, Chiquito, Crown Ranch Onion Springs and Badger Flat would have been limited less than two times a year, with the other trails not affected.

For the most part, all operators would be able to operate at the same level by booking their clients more evenly throughout the week. Even in the busiest month of August, most use could be accommodated with slightly different start dates. This would achieve the desired spatial concentration and temporal dispersal of use by all visitors. However, considerable change in the issuing of wilderness permits would affect the convenience and unconstrained access currently provided.

There would be competition for the most popular dates and trailheads between different commercial operators. Individual operators could not depend on a set number of entry spaces each day committed to their business, as they would have to compete with other operators for the spaces available. Placing multiple quotas on some trailheads reduces competition between pack stations and other outfitter guides. Other trailheads where very little commercial use occurs, would have single quotas. Administration of a system with multiple types of quotas

may actually be simpler than conforming all type of use into one methodology. But initially there would be some administrative challenges.

In the future, growth may be accommodated for services that meet identified public need in areas where there is resource capability. Although all current use levels would be capped, growth could be allowed to meet management objectives. This would act as an incentive system for operators that are performing exceptionally.

Restricting commercial stock operators to system trails only and approved routes not on system trails may eliminate some of the destinations they now use, or may lengthen some trips since some shortcuts may not be approved. The extent of the impact on commercial stock operators is not known since an analysis of user-created trails has not been conducted. As user-created trails are analyzed, there may be some additional effect on all commercial operators. In some cases where user-created trails are incorporated into the trail system, there may be some benefit to commercial operators. Conversely, in cases where the user-created trails are obliterated, there may be some negative effects on commercial operators, which could elicit changes in their services and adjustments to their operations.

Permits and Quotas

By proposing daily limits on both commercial and non-commercial use, this alternative achieves a high degree of equity. The quota period would be from May 1- November 1 and its effect would be to provide the controls needed on days in the shoulder season when use levels would have exceeded the quota. For trails such as North Fork of Big Pine, Bishop Pass, Little Lakes Valley, Cottonwood Lakes and Kearsarge Pass, there would be enhanced solitude and limitations on the spikes in use on weekends in June and September and October. Visitors to the Dinkey Lakes Wilderness would also benefit from these limitations. Some visitors would be adversely affected by not being able to access the areas if the quota is reached.

Commercial operators who have had the privilege of writing wilderness permits for customers would be unable to continue to do so. There would be an immediate inconvenience for these customers and the operators, but over time there would likely be less of an impact as all users adjust to the system.

Party Size

The effect of no change to group size in this alternative may result in continued tension between hikers and stock groups. Also, with the same party size for trail and cross-country travel, there may be increased impacts in off trail areas since these areas are not maintained for large numbers of stock or people traveling. These impacts would be regulated to some extent by the standards and guidelines assigned to each zone.

Since commercial packstock operators would be required to stay on system trails and approved routes, this would, in effect, limit their cross-country use. Some improvement on the condition of user-created, cross-country routes would occur as a result of limiting commercial packstock.

Visitor Impacts

Biophysical impacts associated with campsites and trail use would continue to occur, but would likely be reduced. The standards for campsite density would result in some removal of campsites to reduce impacts associated with high-density areas. In areas like Cottonwood Basin, these standards are currently being exceeded in approximately twelve locations, which would cause the removal of approximately thirty sites. In the Lamarck Lakes area, about ten sites would be removed, and in the Paiute Creek area, eight sites would be removed to meet the standards. In Pioneer Basin the standard is being exceeded at two locations. To extrapolate across the planning area, this standard would result in the removal of less than one hundred sites.

For the standard setback from water, approximately 80 sites would be removed or relocated in the eight areas surveyed. Of the 186 campsites inventoried on the west side of the planning area, 8 percent were too close to water at 25 feet or less and an additional 8 percent were between 25 and 50 feet. This would lead to some immediate effects of disturbance to move sites and might cause the public some inconvenience in camping at sites further from water and trails than they would choose. The overall effect to wilderness quality and character would be enhanced by these actions.

Stock Related Impacts

Stock-related impacts would be reduced by putting into effect authorized grazing start dates, maximum allowable utilization standards on key use areas of 30 to 40 percent, maximum stream bank disturbance standards of 20 percent and stubble height standards on meadow and riparian complexes to meet other resource needs. Implementing these four management practices, coupled with grazing closures as needed, would allow meadows within Category 1 and 2 areas to transition toward, or maintain, a very high seral ecological state. Category 3 areas would transition toward high seral ecological state. There would be sufficient vegetative biomass at the end of season to maintain high plant vigor; build well-rooted, resilient meadow and streambanks, and aggrade meadows and narrow stream channels by sediment entrapment within flood plains.

These administrative actions would result in a need to pack in supplemental feed during the early season with additional stock. The effect of having additional stock travel on trails during the early season would likely increase maintenance and reconstruction needs over time. However, the anticipated cost difference is thought to be minor.

Social Conditions

Social conditions would remain similar to those that exist today with some improvements resulting from reducing the commercial spikes in use. Quotas would not change considerably from present in this alternative. Any downward adjustment to the quota reflected current use, or occasionally a desire to improve the condition. The Mt. Whitney trail would have only a slight change in the overall high social concentration of use on this trail presently and is balanced by a reduction in the day use quota, thereby having an overall neutral effect.

In some places (e.g., the North Fork of Big Pine Creek) quotas are currently being reached up to 80 days a year throughout the summer. Cottonwood Lakes, Mt. Whitney, North Fork of Lone Pine, Bishop Pass and Kearsarge all reach quota a majority of days during the summer. In these areas, the effects on solitude and the social conditions would not change. In Category 3 areas where use can still be accommodated and quotas are not being reached a majority of the time, use would continue to increase. The condition of solitude would continue to be diminished but not significantly from those conditions experienced today.

In Category 2 areas where use would primarily be dispersed across the landscape with a few pockets of crowding, social conditions would remain the same. In Category 1 areas, conditions would be enhanced over time or prevented from having use grow into areas that are currently high in solitude and wilderness experience. Since over 50 percent of the wilderness is within this category, over time, areas currently with low use would remain that way.

Alternative 1

Visitor Use

This alternative allows for the management of the landscape for three experience levels. Impacts would be kept within identified Standards and Guidelines for each category. Category designations match resource concerns and use patterns. This enables the Standards and Guidelines to better account for variations across the landscape.

Approximately 5 percent of the landscape is identified for Category 3, where intensive management would mitigate impacts. These areas have traditionally been popular and the identification of these would serve to contain them and prevent the impacts from (gradually) spreading throughout the landscape.

The cost of management in the Category 3 areas would be higher, due to the intensity of containing and mitigating impacts. This would include intensive site management, both restoration, containment and hardening of sites to ensure the impacts do not degrade the quality and character of the natural resources. A larger part of the landscape (53 percent) is designated as Category 2, which provides for moderate levels of visitors, where use would be dispersed across the landscape. In these areas use would, in most cases, disperse across the landscape and concentration of use would not be visible. Category 1 maintains very low levels of use and impact. Managing the landscape in this manner would have the effect of concentrating visitor use and impacts in a very small percentage of the landscape. Of all the alternatives, this one provides the most protection of both the ecological and social characteristics throughout the entire wilderness. This would occur because concentrated visitor use areas would be contained and low use areas would be capped to ensure that growth of visitor use does not lead toward dispersion of impacts.

Camping

Effects and consequences on camping are the same as Alternative 1 - Modified.

Another effect on camping would be closures to campfires. Camping without campfires would be required in all areas above 10,400 feet. This could cause some changes in use patterns,

people who really want to have campfires might choose to camp below 10,400 feet. There might be a trend toward camping below 10,400 feet, which may lead to greater impacts at locations that now do not receive that type of visitor use.

Day Use

With the exception of direction for acquiring baseline data on day use, the effects and consequences are the same as in Alternative 1 - Modified.

Riding and Packstock

Routes of travel for the visitor that utilizes recreational stock would not be limited differently than other visitors. No trail readiness criteria are proposed. However, temporal and spatial limits on stock grazing would occur either by use of grazing start dates (temporal limit) and/or by forage utilization standards on key grazing areas (spatial limit).

Trail Restrictions

There are two trails currently closed to stock use; the Mt. Whitney and the Meysan Lakes trails. Many other are identified as not maintained or recommended for stock. Determinations on trail maintenance levels, in regard to trails used and maintained for stock use, are made on a case-by-case basis. Consideration is given for terrain, trail conditions, cost of upgrades to riding standards and long-term maintenance feasibility. There are no foreseeable changes that would occur under this alternative. A high degree of visitor freedom would be maintained.

