Chapter 3: Affected Environment and Environmental Consequences

3-1: INTRODUCTION

This chapter describes the present conditions of the environment in and around the Analysis Area. This chapter also discloses the probable consequences (impacts and effects) of implementing each Alternative presented in Chapter 2 on selected environmental resources. It provides the analytical basis to compare the Alternatives. The chapter is organized by selected environmental and social resources. Each resource discussion addresses the following components: (1) scope of the analysis, (2) existing condition, and finally (3) direct, indirect, and cumulative effects.

Some required determinations are not elaborated on in the resource discussions, so they are briefly mentioned immediately below. An explanation is given on why they are not significant.

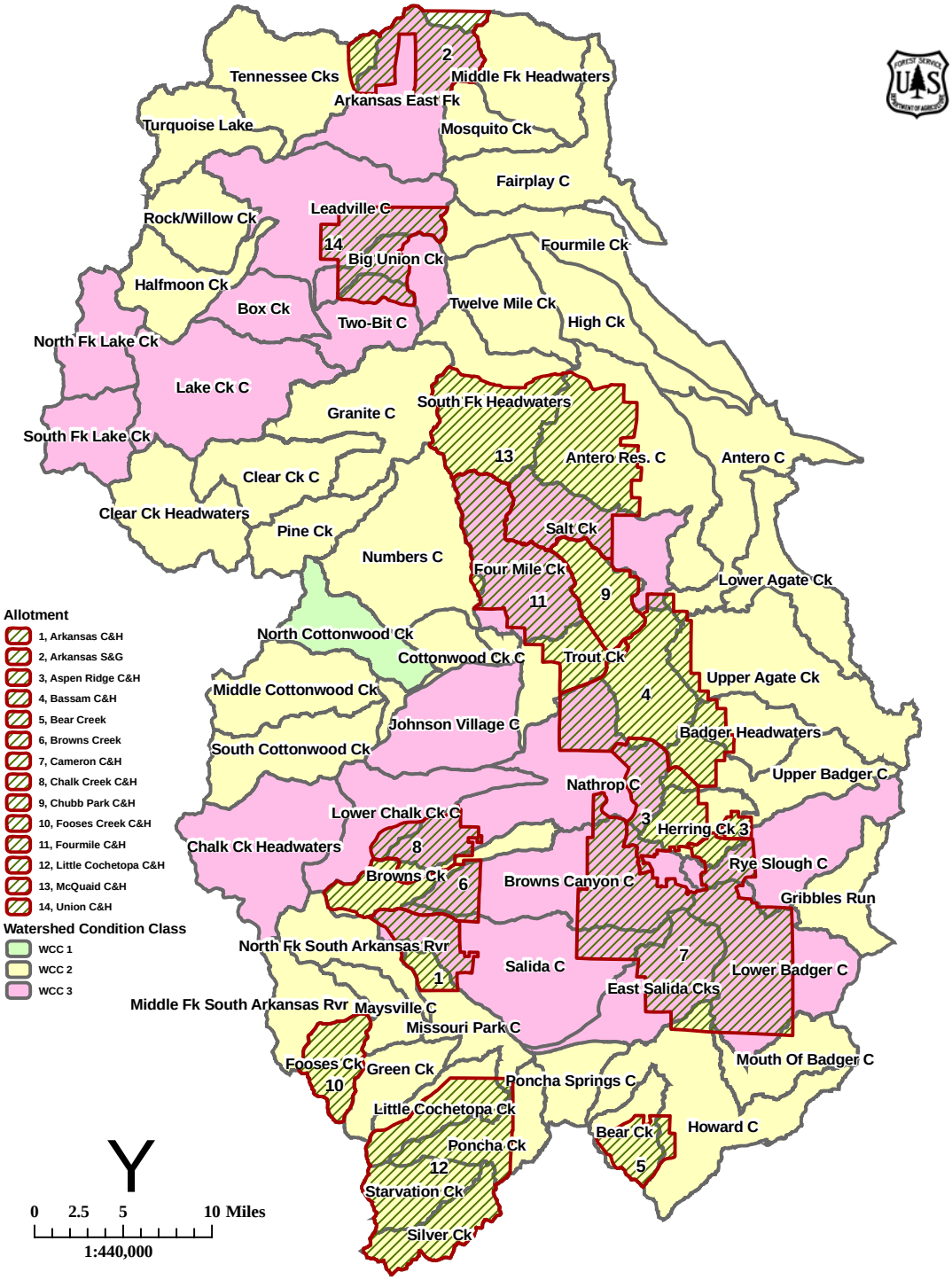
All Alternatives comply with the Clean Air Act. The selection of Alternative B or C (i.e., continuation of domestic livestock grazing within the Analysis Area) would not noticeably alter air quality and, therefore, would be in full compliance with the Clean Air Act.

There are no formally recognized ecologically critical areas within the Analysis Area. The actions proposed in the Alternatives of this EA would have no effect on ecologically critical areas. There are no activities proposed that would alter the natural appearance or function of landscapes in the Analysis Area.

3-2: WATERSHED AND AQUATIC RESOURCES

The Analysis Area is displayed in Map 3-1 below. The size of the Analysis Area does not vary by Alternative. The future livestock management of fourteen existing allotments is being evaluated in this EA. The affected rangeland allotments are as follows: Arkansas C&H, Arkansas S&H, Aspen Ridge, Bassam, Bear Creek, Bowns Creek, Cameron, Chalk Creek, Chubb Park, Fooses Creek, Fourmile, Little Cochetopa, McQuaid, and Union (See Appendix for allotment maps). Watersheds and allotments in the Analysis Area are shown in Map 3-1 on the next page.

Map 3-1: Allotments, 6th-level Watersheds and Watershed Condition Classes of the SLS Project Area



Existing Condition

The project area is located within twenty-nine 6th level watersheds as shown on Map 3-1. Existing condition of the allotments is summarized from a more general perspective in the Inland West Watershed Initiative (IWWI) project to more site specific information on the benchmark areas of the allotments. Water quality and stream/riparian areas of the allotments are also discussed in this section.

IWWI

In 1997 and 1999 the Pike and San Isabel National Forests, Cimarron and Comanche National Grasslands (PSICC) classified watershed conditions in the Inland West Watershed Initiative (IWWI) project. Watershed conditions classes (WCC) were developed and assigned a rating from healthy to degraded. Class I (WCC 1) watersheds are identified as those areas where current and past management activities have not significantly effected the function of stream and riparian areas. Class II (WCC 2) watersheds are identified as those areas where there are currently management activities occurring, and are not in a pristine condition. Class III (WCC 3) watersheds represent areas where major impacts to the land have resulted in severe damage to stream and riparian function.