Grazing Start Dates

Authorized grazing seasons would be determined based on range readiness monitoring and establishment of grazing start dates. These dates would be established for wet, normal and dry precipitation years, depending on snowpack and prevailing weather. During normal years, start dates could be anticipated to begin by July 15th at 9,000 feet elevation and August 15th at 10,000 feet elevation (2210 Range Readiness Stations, Sierra NF). Pack trip itineraries during the months of June and early July in normal years would likely be affected by the restriction on forage use and need to pack supplemental feeds. However, with most use occurring in late July through October, required start dates in normal years are not expected to change current grazing practices to any appreciable extent.

During wet years, grazing start dates could be delayed fifteen to thirty days. Pack trip itineraries during the months of June, July and August in these wet years would be affected by delayed grazing start dates and the need to pack supplemental feed. Early season pack trips would shift to lower elevation areas in these wet years. A portion of the displaced use would also shift to the Golden Trout and South Sierra Wilderness areas at the southern end of the Inyo National Forest. Pack trip itineraries in late summer and fall would not change the current grazing practices appreciably.

In dry years, grazing start dates would likely be fifteen days earlier than normal years. Pack trip itineraries during the months of June, July and August in these dry years would be unaffected by grazing start dates and the need to pack supplemental feed. Early season pack trips would likely shift to higher elevation areas in these dry years. Pack trip itineraries in late

summer and fall would not change the current grazing practices appreciably unless availability of forage was a limiting factor.

Forage Utilization Standards

Grazing would be managed by implementation of utilization standards. Limited grazing use in popular key use grazing areas, from moderate and heavy use levels down to light and moderate use levels would have the effect of shifting use patterns into areas which are currently receiving little or no use. In areas or situations where these shifts in grazing patterns are not practical or feasible, there would be an increased dependence on supplemental feed.

Closures

Annual or long-term closures would be needed for restoration of key grazing areas, which are in unsatisfactory condition and have visually obvious soil disturbance. More extensive and frequent use of annual closures would require proactive and timely administration of Forest Service Grazing Guides similar to those currently used by Sequoia National Park (US Park Service 1994). Commercial and private packers would need well-organized pack trip itineraries that take into account travel time and availability of forage and destination camps. Closures would be less prevalent than in Alternative 2 and more prevalent than Alternatives 3 and 4. The decrease in suitable acres, as well as the decrease in allowable utilization levels on the remaining suitable acres, would result in a portion of the packstock use being relocated outside John Muir and Ansel Adams Wilderness areas. Areas where use is expected to increase include the Golden Trout and South Sierra Wildernesses and possibly the non-wilderness areas east of Highway 395 and east of Crowley Lake.

Rock Climbing and Mountaineering

Same as Alternative 1 - Modified.

Winter Use

Same as Alternative 1 - Modified.

Commercial Activities

This alternative would affect commercial operators by maintaining their overall use to current use levels, limiting the growth in commercial services, subjecting commercial operators to temporal and spatial controls of entry quotas, and changing their access to wilderness permits. Growth would be limited by the needs outlined in the Needs Assessment. Decisions on increasing allocations would have to address the criteria of meeting the identified needed activities and operating in areas where the resource is capable of withstanding more use.

Actions required to implement this alternative would affect operators in areas that have been identified as having resource concerns, most notably Mono Creek and Hilton Lakes. Many areas have rated out as being on the verge of having resource concerns, or trending towards having concerns, but many of the concerns are still correctable. However, if concerns are not corrected or if the conditions worsen, use may need to be adjusted. Actions that can be used to

mitigate concerns include destination quotas, reductions in use, site-specific closures, or designated campsites.

Operators who have utilized the main Mt. Whitney trail would be affected by the determination in the Needs Assessment that commercial services are not needed here. Currently, however, commercial operators provide services to less than 100 out of 25,000 people who access this trail per year.

With the imposition of entry quotas, the following areas would have minor effects. Using data from commercial tally sheets, the following effects were identified:

With a quota of 15 people at Beck Lakes, the only commercial operator utilizing this area would have exceeded that quota one day in the last two years. In North Fork of Big Pine, the pack station would not have reached a 20 person per day quota in 1998 or 1999. Other commercial operators would meet or exceed the quota less than five days per year. Many times, mountain guides use the services of the packers and therefore the wilderness permit needs only to be accounted for once. This may result in fewer impacts on commercial users.

On Bishop Pass, a 15-person a day quota would have been exceeded five times in 1997, but not in any other year. On Fish Creek, a 15-person quota would have been exceeded one day in the past three years. On the Kearsarge Pass trail with a quota of 15 people, it would have been exceeded on average only one day a year. On the River trail, a five-person quota would have been exceeded one time, and this could have been accommodated with the ability to rollover use to the next day's quota. In Little Lakes Valley, the amount of people per day does not come close to a five-person daily commercial quota, this includes mountain guides who use this area frequently but typically have small party sizes.

The biggest effect would occur to operators in the Hilton Lakes area, where if a 15-person per day quota were in effect, some use would be curtailed about five days a year. Those highs were 52, 22, 21 and 49 clients per day, by one pack station.

Another area that would be affected would be the Paiute Pass trail. In 1999, which was a high use year for the pack station, the quota would have been exceeded eight times. In 1998, it would have been exceeded one time.

For the most part, all operators would be able to operate at the same level if they were able to book their clients more evenly throughout the week. Even in the busiest month of August, most use could be accommodated with slightly different start dates. This would achieve the desired spatial concentration and temporal dispersal of use by all visitors.

On the west side, several commercial operators generally use individual trailheads. This means there would be competition for the most popular dates and trailheads between different commercial operators. Individual operators could not depend on a set number of entry spaces each day committed to their business, as they would have to compete with other operators for the spaces available. With the option to use days within the daily ceiling for the duration of the trip, some commercial operators may not be able to get in for several days at a time if an earlier trip used the available ceiling.

Table 4.2. Number of days proposed Commercial Ceiling would have been exceeded in past years for quota trailheads on the Sierra National Forest.

Trailhead	1999
Fernandez	14
Isberg	15
Walton	4
Mammoth	2
Norris/Jackass	11
Chiquito/Quartz	7
Bear Creek/Bear Ridge	8
Cliff Lake	2
Crown/Rancheria	1
Devils/Graveyard	13
Florence	17
Maxon	11
Mono Creek	2
Onion Springs	7
Willow Mdw/Badger Flat	2
Woodchuck	2

In the future, growth may be accommodated for services that meet identified public need in areas where there is resource capability. Although all current use levels are being capped, growth can be allowed to meet management objectives.

Restricting commercial stock operators to only system trails and approved routes not on system trails may eliminate some of the destinations they now use, or may lengthen some trips since some shortcuts may not be approved. The exact level of impact on commercial stock operators is not known since an analysis of user-created trails has not been completed. As user-created trails are analyzed, there may be some additional effect on all commercial operators. In some cases where user-created trails are incorporated into the trail system, there may be some benefit to commercial operators. Conversely, in cases where the user-created trails are obliterated, there may be some negative effects on commercial operators.

Permits and Quotas

By proposing a daily commercial ceiling for each trailhead, this alternative presents a system that is equitable to both private visitors and commercial operators. The year-round quota period would bring about reductions in current use on trails where the numbers are currently not being restricted until the last Friday in June and after September 15th. For some trails, such as North Fork of Big Pine, Bishop Pass, Little Lakes Valley, Cottonwood Lakes and Kearsarge Pass, there would be enhanced solitude and limitations on the spikes in use on weekends in June and September and October. Visitor to the Dinkey Lakes Wilderness would also benefit from these limitations. Some visitors would be adversely affected by not being able to access the areas if the quota is reached.

Commercial operators who have had the privilege of writing wilderness permits for customers would be unable to continue to do so. There would be an immediate inconvenience for these customers and the operators, but over time there would likely be less of an impact as all users adjust to the system.

Quotas would be enforced year-round. This would have little effect on use from west side trailheads since essentially all the use is concentrated in the mid-summer months and very little winter use occurs due to lack of access.

Party Size

Same as Alternative 1 – Modified.

Visitor Impacts

Biophysical impacts associated with campsites and trail use would continue to occur, but would be reduced. The standards for campsite density would require some removal of campsites to reduce impacts associated with high-density areas. In areas like Cottonwood Basin, these standards are currently being exceeded in approximately twelve locations, which would cause the removal of approximately thirty sites. In the Lamarck Lakes area, about ten sites would be removed, and in the Paiute creek area, eight sites would be removed to meet the standards. In Pioneer Basin the standard is being exceeded at two locations. To extrapolate across the planning area, this standard would cause the removal of probably less than one hundred sites.

For the standard setback from water, in the eight areas surveyed there would be 80 sites that would need to be removed or relocated. Of the 186 campsites inventoried on the west side of the planning area, 8 percent were currently too close to water at 25 feet or less and only an additional 8 percent were between 25 and 50 feet. This would lead to some immediate effects of disturbance to move sites and may cause the public some inconvenience in camping at sites farther from water and trails than they would choose. The overall effect to wilderness quality and character would be enhanced by these actions.

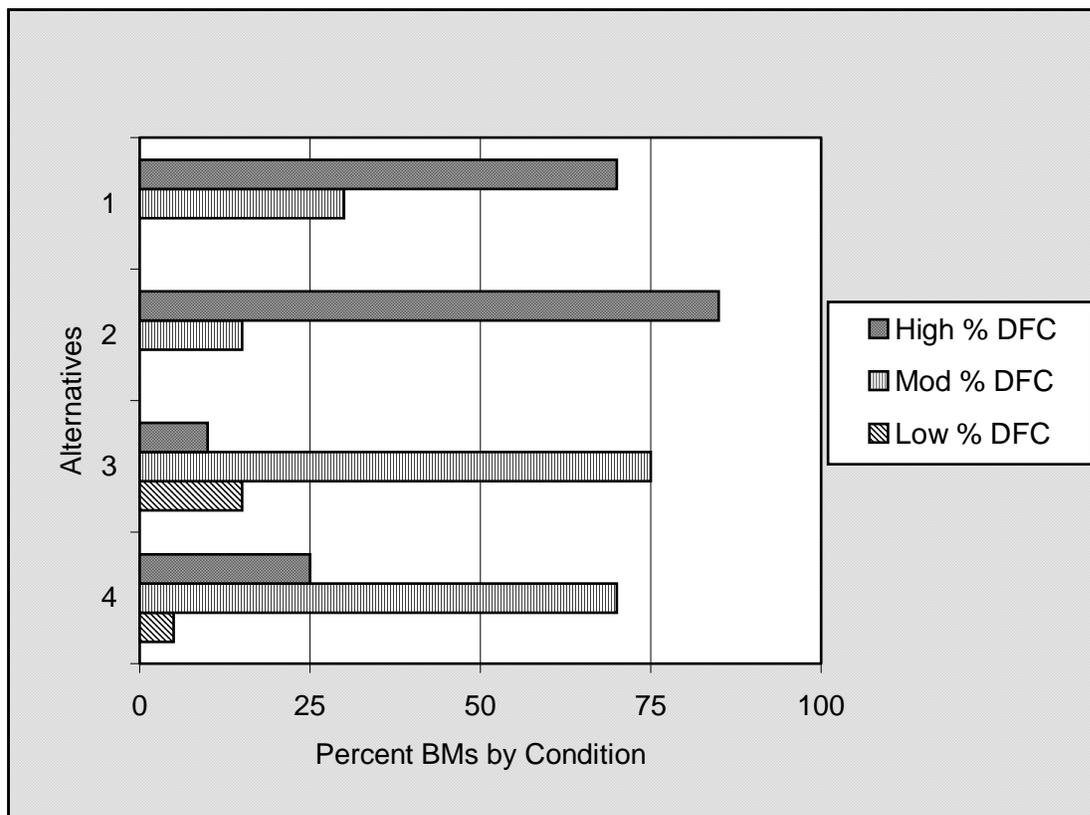
Stock Related Impacts

Stock-related impacts would be reduced by putting into effect authorized grazing start dates, maximum allowable utilization standards on key use areas of 30 to 40 percent, maximum stream bank disturbance standards of 20 percent and stubble height standards on meadow and riparian complexes to meet other resource needs. Implementing these four management practices, coupled with grazing closures as needed, would allow meadows within Category 1 and 2 areas to transition toward or to maintain a very high seral ecological state. Category 3 areas would transition toward high seral ecological state. There would be sufficient vegetative biomass at the end of season to maintain high plant vigor; build well-rooted, resilient meadow and streambanks, and aggrade meadows and narrow stream channels by sediment entrapment within flood plains. The increased use of supplemental feeds may raise the risk of introduced non-native plant seed sources. However, disturbed macrosites favorable for weed establishment would be low.

Based on observed recovery rates for closed wilderness meadows (e.g., Hilgard Meadow) it is forecasted that 70 percent of key benchmark areas would reach high similarity to potential natural community in twenty years as shown in Figure 4-1.

These administrative actions would result in an increased need to pack in supplemental feed during the early season with additional stock. The effect of having additional stock travel on trails during the early season would increase maintenance and reconstruction needs over time. However, the anticipated cost difference is thought to be minor. There would be increased cost associated with range analysis, meadow monitoring, commercial permit compliance estimated at \$10,000 per year (two seasonal employees) over the next ten years and \$5,000 per year thereafter (one seasonal employee).

Figure 4.1. Forecasted Recovery Rate of Established Benchmarks in 20 Years



Social Conditions

Social conditions would remain the same in the areas identified as Category 3, high use destinations. This is because the quotas are not being increased. One exception is Mt. Whitney day hiking, where the quota would be reduced to attempt to maintain or improve the social conditions of the trail by limiting the growth of this activity over time. Since the quota does not yet fill a majority of time, and growth continues at about 40 percent per year, reducing the quota would limit the rate of growth.

In some places, like North Fork of Big Pine, quotas are currently being reached up to 80 days a year, throughout the summer. Cottonwood Lakes, Mt. Whitney, North Fork of Lone Pine, Bishop Pass and Kearsarge all reach quota a majority of days during the summer. In these areas, the effects on solitude and the social conditions would not change. In Category 3 areas where use can still be accommodated and quotas are not being reached a majority of the time, use would continue to increase and the condition of solitude would continue to be diminished but not significantly from those conditions today.

In Category 2 areas where use would mostly be dispersed across the landscape with few pockets of crowding, social conditions would remain the same. In Category 1 areas, conditions would be enhanced over time or prevented from having use grow into areas that are currently high in solitude and wilderness experience. Since over 50 percent of the wilderness is within this category, over time, areas currently with low use would likely remain that way.

Alternative 2

Visitor Use

This alternative proposes to manage for similar conditions across the entire wilderness. In attempting to maintain wilderness character and quality for the visitor, the number of people allowed would be reduced to achieve these social conditions across the landscape.

Table 4.3. Number of days proposed quota would have been exceeded in past years for quota trailheads on the west side.

TRAILHEAD	1999
Fernandez	11
Isberg	10
Mammoth	11
Norris/Jackass	8
Chiquito/Quartz	12
Bear/Bear Ridge	11
Cliff Lake	15
Crown/Rancheria	6
Devils/Graveyard	28
Florence	22
Maxon	25
Mono Creek	8
Onion Springs	9
Willow Mdw/Badger Flat	24
Woodchuck	6

With reductions in visitor use, the experiential qualities of wilderness would be greatly enhanced. In turn, the probability of impacts occurring would be reduced. However, there is no clear or direct relationship between use and impact. With use being reduced, there is also the probability of use dispersing spatially and temporally in order to gain access to a short supply recreation commodity. This would cause more widespread impacts, as areas that currently receive low use would receive increasing use with the visiting public adjusting to new quotas. The entire wilderness would be managed for only one experience level, not taking into account natural variations in the landscape.

It is likely that areas currently experiencing high visitation would improve slightly and that areas receiving low visitation would be diminished slightly by attempting to achieve the same conditions across the wilderness. However, this effect may be buffered by the removal of most user-defined trails. These trails help to disperse visitors, as some visitors would not travel on routes they cannot detect.

With visitor use reductions, fewer people would be able to enjoy and experience these landscapes. Growth would not be accommodated, but the tradeoff is a higher quality experience for the wilderness visitor.

Camping

The management direction for camping activities with indicators and standards for occupied campsites, campfire restrictions, and setbacks from water, would provide a higher degree of resource protection and quality wilderness experience. With the standards for occupied campsites of three sites within sight or sound of each other wilderness wide, the effect would be to provide higher quality at the areas such as Thousand Island Lake, Golden Trout Lake,

Pioneer Basin, Peter Pande Lake, Cottonwood Lakes and Ediza Lake. In areas that are currently low use, the effect would be that the standard would allow for a higher level of occupied sites than currently exists. Social condition would be allowed to deteriorate without a threshold to keep it at those conditions. However, with quotas as low as they are, it is unlikely that the quotas for the occupied campsites would be reached or exceeded in many places. In places where it would, possibly Cottonwood Lakes, Lower Lamarck Lake and other destinations where camping is limited, the standard could lead to possible further reductions in the quota.

With an elevational restriction on campfires of 10,000 feet in the north and 10,400 feet in the south, there would be limitations for those that choose or desire to have a campfire. This may result in more camping in the areas below the elevational closure, perhaps causing new impacts at new destinations as patterns change and people adjust their camping locales. However, lower elevation sites generally have more wood and are more resilient than the high elevation sites.