Table 3-1: IWWI Watershed Condition Class

COUNT	BASIN	WATERSHED	WATERSHED NAME	IWWI Rating
1	South Platte	101900010101	South Fk Headwaters	2
2	South Platte	101900010103	Antero Res. C	2
3	South Platte	101900010104	Salt Ck	3
4	South Platte	101900010105	Antero C	2
5	South Platte	101900010106	Upper Agate Ck	2
6	Arkansas	110200010103	Leadville C	3
7	Arkansas	110200010112	Big Union Ck	3
8	Arkansas	110200010310	Numbers C	2
9	Arkansas	110200010314	Four Mile Ck	3
10	Arkansas	110200010506	Trout Ck	2
11	Arkansas	110200010510	Nathrop C	3
12	Arkansas	110200010514	Browns Ck	2
13	Arkansas	110200010515	Browns Canyon C	3
14	Arkansas	110200010516	Salida C	3
15	Arkansas	110200010518	East Salida Cks	3
16	Arkansas	110200010602	Lower Chalk Ck C	3
17	Arkansas	110200010704	North Fk South Arkansas Rvr	2
18	Arkansas	110200010705	Missouri Park C	2
19	Arkansas	110200010708	Little Cochetopa Ck	2
20	Arkansas	110200010710	Starvation Ck	2
21	Arkansas	110200010712	Silver Ck	2
22	Arkansas	110200010714	Poncha Ck	2
23	Arkansas	110200010801	Howard C	2

COUNT	BASIN	WATERSHED	WATERSHED NAME	IWWI Rating
24	Arkansas	110200010802	Bear Ck	2
25	Arkansas	110200010901	Badger Headwaters	2
26	Arkansas	110200010902	Upper Badger C	2
27	Arkansas	110200010905	Herring Ck	2
28	Arkansas	110200010907	Rye Slough C	3
29	Arkansas	110200010910	Lower Badger C	3

Within the South Platte River basin the Salt Creek 6th level watershed and within the Arkansas River Basin the Leadville Composite, Big Union Creek, Four Mile Creek, Nathrop Composite, Browns Canyon Composite, Salida Composite, East Salida Creeks, Lower Chalk Creek Composite, Rye Slough Composite and Lower Badger Composite 6th level watersheds were rated in the Inland West Watershed Initiative (IWWI) as Class 3. Sources for sediment include erosion from unvegetated areas such as roads, trails, and bank erosion. The Forest Standards and Guidelines state that threshold sediment levels will not be increased by management activities. A threshold sediment level is the maximum level of sediment a stream can carry without adversely affecting the existing channel stability. The Forest Service has initiated monitoring of riparian condition using Proper Functioning Condition assessments (PFC) in many of these watersheds.

Water Quality

The waters of Colorado have been designated according to the beneficial uses for which they are presently suitable or intended to be suitable. The use classifications for streams in the SLS project area are Class 1 Cold water aquatic life, Recreation 1, Water Supply and Agriculture (Colorado Department of Public Health and Environment, Water Quality Control Commission - CDPHE, 1999). State water quality standards require that the San Isabel National Forest comply with the classified beneficial use standard.

CDPHE 303(d) Streams

Chalk Creek (see Table 3-2) has segments listed by the Water Quality Control Division of Colorado (WQCDC) for water quality impairment (CDPHE, 2006). Streams with a 303(d) designation mean that the segment is not meeting water quality standards for all beneficial uses, and require a Total Maximum Daily Load (TMDL). A TMDL determines the pollutant load a water body can accept without exceeding the applicable water quality criteria and allocates the defined load to the point and non-point sources. A TMDL is a process whereby pollutant sources are identified, allocated, and control measures are implemented and monitored

A very small portion of the Chalk Creek allotment (2.5% of the capable acreage) is tributary to Chalk Creek, and it is highly unlikely that grazing is having any effect on the metals concentrations for which this stream has been listed.

Table 3-2: 303(d) Streams

Stream Name	Affected Allotment	303d Impairment	Segment Length (miles)
Chalk Creek	Chalk Creek C&H	Metals	20.3

CDPHE 305(b) M&E Streams

Salt Creek (See Table 7) is on the State Monitoring and Evaluation list (305b) (CDPHE, 2006), and it is suspected of not meeting water quality standards for sediment and temperature. Livestock grazing can result in degradation of riparian areas and uplands that cumulatively contribute to excessive sediment deposition. Changes in grazing would have a change in the total amount of sediment in the watershed, but changes in grazing may not change the 305(b) listing of the stream. The direct impacts may be due to historic or current mining, roads, grazing, recreation and/or other contributors. The source of the pollution has not been identified and the stream will be monitored.

Table 3-3: 305(b) Streams

Stream Name	Affected Allotment	305b Impairment	Segment Length (miles)
Salt Creek	Mc Quaid C&H	Sediment	1.95

Stream/Riparian Areas by Allotments

Table 3-4 describes the existing condition of the stream/riparian areas by allotment. Information in this table was developed by the Interdisciplinary Team (ID Team) and subsequently edited by the project hydrologist based on hydrology field observations during site visits. A similar table should appear elsewhere in the text of the main EA document.

Table 3-4: Existing Condition of Stream/Riparian areas by allotment

Allotment	*Existing Condition*
Arkansas C&H (Salida R.D.)	Stream/Riparian – Fair condition. High incidence of Kentucky bluegrass and introduced clover in some areas. Noxious weeds present (Canada thistle, toadflax) in some locations. Drought stress evident. Weldon Gulch and Placer Creek in the Weldon Unit rated at functioning-at-risk by 2004 hydrology crew. Placer Creek in Low Unit rated at functioning-at-risk by 2004 hydrology crew. Squaw Creek in Squaw Unit rated at PFC by 2004 hydrology crew. IDT conducted site visits of Benchmarks in 2005.

Allotment	*Existing Condition*
Aspen Ridge (Salida R.D.)	Stream/Riparian - High incidence of stream bank trampling, pedestaling and areas of active headcutting. Riparian and upland graminoids present, but decreasing with a high incidence of forbs and Kentucky bluegrass. Lack of willow vegetation. Drought stress evident. Noxious weeds present in limited areas (Canada thistle). High incidence of bare ground. Overall fair-poor condition. Benchmarks in Coons Park and Calf Gulch rated at functioning-at-risk, downward trend in 2005; Bull Gulch also rated at functioning-at-risk, downward trend in 2005.
Bassam (Salida R.D.)	Stream/Riparian - Willow and riparian graminoids present and diverse in age structure and species. Some willow die-off due to drought. Noxious weeds present in limited areas (Canada thistle). Range of condition from fair to very good, with some sites evaluated as poor. Benchmark in Castle Rock Gulch rated at PFC in 2005; benchmark in Dry Lakes rated at nonfunctional in 2005.
Bear Creek (Salida R.D.)	Stream/Riparian - Riparian graminoids present. Drought stress evident in some areas. Noxious weeds present in limited areas (Canada thistle). Good-fair condition. Benchmark in Spring Gulch rated at functioning-at-risk, downward trend in 2005; yet permittee has developed water source out of riparian and fenced off problem area (monitor recovery of improvements).
Browns Creek (Salida R.D.)	Stream/Riparian - Good vegetation cover. Willow communities present, diverse. Some pedestaling and hedging of willows. Stable channel type. Good condition. Browns Creek benchmark in Upper Browns Pasture rated at PFC in 2005.
Cameron (Salida R.D.)	Stream/Riparian – Poor-fair vegetation cover. Willow communities present and diverse in some areas. Drought stress evident. High incidence of Kentucky bluegrass and forbs. Fair-poor condition. Benchmark in Willow Pasture rated as functioning-at-risk, trend not apparent by IDT (hydrology crew rating less favorable) in 2005.
Chalk Creek (Salida R.D.)	Stream/Riparian - Good vegetation cover. Willow community with diverse age structure and riparian graminoids present. Good condition.