Similar displacement would occur as a result of the 100-foot setback from water. With a setback from water of 100 feet, over 200 of 655 campsites in the representative areas inventoried would require removing or relocating. This might result in affecting as many as one-third of existing campsites in the planning area. Of the campsites inventoried in the Ansel Adams Wilderness, 71 percent of the campsites are less than 100 feet from water. Of the 258 sites on the west side of the John Muir Wilderness, 94 would be removed or relocated. In Dinkey Lakes Wilderness, six of the thirteen sites inventoried would be removed or relocated.

It can be assumed that thousands of sites currently existing would be moved to comply with the setback. The cost of implementing this action would be high.

Day Use

It is likely that day use would be restricted and reduced in some locations across the wilderness. In many east side locations and in Dinkey Lakes Wilderness on the west side, day use visitation is high. To meet the desired conditions of this alternative and be consistent with approaches to overnight visitation, day use would be affected. This has the potential of causing displacement of day hikers to areas that are currently less used. This would occur because visitation would not decrease. People would find other places to go. So, as with the effects described in the previous section, these actions would enhance areas where visitation is high. Where visitation is low people would likely experience increases in use and associated impacts.

Riding and Packstock

Riding and packstock use would be affected in several ways. There would be travel restrictions on four trail routes, party size restriction on cross-country travel, grazing start dates and forage utilization standards on key grazing areas.

Trail Restrictions

In addition to existing stock use closures on Mt. Whitney and Meysan Lakes trails, four other trails, on the east side of the crest, would be designated as hiker only: Taboose, Shepherd, Sawmill and Baxter. All these trails, which provide access to Sequoia-Kings Canyon National Park, are steep and difficult to maintain for stock. No trail readiness criteria are proposed.

The effects of this action would be slight as judged by very little past stock use on these trails. In 1988, data showed stock party permits for two on Taboose, one on Baxter, none on Shepherd, and one on Sawmill. In the late 1990s, there did appear to be slightly more stock use by commercial records (tally sheets). The highest visitations in the past five years for commercial stock parties were: 19 stock/23 people on Taboose Pass trail in 1995; 25 stock/16 people on Sawmill Pass trail in 1995; 20 stock/9 people on Sawmill in 1999; 33 stock/32 people on Shepherd Pass trail in 1997; and one record of stock use on Baxter Pass trail at 10 stock/2 people in 1996. The effects of these stock closures would have minimal loss of opportunities for stock user and a gain in opportunities for hikers to choose to travel on hiker-only trails. These trail restrictions would reduce the conflicts between hiker and stock travelers on those particular trails, but may foster an advocacy for more segregation of trail uses in other areas of the wilderness.

Another action that may affect riding and packstock activities is the party size restriction on cross-country travel. This would have an effect on stock parties that travel more than one-half mile from a system trail, by limiting their stock and party size to eight head of stock and eight people. The one-half mile distance from trails would allow for access to most camps and grazing areas. The limit would cause a reduced availability of areas to ride in for parties greater than eight. The effect would likely influence these smaller parties to travel with lighter, bivouac camps and less stock.

Grazing Start Dates

Authorized grazing seasons would be determined based on range readiness monitoring and posted grazing start dates. The environmental consequences are the same as those described under Alternative 1.

Forage Utilization Standards

Grazing would be managed by implementation of utilization standards at slight to light utilization levels. Limited grazing in popular key use areas, from high-moderate use levels down to light levels, would have an effect of shifting use patterns into areas that are currently receiving little or no use. As with Alternative 1, in areas or situations where these shifts in grazing patterns are not practical or feasible, there would be an increased dependence on supplemental feed.

Closures

Closures would be used to a much greater extent than Alternative 1, in order to achieve very high seral ecological conditions on all key-grazing areas. Closures would also be more prevalent than in Alternatives 3 or 4. As with Alternative 1, more extensive and frequent use of annual closures would require proactive and timely administration of Forest Service Grazing Guides. The Forest Service would need to increase its administrative efforts to administer to lower allowable grazing levels. Well-planned pack trip itineraries would be necessary with contingency plans likely to account for this lowered availability of forage at popular destination camps. As with Alternative 1, decrease in suitable acres, as well as the decrease in allowable utilization levels on the remaining suitable acres, would result in a

portion of the packstock use being relocated outside John Muir and Ansel Adams Wildernesses.

Rock Climbing and Mountaineering

These activities would not be affected any differently than other recreational visitors. There are no specific restrictions or reductions proposed for this activity in this alternative. This activity would be affected by the reduction in quotas as described below.

Winter Use

Winter use would continue at current levels of use. If or when the use levels increase more than 10 percent of current levels, quotas would be established for winter activities. This would have the effect of maintaining high levels of solitude in the wilderness during the winter season.

Commercial Activities

Commercial operators would be held at levels below their current use for the activities of packstock-supported trips, backpacking, and day rides. This would have an effect on the businesses conducting these activities. No growth for any activities is allowed and this may have the effect of causing operators to find alternative locations for their activities.

The requirement of having to compete with the general public for access to the wilderness through the wilderness permit system, combined with a reduction in quotas, may have a significant effect on commercial operations. The competition for access could result in a flurry of rules and restrictions on reserving permits as access to a limited supply would lead to methods of obtaining and booking trips by both commercial and the general public that could lead to overbooking for the protection of opportunities. Commercial operators would not be able to depend on a stable proportion of each trailhead quota, as the issuance of permits would be on a lottery system where they had no greater likelihood of obtaining a permit than the general public. It is likely that more restrictions and a more cumbersome reservation system would need to be implemented as a result of the one quota system. The cost of monitoring and implementing the permit program may increase. It would be more difficult for commercial operators to obtain wilderness permits and the cumulative effect on pack stations in particular would be that it could lead to significant changes in their way of conducting business in these wildernesses.

The obliteration of all user-defined trails may affect commercial operators who use destinations only accessed by user-defined trails. This may have a greater effect on stock operators who depend on defined routes more than foot-oriented operators. The effect of this action would be greater than in Alternative 1.

Permits and Quotas

This alternative brings equitability to the system, as all users would have the same opportunity to make a reservation. Quotas are reduced significantly to correct identified resource concerns and to meet the desired conditions of this alternative. With the reductions in quotas, there would be an even higher demand for access. With the incorporation of commercial and non-commercial use under one quota, there would be a noticeable shortage of supply compared to

current quotas and use levels. Use would likely be displaced in both time and space. Lower levels of use would occur over the weekends and more use would be expected to occur during the weekdays as the public adjusts. In addition, use in the spring and fall “shoulder seasons” would increase as fewer visitors could use the wilderness during the peak seasons. There would likely be a sharp decrease in use similar to what was experienced in the 1970s with the first introduction of quotas. Then, as the public adjusts, quotas may fill on a more regular basis.

There may be increased tension and conflicts between commercial and non-commercial uses. As described above, these potential conflicts may result in an increase in restrictions to prevent any group, entity or individual from undermining the permit system. Penalty fees may need to be implemented for a change in a reservation or a no-show. This would be a cost not currently incurred by the wilderness visitor.

In places where use continues to congregate and trailhead quotas do not remedy the impacts associated with popular destinations, destination quotas may be applied. There would be less of a need for destination quotas in this alternative than in Alternative 1, since trailhead quotas are being reduced and relied upon as the primary mechanism for regulating use and impacts.

With the quota season being implemented year-round, there would be an improvement in the social experience during the shoulder seasons (early June, mid-September, October) in the same way as described in Alternative 1.

Party Size

With a cross-country party size of eight persons and eight head of stock, there would be a reduction in the group size for off-trail travel. This would have the effect of concentrating large parties onto system trails. However, since the overall quotas are reduced in this alternative, there would not be significant overcrowding in the trailed areas. This would inconvenience some visitors and commercial operators and infringe on the freedom of large groups to travel off system trails.

This would improve the experience for groups of less than eight traveling cross-country since they would not encounter large groups.

Visitor Impacts

Campsite and trail impacts would be reduced in areas affected by reduced quotas, which are typically the high use areas. In areas where use is not limited, there could be a displacement from the areas that are being reduced. This would cause more widespread impacts since impacts occur at relatively low levels of use; quotas would have to be greatly reduced and capped everywhere in order to achieve an affect of significantly reduced visitor impacts. Over time, there may be a reduction of impacts if management activities can mitigate and restore sites.

Areas that receive low use currently could become more degraded if use patterns change, since the same standard is applied wilderness-wide, thereby allowing the same level of impacts to occur in both heavily visited areas and lightly visited areas.

Stock Related Impacts

Stock-related impacts would be reduced through restrictions on cross-country travel. There would be an improvement in areas where large stock numbers now travel and on trails that are not managed or built for this level of use. Areas with a proliferation of short cut trails would have fewer adverse effects where miles of trail network have evolved over time (e.g., Hilton Lakes and Pioneer Basin).

Stock-related impacts would be reduced considerably by putting into effect authorized grazing start dates, maximum allowable utilization standards on key use areas of 20 percent, maximum stream bank disturbance standards of 10 percent and stubble height standards on meadow and riparian complexes to meet other resource needs. Implementing these four management practices, coupled with grazing closures as needed, would allow all meadows to transition toward or maintain a very high seral ecological state. There would be sufficient vegetative biomass at end of season to maintain very high plant vigor; build well-rooted, resilient meadows and stream banks; and aggrade meadows and narrow stream channels by sediment entrapment within flood plains. The increased use of supplemental feeds may raise the risk of introduced non-native plant seed sources. However, disturbed macrosites favorable for weed establishment would be low.

Based on observed recovery rates for closed wilderness meadows (e.g., Hilgard Meadow) it is forecast that 85 percent of key benchmark areas would reach high similarity to potential natural community in twenty years as shown in Figure 4.1.

These administrative actions would cause an increased need to pack supplemental feed, increase stock traffic and associated trail maintenance costs to a greater extent than Alternative 1. Increased cost associated with range analysis, meadow monitoring, commercial permit compliance estimated at \$20,000 per year (four seasonal employees) over the next ten years and \$10,000 per year thereafter (two seasonal employees).

Social Conditions

The social conditions would improve to achieve more opportunities for solitude and protect the qualities of a visitor's wilderness experience. There would be less people in the wilderness, less crowding and less of a chance to encounter others while traveling and camping. Conditions of sites may improve slowly over time, thereby improving the experiential values associated with visitor use impacts (i.e., large camps, multiple trailing, poor trail conditions).

Alternative 3

Visitor Use

There would be no changes to the current balance of activities and visitor uses. Quotas would be in effect for all non-commercial visitors and some special use permittees. A high degree of visitor freedom would be maintained. However, a range of experiences would not be maintained and use patterns would develop and be unmanaged. Since the quotas on the west side rarely fill except for peak weekends and holidays, impacts would increase as use increases toward full quotas.

Camping

Camping would be conditioned by site-specific closures in effect. Additional closures, if needed, could be accomplished through site-specific environmental analysis, and a Forest Order. The effect of this would be a small amount of displacement from areas that have received heavy recreational use (i.e., Shadow Creek) to other sites adjacent or to new locations. Campfire closures would be in effect on a site-specific basis. It is unlikely that additional closures would be implemented in the absence of Standards and Guidelines. A high degree of visitor freedom would be maintained.

Day Use

Day hiking is unlimited at most locations in these wildernesses, with the exception of Mt. Whitney. The effect is that there would be increasing loss of experiential values in the distances from trailheads that day hiking occurs. This could be remedied, as is noted, with the ability to limit day use on the Mt. Whitney trail. It is likely, however, that use would be capped once conditions deteriorate or are noticeable and there is public acceptance to limits on day use.

Riding and Packstock

These activities are subject to the same regulations as any other activity. Current trail maintenance levels condition these activities.

Trail Restrictions

Same as Alternatives 1 and 4.

Grazing Start Dates

Current grazing practices for packstock would continue where authorized grazing is allowed as soon as key grazing areas are accessible. There would be no use of grazing start dates. Efforts to monitor range readiness would only be associated with production livestock on grazing allotments. For packstock users there would still be a high degree of visitor freedom maintained in setting or changing pack trip itineraries. Early season or wet years trips would still need to rely on supplemental feed until foraging areas become abundant. Pack trip itineraries in late summer and fall would not change current-grazing practices appreciably unless forage standards were exceeded at popular camp areas.

Forage Utilization Standards

Grazing would be managed by implementation of utilization standards. Grazing use in popular key use areas would be allowed at high-moderate levels up to 55 percent on key species. These historic use levels would not likely cause a shift in use patterns into other light use areas. The need for supplemental feeds would remain at current levels and depend primarily on weather conditions and personal choice in maintaining stock.

Closures

As with Alternatives 1, 1-Modified, 2 and 4, key-grazing areas, which are in unsatisfactory condition with continued high grazing disturbance, would require annual or long-term closures to allow restoration. Closures would be less prevalent than in Alternatives 1, 1-Modified, 2 and 4. Some displaced use would shift to the Golden Trout and South Sierra Wilderness areas but at a lower level than under Alternatives 1, 1-Modified, 2 and 4.

Rock Climbing and Mountaineering

These activities would continue, conditioned by the same restrictions and regulations imposed on all wilderness visitors. There would not be any effects or foreseeable changes on these activities. Use in areas where climbing activities are concentrated (Minarets, Bear Creek Spire, Palisades, Williamson, Langley, North Fork of Mt. Whitney) would likely receive growth in use since this activity appears to be trending upward in popularity. There could possibly be an increase in climbing-associated impacts such as high elevation campsites, bolting, and route proliferation. These impacts could be mitigated through behavior change to lessen the effects. A high degree of visitor freedom would be maintained.

Winter Use

This activity would continue to increase at a slow growth rate. Popular winter use areas would continue to be popular and site-specific impacts to the social experience may be the only concern (e.g., the popularity of Shepherd Pass in the spring for skiing the classic trans-Sierra high route).

Commercial Activities

Commercial operations would continue under existing permits. When permits expire or transfer ownership, it would be very difficult to re-issue based on the lack of a needs assessment or forest plan direction for special uses. With controversy so high on the level and type of commercial operations that should be allowed in these wildernesses, it would be unlikely that the current terms and conditions would continue to be allowed over time. It cannot be predicted how a no-action alternative might affect current operators.

Some commercial operators would continue to issue wilderness permits, resulting in no constraints on permit acquisition. The Forest Service would continue to receive use data from tally sheets filled out by operators; however the quality of record keeping and wilderness education varies significantly by operator. Poor wilderness education can lead to abuses of the wilderness resource.

Permits and Quotas

Continuing the current process for administering permits and quotas would allow for administrative changes to the process, such as reservation periods, reservation fees, and processes. Any changes to quotas or significant changes to the permitting process are subject to public debate and disagreement. Changes proposed to the quota season were not accepted in public scoping in 1998 when the Inyo National Forest recommended altering the permit process. Without an overall framework from which to make decisions, it would become increasingly

difficult to attain public consensus on further restrictions or changes. With continued declining budgets, it is likely that the reservation system and permit process would be contracted, especially on the east side, if efforts to implement the current program fail due to public discontent.

Some commercial operators would continue to be exempt from daily quotas while others would be constrained by quotas. This would result in inequality in access to the wilderness between commercial operators as well as the general public.

Group Size

The party size would remain 15 people and 25 head of stock. The effect of this would be continued tension between hikers and stock groups. Also, with the same group size for trail and cross-country travel, there may be increased impacts in off trail areas since these areas are not maintained for large numbers of stock or people traveling.

Visitor Impacts

Biophysical impacts would continue to occur at campsites and along travel corridors. These impacts would be managed as funding allows. Without corresponding restrictions in place to curtail impacts, there would continue to be a cycle of impacts occurring and management mitigations when and where possible. There would not be many measures to employ to avoid degradation from occurring. It is likely that campsite density would increase over time and some sites would continue to degrade with use.

Stock Related Impacts

Stock-related impacts would continue to occur at current levels. Some meadow conditions would further deteriorate. Trails receiving heavy stock use (Mono Pass, Paiute Pass, Purple Lake vicinity) would see some degradation that would be noticeable over time. Mitigations could be implemented on a case-by-case basis using professional judgment and discretion. This could cause a wide range of actions by personnel across the forests with little consistency in approach. This would result in widely varied resource conditions across the wilderness.

Stock-related impacts would increase, over time, without adequate temporal or spatial controls on grazing use. There would be maximum allowable utilization standards on key use areas of 55 percent. This high-moderate use level may not allow practical compliance with 20 percent disturbance standard or provide appreciable stubble heights for other resources in most situations.

Most meadows would transition toward or maintain a mid-seral ecological state and moderate forage value rating. There would be sufficient vegetative biomass at end of season to provide for moderate plant vigor, stream bank protection and sediment entrapment on most meadows and riparian areas. The use of supplemental feeds would keep risk of introduced non-native plant seed sources at current levels. Disturbed macrosites favorable for weed establishment would increase.

Based on observed recovery rates for closed wilderness meadows (e.g., Hilgard Meadow) it is forecasted that 10 percent of key benchmark areas would reach high similarity to potential natural community in twenty years, as shown in Figure 4.1.

These administrative actions would have no increased need to pack supplemental feed, increase stock traffic or associated trail maintenance costs. Administrative costs associated with range analysis, meadow monitoring, commercial permit compliance would be less than Alternatives 1, 1-Modified, 2 and 4 at \$5,000 per year over the next ten years and \$25,000 per year thereafter (one intermittent employee).