Allotment	*Existing Condition*
Chubb (Salida R.D.)	Stream/Riparian – State owned lands poor vegetation cover, composition, and structure. Willow vegetation lacking in lower reaches. Fair-poor condition. Forest Service land has good vegetation cover with native riparian species present with some non-native species present (Canada & musk thistle, pennycress, smooth brome, Kentucky bluegrass). Recent willow dieback possibly due to drought. PFC condition of the benchmark in the Salt Pass Unit rated as functioning at risk, trend not apparent by IDT (downward trend by hydrology crew) in 2005.
Fourmile (Salida R.D.)	Stream/Riparian - Good vegetation cover in most stream channels. Willow and riparian graminoids present and diverse in age structure and species. Two benchmarks in the Lower Fourmile pasture were rated at PFC in 2005. Cottonwood regeneration lacking, poor-fair condition.
Little Cochetopa (Salida R.D.)	Stream/Riparian - Good vegetation cover, willow communities present and vigorous in most locations with isolated problem areas. High incidence of Kentucky bluegrass. Noxious weeds present in main drainages (Canada thistle, yellow toadflax, hoary cress and downy brome). Benchmarks at L. Cochetopa, Beaver Creek and Marshall Pass units rated at PFC in 2005. Benchmark in Murphy's Hole rated at functioning-at-risk by IDT (revision of hydrology crew 2005 assessment).
Union (Leadville R.D.)	Stream/Riparian - Mosaic of riparian graminoids and willows present. Riparian vegetation dense and vigorous. Some areas decadent. Good condition. Benchmarks in the Upper and Lower Rotational Units were rated at PFC in 2005.
McQuaid (South Park R.D.)	Stream/Riparian – Diverse and vigorous set of riparian graminoids present in most stream/riparian locations. Willows on the increase, even in areas where willows had been grazed out in the past. Noxious weeds present in some areas (Canada thistle). Benchmark in Lower Salt pasture rated at functioning-at-risk, downward trend. Benchmark in Deadman pasture rated at functioning-at-risk, trend not apparent. Two benchmarks in Pony Park and benchmark in Buffalo Springs rated at functioning-at-risk, upward trend. Benchmarks in Upper Salt, Jones Hill North and Jones Hill South

Allotment	*Existing Condition*
	pastures rated at PFC.

Desired Conditions

The main objective is to maintain the capable rangeland at desired condition. Table 3-5 states the desired condition for the stream and riparian acres within the SLS project area. While the intent is to be all inclusive, the table shows a good summary of the guidance discussed in the Forest Land & Resource Management Plan (FLRMP) and the Watershed Conservation Practices.

Table 3-5: Desired Conditions of the Streams & Riparian Areas

Resource Ecosytem Community Type	Desired Condition
Streams & Riparian Areas	Maintain all riparian ecosystems in at least an upper mid-seral stage based upon the R2 Riparian Ecosystem Rating System (PSICC LRMP, III-50). Provide healthy, self-perpetuating plant communities, meet water quality standards, provide habitats for viable populations of wildlife and fish, and provide stable stream channels and still water-body shorelines (PSICC LRMP, III-203). Achieve desired condition of riparian areas by following the standards set forth in the Watershed Conservation Practices (WCP) Handbook, FSH 2509.25. Section 12 deals specifically with Riparian Areas. Management measure (3) of this section states, "In the water influence zone (WIZ) next to perennial and intermittent streams, lakes, and wetlands, allow only those actions that maintain or improve long-term stream health and riparian ecosystem condition." Adherence to the design criteria within this standard will help to sustain riparian areas at or move

Resource Ecosytem Community Type	Desired Condition
	them toward their desired conditions (See Appendix B of Hydrology Report for a list of management measure (3) of the WCPs). Where a defined channel exists (perennial and intermittent), streams and riparian ecosystems will be managed to be at a "proper functioning condition" state as defined by the Bureau of Land Management (Technical Reference 1737-9). Conduct actions so that stream pattern, geometry (profile and dimension), and habitats are maintained or improved. Where a defined channel does not exist, the area will be managed to maintain the hydrologic function and provide for self-perpetuating plant communities in riparian corridors/pockets.

Table 3-5 attempts to concisely summarize the desired conditions for stream and riparian areas. However, the range permittees are still obligated to comply with the FLRMP and the WCP handbook along with other applicable state and federal laws, rules and regulations.

General Environmental Consequences

The environmental consequences of the proposed alternatives were determined from a qualitative watershed perspective. The primary concerns are riparian recovery, sediment delivery, retention and storage, water quality, and the amount of management that an alternative requires (Table 3-6).

Table 3-6: Alternatives Comparison

Concern	Alternative 1 (No Action/Grazing)	Alternative2 (Current Management)	Alternative 3 (Adaptive Management)
Riparian Recovery Time	3-15 years	Continued status quo-acceptable in some places not in others	3-15+ years
Sediment Delivery	Lowest	Highest	Middle
Water Quality	Best – most rapid potential recovery relative to livestock	Continued generally unacceptable	Middle-much better than alternative 2 not quite as good as

Concern	Alternative 1 (No Action/Grazing)	Alternative2 (Current Management)	Alternative 3 (Adaptive Management)
	impacts only		1 relative to livestock impacts only
Management Needs/Intensity	Least (none after allotments closed but has significant impacts on private lands and overall operations	Middle -low to moderate intensity depending on alternative	Most-intensive management

Effects Common to All Alternatives

A riparian area at PFC provides adequate vegetation, landform, and/or large woody debris to dissipate stream energy associated with high water flows, thereby reducing erosion and improving water quality. Additionally, it reduces sediment loading helping to meet state water quality standards. A healthy riparian condition provides protection against the extremes of temperature that can limit aquatic life. A healthy, properly functioning riparian system develops root masses that stabilize stream banks against cutting action and supports greater biodiversity.

Improper management activities can cause degraded riparian conditions, (something other than desired conditions) and alter the composition, density and vigor of vegetative communities. This in turn can alter rooting depth, rooting character, surface protection, thermal protection, and aquatic habitat.

Many of these changes can cause adverse stream channel adjustments such as accelerated bank erosion, increased width/depth ratios, altered channel patterns, reduced channel stability, increased sediment supply, decreased channel substrate size, decreased sediment transport capacity and damaged fisheries habitat by filling riffle/pool complexes with sediment. Oftentimes, the stream channel adjustments result in downcutting and gullying. This in turn lowers the water table and dewaters riparian-associated wetlands.

Alternative A: No Action – No Livestock Grazing

***Direct Effects*:** Discontinuing livestock grazing in the SLS project area would allow for recovery of the damaged areas. High-use areas would no longer receive repetitive use by cattle thereby eliminating additional compaction, trampling and hoof shearing. Riparian areas would move toward desired conditions. Problems may still persist where multiple use activities and other improvements (i.e. roads and trails) exist.

***Indirect Effects*:** Water quality and riparian health would start to improve as degraded areas recover from the effects of livestock grazing. As riparian corridors recover and connected disturbed areas become disconnected or healed, sediment loads and water temperatures would be reduced. As riparian vegetation regenerates in areas where it is currently absent, its roots would anchor soil and banks, and its leaves would provide

shade. Salt Creek, on the 305(b) monitoring and evaluation list for sediment and temperature, would have a better chance of not being listed on the 303(d) list or perhaps could even be delisted from the 305(b) list.

Alternative B: No Change -Livestock Grazing with Current Management
Under this alternative, grazing management would continue as it has in the recent past. According to 2004 and 2005 hydrologic data, current management has resulted in less than desired conditions on portions of several of the allotments. Those pastures not at desired conditions are displayed in Table 3-7.

Table 3-7: Pastures not at Desired Conditions

Allotment	Pasture(s)
Arkansas C&H	Weldon Unit, Low Unit
Aspen Ridge C&H	Calf Gulch, Coons Park, Bull Gulch
Bassam C&H	Dry Lakes
Chubb Park C&H	Salt Pass Unit
Bear C&H	Spring Gulch
Cameron C&H	Willow
L. Cochetopa C&H	Murphy's Hole
McQuaid	Lower Salt, Deadman

Many of these pastures have degraded watershed and riparian conditions, as discussed in the previous section. Many of these areas do not meet the Forest Plan or Watershed Conservation Practices Handbook standards (USDA-Forest Service, 1984 and 1999, respectively).