Social Conditions

Social conditions would be maintained in the current state. Fluctuations (e.g., spikes and lows) would lead to times and places of concentrated heavy use. This may have a negative effect on the wilderness experience for some people at certain times, though this generally occurs infrequently. This may increase if commercial use increases, as there is room for growth in by most commercial operators. Since there is a range of values that are acceptable by the public, some people would be affected by current use pattern and there are those that would not. Conflicts would continue between user groups without resolution of issues related to social or experiential values in wilderness.

Alternative 4

Visitor Use

There would be no changes to the current balance of activities and visitor uses. Quotas would be in effect for all non-commercial visitors and some special use permittees. A high degree of visitor freedom would be maintained.

Significantly higher quotas would result in increased impacts to trailed and trail-less areas. The management direction allows for a greater level of impacts than any of the other alternatives.

Camping

Camping would continue much as in Alternative 3, except there would be standards in place for site density, campsite conditions, and occupied sites. These standards would not have a significant effect on visitor choices or freedom, but would serve to ensure that either the social or resource conditions do not degrade significantly. However, the standards would not serve to protect solitude or a person's ability to experience high quality wilderness character. The standards would allow for the greatest numbers of people and the lowest level of acceptable resource and social conditions.

The density of campsites allowed by the Standards and Guidelines are significantly higher than Alternatives 1, 1-Modified and 2. The trail-less areas allows for a density of four campsites/acre, which would be equal to the highest use category in Alternative 1 (Category 3). The campsite density allowed in the trailed zone would be 250 percent higher than the Category 3 areas in Alternative 1 (10/acre in this alternative compared to only 4/acre for Alternative 1).

The Standards and Guidelines for occupied campsites also reflect this significant increase from Alternatives 1 and 2.

Day Use

The lack of any present or future restriction on day use means there would continue to be a high volume of day use at popular trails. This could lead to the degradation of popular lakes within the day use corridor and experiential values of wilderness would be diminished. People seeking more solitude would likely be displaced and may disperse to areas that currently do not receive much day use. There might be a diminishing of experiential qualities in more places in this alternative.

Riding and Packstock

There would be no changes to this activity. Packstock and riding activities would be restricted in the same manner as the general public with the exception of no stock on the Mt. Whitney and Meysan Lake trails. The effect of this would be more visitor freedom and choice by individuals. There would likely be continued conflicts between hikers and stock in some areas where both stock and hiker use is high.

Trail Restrictions

Same as Alternatives 1, 1-Modified and 3.

Grazing Start Dates

Same as Alternative 3

Forage Utilization Standards

Grazing would be managed by implementation of utilization standards. Grazing use in popular key use areas would be managed at moderate levels, up to 45 percent on key species. These near historic use levels would likely not result in a shift in use patterns into other light use areas. The need for supplemental feed would remain at current levels and depend primarily on weather conditions and personal choice in maintaining stock.

Closures

As with Alternatives 1, 1-Modified, 2 and 3, key-grazing areas, currently in unsatisfactory condition with continued high grazing disturbance, would require annual or long-term closures to allow for restoration. Closures would be less prevalent than in Alternatives 1, 1-Modified, and 2 and more prevalent than Alternative 3. It is anticipated that a portion of the packstock use would be relocated outside the John Muir and Ansel Adams Wildernesses at a lower level than Alternatives 1, 1-Modified and 2 and at a higher level than Alternative 3.

Rock Climbing and Mountaineering

These activities would not be affected any differently than other activities. Use in areas where climbing activities are concentrated (Minarets, Bear Creek Spire, Palisades, Williamson, Langley, North Fork of Mt. Whitney) would expect to receive growth in use since this activity appears to be trending upward in popularity. There could be an increase in climbing-associated impacts such as high elevation campsites, bolting, and route proliferation. These impacts could be mitigated through behavior changes to lessen the effects. A high degree of visitor freedom would be maintained.

Winter Use

Same as Alternative 3.

Commercial Activities

Commercial use would be allowed to grow based upon current allocations of use. Some operations that are up against their allocated use levels would be limited, while those that have not used their allocations could continue to grow. This would not be based on identified need, but rather on a surplus of service days. When service days are not being utilized, they could be redistributed to other operators in a “pool” of temporary use. This would allow operators to grow, temporarily, but would also have the effect of being not consistent year to year.

There would be an effect of not managing resource concerns directly. With a pool, use could be transferred from place to place. It would not be tied to a defined acceptable level by trailhead or location. This effect might cause resource degradation to occur.

There would be some beneficial effects to operators that would continue to write their own wilderness permits. With ‘licensing’ required to write permits, there would be an improvement in the accountability and reporting requirements. It is likely that the quality of data would improve. With case-by-case decision making on growth and uses there could evolve many inconsistencies in approaches and decisions across the wildernesses.

Permits and Quotas

This alternative would maintain the same numerical quotas as Alternative 3 (no action) and allows permits to be issued by cooperators. The difference in the writing of wilderness permits by cooperators as opposed to how it is done in Alternative 3 would be defined guidelines and permissions that would provide quality controls on the privilege of writing permits. There would likely be an improvement in the quality of data, educational components associated with issuing permits and accountability than currently exists.

With the quotas, the effects would be the same as Alternative 3. Growth could occur on many, possibly all, trailheads since quotas do not fill every day. There is still ‘capacity’ for growth in most areas within these wildernesses.

Party Size

This is the same as described in Alternative 3. However, with increased quotas, there is the potential that if quotas were filled, there would be an increase in use resulting in increased impacts both in the trailed and trail-less areas.

Visitor Impacts

With standards for campsite density and occupied campsites, there would be some improvement in managing the biophysical impacts associated with campsites. The standards are low as compared to Alternatives 1, 1-Modified and 2. This would result in less improvement or mitigation taking place in moderate to heavily used areas. However, the two standards for trailed and trail-less areas could result in less degradation occurring in trail-less areas. Controls for mitigating the typically more pristine trail-less areas may lead to some reductions in biophysical impacts.

With the setback from water reduced to 25 feet, most campsites would be allowed.

The effect of a lack of Standards or Guidelines for user-created trails would be case-by-case decisions. With a lack of consistency in approach, there could be different allowances for conditions and a variation of resource degradation allowed to occur. Use trails would likely proliferate and decision makers would have difficulty making determinations on either sanctioning the use or mitigating the effects.

Stock Related Impacts

Stock-related impacts would continue to occur but at levels lower than Alternative 3. Some meadow conditions would further deteriorate and others would improve. As with Alternative 3, trails receiving heavy stock use (Mono Pass, Paiute Pass, Purple Lake vicinity) would see some degradation that would be noticeable over time.

Stock-related impacts would increase slightly, over time, with fewer temporal or spatial controls on grazing use than Alternatives 1, 1-Modified and 2. There would be maximum allowable utilization standards on key use areas of 45 percent maximum streambank disturbance standards of 20 percent. Adjustments up to 10 percent could be made for areas occupied by sensitive aquatic species and stubble height standards on meadow/riparian complexes to meet other resource needs. This moderate use level might not allow practical compliance with a 10 percent disturbance standard or provide appreciable stubble heights for other resources in some situations.

Most meadows would transition toward or maintain a mid-seral ecological state and moderate forage value rating. There would be sufficient vegetative biomass at the end of season to provide for moderate plant vigor, streambank protection and sediment entrapment on all meadows and riparian areas. The maintained use of supplemental feeds would keep risk of introduced non-native plant seed sources at current levels. Disturbed macrosites favorable for weed establishment would increase.

Based on observed recovery rates for closed wilderness meadows (e.g., Hilgard Meadow) it is forecast that 25 percent of key benchmark areas would reach high similarity to potential natural community in twenty years as shown in Figure 4.1.

These administrative actions would cause no increased need to pack supplemental feed, and would not increase stock traffic or associated trail maintenance costs. Administrative costs associated with range analysis, meadow monitoring, commercial permit compliance would be similar to Alternative 1 at \$10,000 per year (two seasonal employees) over the next ten years and \$5,000 per year thereafter (one seasonal employee).

Social Conditions

Social conditions would be managed primarily through the quota and the occupied campsite standard. Numerical quotas would allow for more visitations than currently exists, and would fluctuate over time. Social conditions would deteriorate for those seeking solitude in places where quotas are high and where commercial operators write permits, only conditioned by an overall service day allocation. Those seeking solitude might be displaced to other areas and if use continues to grow, less solitude across the wildernesses may result. For those with lower tolerance for solitude, many opportunities would still be available. Over time, the area may draw people less interested in experiencing solitude and displace those that do seek that experience.

At campsites, the effect of the standards for occupied campsites would provide more protection of solitude and experiential values in the areas off trail. However, with the standard being low (e.g., no more than three occupied sites within sight or sound) that experience could result in a low quality experience. The standards for the trailed areas are also low (e.g., no more than ten sites within sight or sound). This could allow conditions to be similar in all trailed areas to what currently exists on the Mt. Whitney trail at Trail and Outpost Camps. This again might have the effect of displacing those wilderness visitors seeking solitude in their wilderness travel, if use continues to increase.