Each of the allotments has at least one active, existing water development. Overall, there are 177 existing water developments on the twelve allotments covered in this hydrology report based on the current GIS coverage. Appendix C of the Hydrology Report contains a complete list of the number of water developments by allotment. The alloments with the highest number of water developments follow: Aspen Ridge(55), Bassam(56) and Cameron(22). Many of these occur in riparian areas. All water developments tend to congregate cattle and can lead to compaction, loss of ground cover, pedastaling, and trampled banks. In addition, each development controls the flow of the water, the amount of water stored, and the disposition of the unconsumed portion. No attempt has been made to quantify the individual effects from these existing water developments.

***Direct Effects*:** Riparian and stream conditions at some benchmarks (some analyses outside benchmarks) are at PFC or functioning-at-risk with an upward trend. These areas should continue to improve or remain acceptable under this alternative. Other benchmarks were rated as functioning-at-risk with a downward trend or non-functional. These riparian areas and streams will likely deteriorate with some declining into a non-functional PFC rating. Negatively affected areas will likely continue to expand.

***Indirect Effects*:** Where stream and riparian areas are at or approaching desired condition, the aquatic systems are functioning at or near optimal levels. As water-holding capacities of these systems are increased, the amount of water available for plants, animals and humans is increased as well. Where stream and riparian areas are not at or approaching desired conditions, there may be elevated sediment deposition, changes in stream channel morphology or degradation of aquatic habitat downstream. If the stream incises (loses vertical stability) as a result of degraded conditions, the water table will drop resulting in a loss of riparian habitat.
Conditions could worsen in Salt Creek, causing it to be listed on the State's 303(d) list, which would require a TMDL analysis in the future.

Alternative C: Livestock Grazing using Adaptive Management

If the adaptive management alternative is implemented, there will be additional design criteria to follow and adaptive options to implement. This will facilitate riparian area recovery and improved stream health, particularly in those pastures identified in Table 3-7. By working closely with the Range Specialist (M. White) in July 2006, requisite, hydrology design criteria were established to maintain areas at desired conditions and to improve degraded riparian and stream areas. This exercise allowed design criteria to be set for all the pastures/allotments on the Salida and Leadville Ranger Districts by incorporating the range specialist's on-the-ground knowledge for those allotments.

This alternative would allow for continued grazing on NFS lands while providing the framework for improving rangeland conditions albeit at a more intensive management level. Allotment summaries displaying useful range and hydrology information are provided in Appendix D, Hydrology Report. For each allotment, the following are displayed: general, range, historical, water availability, water improvements, riparian condition, monitoring and comments.

In order to move those portions of the capable rangeland from less than desired to desired conditions, adaptive option(s) would be implemented to facilitate improvement. Water-related range improvements and watershed improvement projects may be selected as adaptive options. Because of their potential importance and complexity, water-related range improvements and watershed improvement projects are subsequently addressed herein.

***Direct Effects*:**

If properly implemented, this alternative would result in improved watershed condition of the uplands and riparian areas. The effect of adaptive management on these allotments would be to increase residual vegetation where needed, reduce litter accumulations, lessen amounts of bare ground where excessive, and increase the overall vigor of plants through better distribution of cattle across the allotments. Increasing beneficial vegetation and improving its vigor ensures that plenty of material is available for trapping sediment in runoff and overland flow events. Additionally, adequate litter (not excessive) insulates plant crowns and over wintering buds, protects and covers soil, holds moisture

in the ground and allows the plants to continue photosynthesis for carbohydrate production and storage. Greater carbohydrate storage results in more roots being produced by each plant. This increases the erosion defensibility and moisture-holding capability of soils. It also provides a buffer to plants in times of stress (such as drought).

Chemical water quality parameters such as nutrients, fecal coliforms, and pH would likely improve. With the upward trend in riparian condition, there would be increased thermal cover, reducing temperatures in the summer, improved stream stability, reduced sediment, increased ability to handle floods, and increased riparian areas and wetlands.

Riparian pastures would be grazed to the appropriate stubble heights. The pastures should be grazed early (before the end of July) in areas where willows are the seral vegetation type. This would facilitate use of the uplands while they are still green and the temperatures are cooler (Kauffman et al., 1983; Kovalchik and Elmore, 1991; Martindale and Wickel, 1988). In areas where *Carex spp.* is seral, later grazing can occur (after August 30).

Degraded riparian areas could need complete rest to initiate the recovery process (Clary and Webster, 1989; Platts and Wagstaff, 1984). Where recovery does occur while still being grazed, it would be at a much lower rate than if cattle were excluded (Clary and Kinney, 1997; Knopf and Cannon, 1981).

Where necessary, fencing could be used (temporarily) that would eliminate livestock grazing and allow for recovery in non-functional areas (Fitch and Adams, 1998; Platts and Wagstaff, 1984). Vegetation would re-establish, and the raw banks would have a chance to re-stabilize. These fenced areas could be used in the future once conditions have adequately improved, but this may take from 3-15 years (Clary et al., 1996; Knopf and Cannon, 1981).

***Indirect Effects*:** Water quality would improve along with improved riparian conditions. Stream bank damage would be reduced, which would in turn reduce the amount of sediment aggradation in the stream. Stream temperatures would be reduced from increased shading by vegetation. This alternative would help improve riparian areas and water quality. Improved water quality could lead to the removal of Salt Creek from the 305(b) monitoring list.

Cumulative Effects Common to All Alternatives

Past, present and reasonably foreseeable future activities that affect riparian and water resources in the SLS project area include: timber treatments; prescribed fires and wildfires; mining activities; permitted and public recreational activities; livestock grazing practices; wildlife populations and movements; noxious weed control; road and trail developments; human population and social dynamics; water diversions, rights and

developments; watershed improvement projects and reforestation and firewood salvage sales. The affected watersheds support many multiple uses. Grazing impacts uplands, riparian corridors and streams within the SLS project area.

Wildfires and extreme storms often drive the episodic erosion events that dominate long-term sediment yield in mountain aquatic ecosystems (Kirchner et al. 2001). Therefore, human and land management activities that alter the risk or the size of catastrophic erosion events have the greatest impact on sediment yield.

Cumulative Effects, Alternative A – No Action, No Livestock Grazing

Under this alternative, the absence of livestock grazing would no longer contribute to any cumulative effects within the watershed. As riparian areas improve, the cumulative effects of other activities may have less of an impact on streams and watershed health. The elimination of grazing may have some unintended cumulative effects if recreation increases due to the removal of livestock. An increase in OHV and ATV use, especially in and around riparian areas would negatively impact associated vegetation and soils which in turn contribute directly to the health of riparian and water resources. As plants and soils are lost, stream incision and water table depression could result.

Cumulative Effects, Alternative B – No Change, Livestock Grazing with Current Management

Livestock grazing under this alternative would continue and potentially increase any adverse effects currently occurring. Improper livestock grazing along the riparian area reduces the riparian vegetation and decreases the plants ability to hold the soil as the stream widens.

As recreation and private land development continues to increase, so will the associated impacts to watershed health and water quality. Population growth in and around the project area will result in a greater number of forest users. Unauthorized OHV and motorcycle use already impact many of the riparian areas. Social trails and semi-permanent camping areas are developing along some of the creeks as well. In addition to livestock grazing, these actions may have an overall negative effect on the integrity of rangeland and riparian ecosystems by weakening the vegetation and creating ruts and unvegetative scars across portions of the riparian zone.