Trails

Consequences by Alternative

Alternative 1 - Modified

In this alternative trail maintenance levels would be adjusted to match the desired condition and recreation category assignments. This would result in some trails being maintained at a lower frequency or lower standard than is stated. There may be trails whose maintenance (service) levels would be increased. Changes to identified service levels may not necessarily change the character of the trail. Overall, the adjustments would likely lead to a more efficient trails program with a reduction in costs for maintenance.

Establishing trails not recommended for stock and prohibiting commercial packstock on these trails would reduce costs of maintenance and reconstruction. Overall the effect of this would be beneficial to soils, vegetation and other biophysical resources. It may also reduce conflicts between user groups.

Alternative 1

In this alternative numbers of people would not be reduced so impacts to trails would continue at the current rate. Some impacts would be curtailed in cross-country travel with commercial operators limited to authorized routes. This could reduce the need for rehabilitation and restoration of inappropriate routes over time. However, it might lead to increased use of some system trails, possibly resulting in higher maintenance needs. In areas of high visitor use, an increase of trail use that may occur with growth could result in an increase of maintenance or improvement needs.

Establishing criteria for management of user-created trails would provide for consistent approaches to making decisions on these trails. It could lead to additional trails being added to the system. However, it is not expected that many miles of trail would be added through this process.

Alternative 2

In this alternative use levels would be reduced across the planning area. This may lead to diminished maintenance needs over time. However, if use levels are lowered consistently across the planning area, use may disperse and result in higher maintenance needs in areas that currently receive low use. Reconstruction projects may be less frequent with low levels of use.

In this alternative cross-country party size reductions may result in less resource damage occurring off the system trails.

Alternatives 3 and 4

In both of these alternatives, use levels would continue to grow. Maintenance of trails could continue to require financial investments of upwards to one million dollars per year within the three wildernesses. If budgets remain constant, backlogs of maintenance would continue to increase. There would be a continued need for capital investments for reconstruction projects ranging from \$250,000 to over \$500,000 annually. Impacts on resources from non-system trails would continue until effects were significant enough to trigger actions or mitigations on a case-by-case basis.

Heritage Resources / Tribal Relations / Contemporary Native American Uses

Consequences Common to All Alternatives

According to the Programmatic Agreement (PA), “Controlling Impacts on Historic Properties: Management of Ansel Adams, John Muir, and Dinkey Lakes Wildernesses, Sierra and Inyo National Forests”, whatever alternative is selected would have the same consequences with respect to Heritage Resources and Tribal Relations. Specific stipulations would be in place to address the management of heritage resources now and in the future. In addition to meeting Section 106 of the National Historic Preservation Act (NHPA), the PA would assist in meeting the trust responsibilities of the federal government to tribal governments and communities. Closer working relations between the PA parties would enhance the ability of the agency to achieve desired conditions.

Economic

This section focuses on economic impact and does not attempt to quantify or otherwise measure the non-economic values associated with the wilderness resource. While a dollar value is not specifically assigned to other resources, such as solitude, biological diversity, and quality recreation experience, their value is acknowledged throughout this document, in the development of alternatives, and in the receipt of (and response to) public comment.

Table 4.4 illustrates the allocation of service days across an array of activities for each alternative. The information in this table is used, in part, to characterize the likely economic effects to commercial enterprises from the selection of a given alternative.

Table 4.4 Actual Use vs. Service Day Allocations by Activity and Alternative

Activity	Actual Use ¹	Allocation				
		Alt 1	Alt 1 Mod	Alt 2	Alt 3	Alt 4
<i>East Side Entry</i>						
Packstock Supported	13,214	13,600	13,300	10,000	18,432	18,000
Backpacking	2,075	2,320	2,100	1,500	2,104	2,300
Mountain Guiding/ Winter Guiding²	1,883	2,500	3,000	2,250	2,218	4,000
Day Hiking	49	0	0	0	50	50
Day Rides	5,396	3,200	5,000	2,000	7,291 ³	5,000
Credited Educational	0	1,000	750	1,000	0	2,000
Temporary Use Pool	0	0	1,500	0	0	0
Nontraditional Packstock	0	500	500	2,000	0	0
TOTAL	22,617	23,120	26,150	18,750	30,095	29,650
<i>West Side Entry</i>						
Packstock Supported	2,793	3,300	3,000	2,500	2,900	6,500
Backpacking	11,987	6,400	12,000	5,000	6,300	10,000
Mountain Guiding/ Winter Guiding	0	500	600	0	0	500
Day Hiking	0	0	0	0	0	250
Day Rides	419	0	600	0	0	500
Credited Educational	1,082	1,750	1,100	2,000	0	2,000
Nontraditional Packstock	162	200	200	500	200	250
Temporary Use Pool	0	0	1,500	0	0	0
TOTAL	16,443	11,650	19,000	10,000	10,400	20,000

Consequences by Alternative

Alternative 1 - Modified

Alternative 1- Modified would add two additional types of quotas and allows the Forest Service to more closely control use in certain locations within the wilderness areas that are being hit relatively hard by both commercial and non-commercial users. First, this alternative addresses the administrative burden of administering complex quota systems by instituting a single trailhead quota for both commercial and non-commercial use where the combined level of use is still relatively low. Second, in areas where there is high demand for visitor use and substantial levels of commercial use, separate quotas for commercial and non-commercial are implemented. However, in areas where conflicts between operators are likely, the commercial quotas have been further split between pack stations and other outfitter/guides. This should alleviate some concerns over competition among operators. Finally, commercial use for some entry points with little commercial activity underway would be considered for approval on a

¹ Average of the high 2 out of the last 5 year's actual use.

² Includes mountaineering, winter mountaineering, ski mountaineering/touring.

³ Only 6 of the 12 pack stations have an identifiable service day allocations for day rides.

case-by-case basis. The latter category would affect some fifteen trailheads on the east side and one trailhead on the west side.

This alternative reduces service day allocations for most activities to a level at or slightly above current use levels. This would allow existing businesses to continue with minimal disruption to their operations. In isolated cases, some shifting of use may need to occur for individual operators and areas. However, the commercial use levels were carefully reviewed and, where possible, daily quotas adjusted upward (by 3-5 people per day) for certain entry points to accommodate the operational considerations of permittees. Conversely, commercial use was further restricted on one or two trailheads with exceedingly high levels of use.

Changes to existing service day allocations, adding daily trailhead quotas for commercial use, and using “limiting factors” to monitor and regulate use would cause some short-term dislocation of users and alter patterns of use for more heavily impacted trailheads. Longer-term effects would depend on how the affected permittees and their clients adapt to new operational constraints. If businesses market appropriately and clients plan further ahead to take advantage of non-peak times, a steadier, more predictable flow of activity could have a positive effect on permittees and the local businesses that benefit from their presence.

Smaller non-commercial trailhead quotas for some systems would have the greatest effect on spontaneous users of the wilderness backcountry. The proposed one-third reduction in Mt. Whitney day hikes would negatively affect some users of this particular area and might affect the local business community, especially in Lone Pine.

Alternative 1

Under this alternative, service day allocations would be reduced to the level of current actual use, effectively precluding significant upward fluctuation in the number of clients served. Permittees can no longer issue wilderness permits. Alternative 1 would establish a separate category of trailhead quotas for commercial users in addition to the quota already in effect for non-commercial users. Every trailhead that is used commercially has been assigned a quota under this alternative, including some trails that have not previously been subject to quota regulation of any kind. Where trail systems are used by more than one permittee, the new commercial quotas might create competition among business owners and prompt the development of bidding strategies, black markets for specific service days, and other such strategic ploys to capture key trails and peak days for financial gain. Giving commercial operators a separate trailhead quota addresses concerns over equitable management of use without subjecting business owners to the uncertainty associated with competing against non-commercial users.

This alternative would maintain the current level of business activity in wilderness-related outfitting and guiding. A review of actual use records suggests that, with careful planning, most permittees could continue to operate within the commercial trailhead quota established under this alternative with minimal disruption to business activity. Substantial alterations in patterns of use are expected to be limited to certain identifiable trailheads where use levels have consistently exceeded the proposed commercial trailhead quota (e.g., Hilton Lakes and Mono

Pass). It is unknown if commercial operators faced with such restrictions could adhere to the limitations of the new quota system while maintaining a viable business.

Alternative 1 generally shifts the burden of meeting future business growth in commercial packing and guiding onto non-wilderness National Forest System lands. However, this alternative would allow wilderness service day allocations to be increased in certain cases where such increases are warranted by market demand and supported by the appropriate level of analysis and documentation.