Timber projects and prescribed fires are planned for some of the watersheds within the SLS project area. Usually, these projects have a short-term negative impact to watershed health; they do provide for long-term benefits to the watershed when implemented properly. Such practices have been shown to improve herbaceous conditions by increasing understory vegetation production and stimulating a variety of herbaceous species. Increased herbaceous vegetation has a positive effect on riparian and water conditions creating favorable habitats for all types of terrestrial and aquatic life. This increased ground cover also protects soil resources from erosion and high temperatures.

Allotment conditions contribute to overall watershed health. Where no improvements are made, watershed conditions would not improve. Riparian areas that are degraded by

grazing may be more susceptible to damage from natural events and anthropogenic influences. As a result, cumulative impacts from other sources may be magnified.

Cumulative Effects, Alternative C – Livestock Grazing with Adaptive Management

If implemented properly, the proposed adaptive grazing management strategies should help to maintain or improve riparian and stream habitat and upland conditions resulting in overall positive cumulative effects across the SLS project area. Aquatic resources and water quality should also improve. Streams should be healthier and should be able to better withstand the effects from other activities in the watershed.

Current and future fuels management projects will reduce the risk of catastrophic fires and thus reduce the potential for catastrophic sediment delivery over the long-term. Past and on-going restoration efforts within the burn areas, such as closing roads, mulching, and seeding should also reduce erosion and sediment. These efforts combined with managing livestock grazing to improve riparian and stream habitat conditions under the proposed action would have cumulative benefits to the affected aquatic ecosystems within the SLS project area of the South Fork South Platte River and Arkansas River basins.

Compliance with the Forest Plan

Alternative B does not meet the management measure 12.1 of the watershed conservation practices outlined in the Forest Handbook which states, "In the water influence zone next to perennial and intermittent streams, lakes, and wetlands, allow only those actions that maintain or improve long-term stream health and riparian ecosystem condition." Additionally, Alternative B does not meet the Forest Plan direction for 9A management areas to "maintain proper stocking and livestock distribution to protect riparian ecosystems," and to "prohibit trailing of livestock along the length of the riparian areas except where existing stock driveways occur." Alternatives A and C would move us toward meeting this direction. Alternative C would allow for continued grazing on NFS lands while providing the framework for improving rangeland conditions albeit at a more intensive management level.

3-3: Rangeland Resources

Affected Environment

Range management background – Domestic livestock have grazed the SLS analysis area since before the National Forest was established. In the early 1900's, the Forest Service instituted a system which defined areas to be grazed, set the season of use and established the number of livestock to be permitted. Permittees were to place their livestock in designated areas, but few if any fences existed to ensure livestock grazed only in the area they were permitted. The lack of livestock control also made it difficult

to determine if unauthorized livestock in excess of those permitted had been placed on National Forest land. Fences were constructed on allotment boundaries to control livestock numbers between allotments, but grazing management within the individual allotments generally consisted of continuous season-long grazing systems for many years.

Grazing management of cattle and sheep, which included extremely heavy stocking, occurred in the area prior to 1950 and detrimentally impacted species diversity and forage value and production throughout the area. Following widespread flooding in the 1950's and 1970's, many stream channels incised and caused drops in the water table. These incisions resulted when weak soils held together by weak vegetation were unable to resist the force of rushing water. Many riparian meadows all but disappeared and forage production was significantly reduced in the riparian areas. Evidence of flooding can still be seen today. There are still incised channels, but sloughing continues and these areas widen as they attempt to support establishing vegetation and new meander patterns. Old riparian meadows are now benches with early seral upland species instead of riparian species. Most of the allotments in the SLS analysis area were closed for varying periods of time to livestock grazing between 1936 and 1976 for the purpose of watershed and rangeland restoration. After allotments re-opened, many were re-designed to be run as a multiple pasture rotational system, where the same or very similar pasture sequence is followed every year. Current management systems vary from continuous, season-long management to rotation systems with up to 15 individual pastures. The use of all-terrain vehicles to facilitate fence maintenance and construction has become a common practice in the past 10-15 years. Specifics for each allotment can be found in the existing allotment management plans and annual operation instructions in the rangeland permit/allotment files (file designation 2210 and 2230) at the Salida and South Park Ranger Districts.

Today, the rangeland environment across the SLS varies along a successional continuum, beginning with early seral stage pioneering plant communities. These early seral stage communities consist of annual grasses and forbs. Mid-seral stage plant communities of annual grasses, perennial grasses and forbs lead to late-seral stage successional communities comprised mainly of perennial grasses and forbs. These perennial communities are better able to withstand a host of environmental stresses. Community types from all successional stages are represented in the SLS, creating an ecologically diverse environment.

The most common plant association in the SLS is Arizona fescue/mountain Muhly (*Festuca arizonica/Muhlenbergia montana).* Arizona fescue is a cool-season bunchgrass with very good palatability for both livestock and wildlife. Mountain "muhly" is a densely tufted bunchgrass with good palatability for both livestock and wildlife. Both grasses provide significant nutrient and energy resources for livestock and wildlife. Drought conditions existed over most of the project area from 2000-2005, and on portions of the SLS in early 2006. Vegetation measurements were taken despite these circumstances, with the notation that they were collected during drought and should be evaluated in that context. Seven of the twelve active allotments in the project area were

grazed at voluntarily reduced stocking levels (partial to full non-use for resource protection) in 2000, 2001, 2003, 2004, 2005 and 2006. Rangeland analysis and inventories were conducted on approximately half of the allotments within the project area during the year 2004, with the remainder of the allotments data collected in the 2005 field season. The field survey process involves identification of plant species and their relative frequency and composition, determination of relative rangeland health, riparian characteristic evaluations, shrub cover evaluations, preparation of allotment analysis maps and summarization of data. This work was completed by the Rangeland Management Specialist and seasonal Range Technicians for the San Isabel National Forest.

The rangeland analysis and inventory process concentrated on existing vegetation, and the comparison of current conditions and plant communities to the desired conditions and plant communities. Comparisons of existing condition and historical condition were also evaluated where historical Parker Three-step data existed. The more similar existing conditions and plant communities are to desired conditions, the higher the ecological status is for the rangeland involved. Many sampling points across the SLS showed a shift in species composition over time toward less desirable species.

Methods used in the collection of data for this project include identification and inventory of plant resources, Parker 3-step method, Cover-Frequency Method, Line Intercept Method, Green-line method, Rangeland Health Evaluation Matrix, Riparian Characteristics Evaluations and Proper Functioning Condition assessments (in conjunction with other specialists).

Range Improvements- The permittees on the allotments are responsible for the maintenance of most of the improvements located within the analysis area. Improvements for which the Forest Service or other governmental agencies currently have the maintenance responsibility include fences around administrative sites, fences creating riparian and range exclosures, and cattleguards. The legal locations of all existing improvements and the permittees to whom they are assigned for maintenance can be found in the Salida and SouthPark range improvement folders (file designation 2240) and individual permit folders (file designation 2230) for the permittees permitted to graze livestock within the analysis area.

Most of the improvements were constructed between 1960 and 1985 when management emphasis was to move towards rotational grazing systems. A considerable number of fences and stock watering facilities on all of the allotments presently require or will require reconstruction in the near future. Due to exposure, maintenance neglect, and the natural processes of oxidation and microbial decomposition, many of the improvements have come to the end of their functional life.

Table 3-8 displays the current management system, permitted livestock numbers, Head Months (HMs), grazing season, and acreage (derived from current GIS databases) for each of the 14 allotments within the Analysis Area.

Table 3-8: Summary of Current Management for the Salida-Leadville-South Park Rangeland

Allotment	Permitted Number	Permitted HMs	Total Acres	Capable Acres	SEASON	Management
Arkansas C&H	90 c/c	361	10167	7221	6/1- 9/30	Deferred rotation
Arkansas S&G	(940 sheep)	(2444)	17,249	6008	7/5 – 9/20	Vacant
Aspen Ridge C&H	255 c/c	886	16366	13243	6/10 - 9/30	Rest rotation
Bassam C&H	270 c/c	1157	35230	26649	6/1 - 10/31	Rest rotation
Bear Creek C&H	15 c/c	31	7011	1442	7/1 – 8/31	Deferred rotation
Browns Creek &H	80 c/c	282	13265	6618	6/16 – 9/30	Deferred rotation
Cameron C&H	291 c/c	1203	64295	26742	6/1 – 10/31	Rest rotation
Chalk Creek C&H	200 cows	204	9646	4765	9/30 – 10/30	Deferred rotation
Chubb C&H	33 c/c	166	11080	5557	6/1 – 10/31	Rest rotation
Fooses C&H	(50 c/c)	(103)	9653	4069	7/1 – 8/31	Vacant
Fourmile C&H	50 c/c	178	30007	18227	6/1 – 9/15	Deferred rotation
Little Cochetopa C&H	99 c/c	348	43382	18592	6/16 – 9/30	Rest rotation
McQuaid C&H	400 c/c	1600	55510	34472	6/16 – 10/15	Rest rotation
Union C&H	111 c/c	344	17012	6319	7/10 – 10/10	Deferred rotation
Totals active only	1,894 c/c	6,760	339,875	179,923		

DIRECT, INDIRECT, AND CUMULATIVE EFFECTS: RANGELAND RESOURCES

Alternative A: No Action – No Livestock Grazing

Direct and Indirect Effects:

Alternative 1 would eliminate livestock grazing from National Forest lands in the analysis area. All term grazing permits would be cancelled. No new permits would be issued for any of the affected allotments. There would be no livestock grazing and trailing that currently occurs on an annual basis, especially in riparian zones. There would be no impact from livestock on streambanks and wet meadows in those areas accessible to cattle. Hummocking and bank shearing from livestock hoof action along streams would be reduced. There would be no grazing of riparian shrubs (mostly willow) by cattle. Conflicts between livestock and other uses on the National Forest would not occur. Most range improvements currently in existence on the allotments would be removed or abandoned. Subsequent decisions would need to be made regarding retention of any improvements (such as water developments) for other resource needs and funding would need to be secured for maintaining them. All fences, except Forest Service boundary fences or allotment boundary fences adjacent to other active grazing allotments would be removed. Several term, private land grazing permits would be cancelled, as

well as one on/off permit. If the lease/permit holders of the associated State of Colorado lands, or if private land owners desire to continue grazing the state or private lands, it may be necessary for them to fence the boundaries or to otherwise ensure their livestock did not trespass on NFS lands. Spring and other water developments (stock ponds, pits, tanks) would no longer be maintained by permittees; Forest Service would need to assume maintainance of the developments for wildlife benefit to retain the water rights or they would need to be removed.

The overall effect of no livestock grazing on rangeland condition is likely to be beneficial the first few to several years and potentially neutral to negative thereafter. Indirectly, those areas in poor to fair condition would experience increases in litter accumulation and decreases in bare ground. This matting and accumulation of dead plant material would insulate the ground; provide some water-holding capacity and decrease surface soil movement and erosion.

However, grasses evolved with the periodic removal of vegetative material through fire, insects, or ungulates. In the absence of grazing or other disturbance such as fire, plants continue to accumulate litter (dead grass blades left at the end of the growing season). After years of litter accumulation, plants go into a "self-imposed stress" whereby the detritus (previous years' growth) chokes out new shoots competing for light (Knapp and Seastedt, 1986). The vigor of the entire plant is compromised and rangelands become less productive and healthy. Many invertebrate and wildlife species depend upon productive grasslands, especially for winter range.

The removal of cattle grazing would allow riparian areas that are not in desired condition to improve in ecological condition. Riparian species would likely increase in cover and frequency. Streambanks would stabilize as riparian graminoids and shrubs establish on previously unvegetated or unstable sites. This trend would probably continue through the mid- to late-seral stage. Natural hydrologic processes would continue to occur (including presence of beaver which can produce dramatic changes in short amounts of time). Trend would likely fluctuate through time due to the dynamic nature of stream systems.

Water may not be provided to wildlife in as many areas where it presently is provided. Wildlife distribution may become more concentrated in some areas because of reduced availability of water in the uplands. If water developments are removed, some springs could become bog holes from wildlife use where the water isn't collected and piped into a tank outside of moist soils. Use of these areas by big game would continue, though distribution may be altered with livestock removal.

In the absence of grazing or fire, loss of plant vigor and decreases in rangeland health over time combined with the accumulation of litter, allows fine fuels to build up which increases susceptibility to fire.

Treatment strategies for noxious weeds would be in compliance with direction outlined in the May 5, 1998 Decision Notice for Noxious Weed Management Environmental Assessment for the Pike and San Isabel National Forests & Cimarron and Comanche

National Grasslands. Noxious Weeds would continue to be managed according to the PSICC Noxious Weed Action Plan completed in December, 2005.

Cumulative Effects:
Population growth in and around the project area has lead to greater numbers of forest users. Unauthorized OHV and motorcycle use negatively impacts environmental conditions in some riparian areas. Social trails and semi-permanent camping areas are developing along some creeks as well. These actions may have an overall negative effect on the integrity of rangeland and riparian ecosystems by trampling/weakening the vegetation, compacting the soil and creating ruts and bare ground across portions of upland, transition and riparian zones.

Past timber management practices in some areas have had a positive effect on promoting herbaceous conditions through increased understory vegetation production and stimulation of a variety of herbaceous species. Possible future timber sales in some of the allotments could increase areas of grass production and improve rangeland health by opening up the overstory and invigorating grass production. Increased ground cover protects soil resources from erosion and high temperatures. Increased herbaceous vegetation has a positive effect on riparian and water conditions creating favorable habitats for all types of terrestrial and aquatic life.

The exclusion of fire (both wild and prescribed) has a measurable effect on rangeland extent, quality and health. Comparing aerial photos from the 1950s to now shows that the extent of non-forested rangeland in the project area has been reduced due to conifer encroachment. Many of the rangeland communities are adapted to fire. In the absence of fire, many areas not accessible to grazing have had long intervals of no disturbance to rejuvenate plant growth. The vegetation is not as healthy (vigorous) as it could be. High numbers of big game animals, especially elk, have a significant effect on herbaceous vegetation. The dietary overlap between elk and livestock is similar. Big game would continue to use the allotments however, management of elk numbers is under the control of the Colorado Division of Wildlife.

Cumulatively, the above actions may have a negative effect on the integrity of rangeland and riparian ecosystems regardless of the presence of livestock. Removal of livestock is likely to be beneficial the first few to several years and potentially neutral to negative thereafter.

Alternative B: No Change-Livestock Grazing with Current Management

Direct and Indirect Effects:
Alternative 2 would maintain the current management of livestock grazing on National Forest Service lands in the analysis area. In general, the effect of continuing current management would be to perpetuate the conditions described for the benchmark areas of each allotment (Appendix 1, Allotment maps). This management has led to the environmental conditions and communities seen today. Levels of use in terms of timing, intensity, and duration/frequency by livestock is directly related to seral condition, forage

value and rangeland health. Pastures or allotments that have been used improperly have lower seral conditions and lower cover and forage values.