Changes to existing service day allocations, adding daily trailhead quotas for commercial use, and using “limiting factors” to monitor and regulate use would cause some short-term dislocation of users and alter patterns of use for more heavily impacted trailheads. Longer-term effects would depend on how the affected permittees and their clients adapt to new operational constraints. If businesses market appropriately and clients plan further ahead to take advantage of non-peak times, a steadier, more predictable flow of activity could have a positive effect on permittees and the local businesses that benefit from their presence.

Smaller non-commercial trailhead quotas for some systems would have the greatest effect on spontaneous users of the wilderness backcountry. The proposed one-third reduction in Mt. Whitney day hikes would negatively affect some users of this particular area and may affect the local business community, especially in Lone Pine.

Alternative 2

This alternative would negatively impact many business ventures dependent upon wilderness access. Individually, many of the changes proposed under this alternative would require businesses to alter some aspects of their operations. However, the cumulative effect is likely to push some small businesses beyond the point of recovery. One outcome could be the merger of several independent business ventures into one or more larger corporations to facilitate management of an increasingly complex scheduling and logistical work environment. Each of the following would either reduce revenues or increase costs to commercial operators upon implementation:

- A reduction of 3,001 service days in pack-supported use on the east side and 788 service days in pack-supported use on the west side
- A reduction of 574 service days in backpacking use on the east side and 1,369 service days in backpacking on the west side
- A reduction of 1,130 service days for day rides on the east side
- A substantial reduction in the availability of forage for packstock
- Reducing trailhead quotas below current use levels and requiring both commercial and non-commercial users to adhere to them
- Adopting a year-round trailhead quota system

While it is not possible to predict the economic impact of the above restrictions with a high degree of precision, the foregone service days represent a loss of roughly \$500,000 in income

each year to the aggregate of all commercial operators. This is roughly equivalent to the combined income of two large pack stations. Although this would be a substantial impact to the small business owner, in the context of the regional economy, the economic impact would be minor.

Some of the reductions to wilderness service days could be offset by increasing use outside the wilderness and/or moving into activities where some additional service days are allowed (such as non-traditional packstock and credited educational activities).

With the Forest Service as the only entity issuing wilderness permits and all wilderness users competing for daily trailhead quotas, established business practices would not work effectively. The short-term effect on current commercial permittees would be negative. Longer-term effects would depend upon how the business community adapts.

Alternative 3

This alternative maintains the status quo for business ventures dependent upon wilderness access. As a result, selection of this alternative would not likely directly affect any wilderness outfitter and guiding business in operation today. For commercial pack stations and mountaineering outfitter-guides, use levels and use patterns would continue to be managed through annual operating plans. All other outfitter-guides would continue to be subject to daily trailhead quotas.

While maintaining the level of current service day allocations, Alternative 3 offers no assurance that requests for increased allocations would be approved to allow for future business expansion. However, the alternative would allow for additional revenue generation to existing businesses as current use levels are well below the authorized allocation for most activities (with the exception of day rides). Under these circumstances, activity levels would primarily be determined by market demand.

Alternative 4

This alternative would allow for future business growth by increasing service day allocations for most activity categories. Of special importance is the increased number of service days allocated to day rides and mountain guiding, activities for which demand has been increasing. No additional revenues are generated solely from implementation of this alternative, but it would provide an opportunity for increased income and employment where markets are growing and consumer interest materializes.

Maintaining current trailhead quotas and allowing unregulated day use would allow local residents to retain spontaneity in wilderness use.

Social

The potential social effects of each alternative are difficult to estimate for several reasons. Each of the affected counties has a different mix of economic activities, cultural characteristics, and future development options. Wilderness use is only part of this mix and the importance varies widely from one county to another.

The wider community of interest also has a mix of groups that sometimes disagree on the merits or outcomes of particular actions or policies. Yet some generalizations are possible. Public response data indicate that many people think a good, socially responsive alternative should be consistent with the long-term goal of environmental protection, should meet current consumer needs to the extent feasible, and should minimize adverse social and economic consequences.

Attitudes and Values

Alternatives would affect individuals and groups based on the values they hold. Social consequences are evaluated by looking at changes in visitor use and campsite management.

Affected Publics

Local Governments

Counties and communities near national forests are most affected by changes in Forest Service policy. Local effects are most likely in the tourism dependent areas of the Eastern Sierra.

Long Term Residents

Local businesses are concerned with possible changes that could affect sales or services. Other long-term residents are concerned about changes in trailhead quotas, possible day use regulation and changes in visitor use and campsite management.

Minorities and Low-Income Visitors

Formal consultation has been entered into with Native American Tribal Governments, State Historic Preservation Office, interested publics and others. It is expected that their concerns will be addressed in the PA. There may be an environmental justice issue because many of the existing trails are prehistoric trade routes and some continue to be of cultural significance to the tribes. These are addressed in the PA.

While wheelchairs are allowed in the wilderness, no specific arrangements have been made to encourage use. No other indicators could be identified that would measure effects to this group.

Generally, low-income recreationists do not travel far from their local areas to recreate. Due to the travel distances to the wilderness areas on the eastside for most of southern California these areas are probably not popular with low-income recreationists. The Westside, however, due to its proximity to higher population centers is likely more popular.

Recreation Users

Recreation users would be affected differently depending on what they seek in a wilderness experience. Consequences would be evaluated by looking at the projected changes from in current in allocated use, quantity and type, as well as changes in visitor use management.

Consequences Common to All Alternatives

There may be site-specific effects to under-served groups but no alternative differentially affects minorities and low-income visitors at the programmatic level.

Alternatives 1, 1 - Modified, 3, and 4 would not limit use below current level. Alternatives 1, 1 - Modified and 2 set service day allocations for the west side at current use levels. No negative effects to west side commercial permittees are anticipated. Alternatives 3 and 4 set service day allocation on the west side at current levels. This permits some growth in existing services.

Consequences by Alternative

Alternative 1 – Modified and Alternative 1

Local residents are generally more spontaneous in wilderness use decisions. Possible future site-specific day use restrictions as well as impositions of non-commercial trailhead quotas at all trailheads could affect local residents adversely by limiting spontaneity.

Implementing range readiness and grazing standards could adversely affect pack stock users experiences by shortening the grazing season and causing stock users to pack in feed. The potentially shortened season would similarly adversely affect commercial and non-commercial stock users.

Alternative 2

Year-round quotas and site-specific day use restrictions would affect local residents adversely. Changing daily trailhead quotas to “first come, first served” would also limit opportunities to be spontaneous.

Requirements to used planned itineraries and designated campsites would limit clients’ opportunities to feel free of regulations in the wilderness setting. Effects would depend on the individual user’s values. If the user were looking for an old West experience, this restriction would not be onerous. If, however, the user were looking for a free, spontaneous experience, this new method of operation would be unwelcome.

Implementing range readiness and grazing standards could adversely affect traditional pack stock support by shortening the season similarly to Alternatives 1 and 1 – Modified.

Creating one zone wilderness wide will radically change the wilderness experience for some users. Those who feel wilderness should be pristine would be generally satisfied. Others,

especially those with connections to specific heavily used places, would be adversely affected by restrictions such as eliminating all campsites within 100 feet of water. Even those who agree in principle may lose use of favorite places.

Reducing daily trailhead quotas would most affect spontaneous users.

This alternative would most adversely affect use oriented individuals and groups. Those most positively affected are individuals and groups who value natural processes over human use. This alternative would also appeal to those who do not physically use wilderness, but simply value the concept of untrammelled space.

Alternative 3

Individuals and groups would feel exactly as they do now – some content, some unhappy. Individuals and groups who believe that resource conditions in the wilderness are relatively good would be content with this alternative. Those whose recreation expectations are met under current management would be content.

Those most adversely affected by this alternative are those who value the solitude and untrammelled nature of wilderness areas and those who believe resource protection should take precedence over human uses in wilderness. Those individuals and groups who do not physically use the wilderness, but who valued the concept of wilderness, would not be satisfied with current management.

Recreationists would be adversely affected if they value solitude and pristine conditions with no evidence of man in any wilderness setting. Other recreationists, local and out-of-area, would continue to enjoy traditional access to favorite places.

The current method of resolving recreation/resource conflicts on a case-by-case basis would continue to create discontent with all groups.

Alternative 4

Maintaining current trailhead quotas and allowing unregulated day use would allow local residents to retain spontaneity in wilderness use.

Creating trailed and trail-less management zones would change the wilderness experience for some users. Those who value solitude would be adversely affected by allowing five occupied campsites even in the trail-less areas. Others, especially those with connections to specific heavily used places, would be positively affected by allowing relatively higher levels of use.

Use-oriented groups and individuals would be satisfied. The entire concept of this alternative would adversely affect individuals and groups who believe the concept of wilderness precludes evidence of mans' activities.