Current management is inadequate in responding to changes in environmental conditions, events and information on a year-to-year basis. Unlike other actions the Forest Service may undertake, (where it may take years to see the effects of management and respond to them), rangeland managers deal with a brand new set of forage plants each year. This vegetation (type, amount, condition, diversity, density) changes annually depending on environmental factors, management, and human and natural events. Prescriptions that are formulated prior to the grazing season and applied without regard to a changing environment often fail to achieve desired results.

The effect of current management on rangeland and its associated vegetation would be to sustain current conditions in terms of timing, intensity, frequency and duration of forage use by livestock. This would be positive for mid- to late-seral upland plant communities and riparian plant communities with heavy willow cover, saturated soils or armored banks. The current system of use is fairly static from year to year. Poor livestock distribution is the major factor leading to cattle congregating in benchmark or key areas. In these situations, use continually occurs on the same areas while livestock are in the pasture, rather than the use being spread throughout the pasture. Current management may not benefit early seral plant communities (often created as a result of repetitive use) or some of the easily accessible riparian plant communities. The result is that in poor years, livestock may end up staying too long in certain areas of a pasture, and in good years, the cattle may not be providing enough use to stimulate production and vigor of the vegetation. The current system of management may not allow enough flexibility to respond to changes in vegetative conditions quickly enough to promote the desired effects.

Monitoring has shown that current management has had varying success in meeting Forest Plan standards and guidelines for livestock grazing. Few of the allotments have consistently met utilization standards as set in allotment management plans and annual operating instructions in recent years. Key areas on many allotments have frequently been grazed beyond allowable use standards.

Where standards are more consistently met, the allotments have one or more of the following in common:

- Permittees have been willing to delay or defer placing livestock on the allotment to allow for forage development and/or to remove livestock prior to the end of the scheduled/permitted period of use,
- Permittees are very active or involved in the management of the allotment (monitoring cattle use; riding, salting and herding regularly to improve cattle distribution; and maintaining improvements),
- Allotments consist of multiple pastures or are operating under some form of rotation system.

Under this alternative the past trends of heavy use in key areas and species composition changes toward less desirable plant composition in the upland and bench transition areas of most cattle allotments would continue. Many of the Parker 3-Step/Cover Frequency transects show a decline in range conditions on these allotments over the past thirty to forty years. This continual decline in the upland vegetative conditions has caused plant composition to shift. There has been a decline in vigor, density and number of desirable species and an increase of undesirable species in many areas as documented in the range analysis folders (file designation 2210). Under the current standards required by the Forest Plan and Annual Operating Instructions (AOI's), these transects should at a minimum remain stable and possibly even start to improve. These standards have, however, been exceeded to some degree on many of the cattle allotments in recent years as documented by Forest Service personnel in the individual permit folders (file designation 2230) for the permittees permitted to graze livestock within the analysis area. If these standards were met on a consistent basis, vegetative conditions should at least remain stable and should start to show an upward trend in most riparian and upland range sites.

The drought of the past several years has added to the permittees' inability to meet use standards but is not the only factor. Other key factors include:

- Permittee's inability to follow Forest Service direction, self monitor, and move livestock prior to exceeding standards.
- Permittee's unwillingness or inability to intensify their management efforts to adjust the length of time spent in each pasture.
- Permittee's historical lack of maintenance of existing range improvements.

The Allotment Management plans and AOI's for each allotment emphasized the allowable use standards must be met yet these standards were exceeded to varying degrees on the cattle allotments. In many cases, permittees have voluntarily reduced livestock numbers, though these adjustments have not always been successful in preventing actual use from going beyond allowable use standards in key areas. Under this alternative, it is expected similar patterns of periodically exceeding standards, followed by annual adjustments in management would continue. If actual use exceeds the allowable use standards on consecutive years, the Forest Service has the option of going beyond management adjustments and initiating administrative action (numbers or season) against the permit of the offending permittee. To date, administrative action against a term permit for exceeding allowable use standards has been limited unless other violations of the term permit have also occurred.

Since many of the range improvements were constructed many years ago, their location and design are not necessarily consistent with current management direction. In situations with spring developments, some stock tanks were placed in riparian areas. Maintenance of range improvements would continue to be required. No new range improvements would be constructed, but reconstruction of existing improvements would continue as the need arises and funds allow. Many areas of water development would continue to receive concentrated use by both livestock and wildlife. Riparian condition would likely continue to degrade.

Treatment strategies for noxious weeds would be in compliance with direction outlined in the May 5, 1998 Decision Notice for Noxious Weed Management Environmental Assessment for the Pike and San Isabel National Forests & Cimarron and Comanche National Grasslands. Noxious Weeds would continue to be managed according to the PSICC Noxious Weed Action Plan completed in December, 2005.

Cumulative Effects:
Population growth in and around the project area has lead to greater numbers of forest users. Unauthorized OHV and motorcycle use already negatively impacts livestock distribution and environmental conditions in some riparian areas. Social trails and semi-permanent camping areas are developing along some creeks as well. These actions may have an overall negative effect on the integrity of rangeland and riparian ecosystems by trampling/weakening the vegetation, compacting the soil and creating ruts and bare ground across portions of upland, transition and riparian zones. Some recreationists leave gates open on the National Forest. Livestock can then wander into pastures where they have already grazed or into pastures that should be rested until later in the season. This can cause additional use on the forage, or allows forage to be grazed that should not be grazed until later in the season. As more use occurs from the public, more frequent checks by the permittees are needed to ensure gates are kept closed when they are supposed to be closed.

Possible future timber sales in some of the allotments could have a positive effect on forage availability and rangeland health by creating additional forage in places that currently are secondary range areas. This would increase overall forage production and availability. Past timber management practices have had a positive effect on promoting herbaceous conditions through increased understory vegetation production and stimulation of a variety of herbaceous species. Increased ground cover protects soil resources from erosion and high temperatures. Increased herbaceous vegetation has a positive effect on riparian and water conditions creating favorable habitats for all types of terrestrial and aquatic life.

The exclusion of fire (both wild and prescribed) has a measurable effect on rangeland extent, quality and health. Comparing aerial photos from the 1950s to now shows that the extent of non-forested rangeland in the project area has been reduced due to conifer encroachment. Many of the rangeland communities are adapted to fire. In the absence of fire, many areas not accessible to grazing have had long intervals of no disturbance to rejuvenate plant growth.

High numbers of big game animals, especially elk, have a significant effect on herbaceous vegetation. The dietary overlap between elk and livestock is similar. Grazing management of forage by the Forest Service takes wildlife grazing use into consideration when setting utilization standards. However, if standards are consistently exceeded, wildlife grazing further degrades the rangeland and riparian condition. Management of elk numbers is under the control of the Colorado Division of Wildlife.

Cumulatively, the above actions may have a negative effect on the integrity of rangeland and riparian ecosystems. Areas with poor ground cover are not likely to improve where less desirable species exist and standards are not consistently met. Key areas are likely to continue to be used heavily without changes in infrastructure, water development and management practices.

Alternative C: Livestock Grazing Using Adaptive Management

Direct and Indirect Effects:
Alternative C would allow for the continuation of livestock grazing in the analysis area but would change the management of livestock from current management to management as described in Table 2-4. Alternative C provides for adaptive management principles on all allotments. The effect of adaptive management would be to better control the timing, intensity, duration and frequency of grazing the vegetation on the range allotments (see Adaptive Options in Table 3-4 for specific locations and how this will be achieved). This should increase residual vegetation in areas where it is presently less than desired, reduce the amount of bare ground in areas where it is currently too prevalent, and increase the vigor of individual plants through better distribution of livestock across allotments.

Increasing litter ensures that plenty of material is available for trapping sediment in runoff and overland flow events. Additionally, this material insulates plant crowns and over-wintering buds, protects and covers soil, holds moisture in the ground and allows the plant to continue photosynthesis for carbohydrate production and storage. Greater carbohydrate storage results in more roots being produced by each plant. This increases the erosion defensibility and moisture-holding capacity of soils. It also provides a buffer to plants in times of stress such as drought. Less bare ground means more plants holding the soil in place while lessening the likelihood of invasion by noxious weeds.

Monitoring benchmarks and key areas (areas that livestock will use preferentially) provides insurance to all other areas of the pasture. If a permittee does a good job of pasture management, the effect is better livestock distribution and use across a pasture. Promoting better distribution means that previously ungrazed areas will have a better chance of being grazed (stimulating growth), and that individually grazed plants will be grazed fewer times during the growing season, providing rest or deferment. Permittees would be required to implement or increase riding to help distribute livestock. Permittees would be required to move livestock based on utilization standards rather than on number of days in a pasture. This may not always coincide as a "convenient" time for them.

Permittees would be required to self monitor, and to provide actual use reports for each grazing season. The Grazing Response Index (GRI) can be used as an indicator of the effects of the current season’s grazing activity and is used to assist in making decisions to resolve problems and adjust management in a way that will move the resource toward desired conditions). The GRI addresses three areas of grazing management: 1) **frequency** – number of times a plant is defoliated during the grazing period; 2) **intensity** – amount of leaf material removed during the grazing period; and 3) **opportunity** – amount of time plants have to grow prior to grazing or regrow after grazing. Opportunity

is the one factor most highly related to long-term health and vigor of the vegetation. A series of positive GRI scores over time would be expected to promote a healthy range condition; a continuing series of neutral GRI scores over time would most likely maintain the current range condition. A continuing series of negative GRI scores would most likely be related to a decline in rangeland condition. Future information collected can be compared to baseline data or desired condition data to see how close we are to achieving management goals. This determination will allow the Forest Service and permittee to work cooperatively towards a positive rating, which will maintain and increase plant vigor and health.

This alternative will require additional structural range improvements to be installed or constructed. Since many of the range improvements were constructed many years ago, their location and design are not necessarily consistent with current management direction. In situations with spring developments, some stock tanks were placed in riparian areas. Upon reconstruction, stock tanks would be placed completely outside of areas with potential for riparian vegetation. Many stock ponds and pits would be reconstructed as water holding facilities from which water would be piped to tanks located in the uplands outside of areas with potential for riparian vegetation. In situations where water sources are not being adequately protected, exclosures would be constructed or enlarged to encompass the area of potential impact. Where water is the limiting factor for cattle distribution additional water developments would be constructed outside of riparian zones. Water rights in the name of the US Forest Service would need to be filed for on new and/or reconstructed water developments. This would be an additional cost to the government.

In situations where allotment fences are constructed or re-constructed, they would be replaced with permanent or let down wire fences, or some kind of pole fence to minimize maintenance needs over the life of the improvement. Additional soil disturbance will occur during the installation of some of these improvements. Some trees may need to be removed to provide a clearing for installation and maintenance of some fences. Additional fencing may be a barrier (temporary or permanent) to some wildlife species movement if not installed to minimize/prevent this. Permittees will be required to invest in some of the cost of new and/or reconstructed range improvements, and to rehabilitate some sites where improvements (ponds, tanks) are moved to different locations.

Under this alternative, revised allotment management plans would contain objectives that are designed to meet desired conditions for soil and vegetation. The condition and trend of the soil and vegetation will likely improve since allowable use levels are set to provide for maintenance or improvement of each specific plant community type and condition. Improved grazing management and adaptive stocking rates should allow soil and vegetation to reach desired conditions on the allotments within 10-15 years. The more productive range sites may recover more rapidly, especially those associated with plant communities in early-intermediate seral stages dominated by native species. Early seral plant communities associated with less resilient shallow and/or rocky soils, especially those dominated by introduced species, may require more than 15 years to reach late seral vegetative condition. Areas in early and early-intermediate seral stages will move toward

late seral vegetative conditions as a result of improved management practices. Changes in management practices will improve grazing efficiency and reduce adverse effects on soil and upland vegetation within the allotments.

Risk of noxious weed invasion would be decreased in the long-term under this alternative. The proposed action prescribes livestock management and limits utilization, which would lessen the chance of weed invasion. As range conditions improve and less soil disturbance occurs, there will be less bare soil to invite noxious weed invasion. Treatment strategies for noxious weeds would be in compliance with direction outlined in the May 5, 1998 Decision Notice for Noxious Weed Management Environmental Assessment for the Pike and San Isabel National Forests & Cimarron and Comanche National Grasslands. Noxious Weeds would continue to be managed according to the PSICC Noxious Weed Action Plan completed in December, 2005.

This alternative gives the Forest Service and the permittee more flexibility to choose the best way to consistently meet the allowable use standards and move toward desired future conditions of the rangelands and riparian areas on the allotments. The permittees would need to take a greater role in planning and monitoring when grazing occurs in each pasture, the length of grazing periods in each pasture and when and where to use the adaptive options. All of these type of activities would increase the permittees direct costs related to the administration of their allotments.

Permitting livestock grazing in a manner that does not negatively impact the NF will help perpetuate the continuation of local ranching operations which will help delay/prevent them from being subdivided. Demonstrating proper grazing management on adjacent NF lands may help reduce resource problems on private lands where subdivisions have already occurred.

Overall, the direct and indirect effects of implementing the proposed alternative of livestock grazing using adaptive management should be positive in achieving or moving toward desired conditions for rangeland and riparian vegetation and soils.

Cumulative Effects:
Population growth in and around the project area has lead to greater numbers of forest users. Unauthorized OHV and motorcycle use already negatively impacts livestock distribution and environmental conditions in some riparian areas. Social trails and semi-permanent camping areas are developing along some creeks as well. These actions may have an overall negative effect on the integrity of rangeland and riparian ecosystems by weakening the vegetation and creating ruts and bare ground across portions of upland, transition and riparian zones. Some recreationists leave gates open on the National Forest. Livestock can then wander into pastures where they have already grazed or into pastures that should be rested until later in the season. This can cause additional use on the forage, or allows forage to be grazed that should not be grazed until later in the season. As more use occurs from the public, more frequent checks by the permittees would be needed to ensure gates are kept closed when they are supposed to be closed.

Possible future timber sales in some of the allotments could have a positive effect on forage availability and rangeland health by creating additional forage in places that currently are secondary range areas. This would increase overall forage production and availability. Past timber management practices have had a positive effect on promoting herbaceous conditions through increased understory vegetation production and stimulation of a variety of herbaceous species. Increased ground cover protects soil resources from erosion and high temperatures. Increased herbaceous vegetation has a positive effect on riparian and water conditions creating favorable habitats for all types of terrestrial and aquatic life.

The exclusion of fire (both wild and prescribed) has a measurable effect on rangeland extent, quality and health. Comparing aerial photos from the 1950s to now shows that the extent of non-forested rangeland in the project area has been reduced due to conifer encroachment. Many of the rangeland communities are adapted to fire. In the absence of fire, many areas not accessible to grazing have had long intervals of no disturbance to rejuvenate plant growth.

High numbers of big game animals, especially elk, have a significant effect on herbaceous vegetation. The dietary overlap between elk and livestock is similar. Grazing management of forage by the Forest Service takes wildlife grazing use into consideration however, management of elk numbers is under the control of the Colorado Division of Wildlife.

Cumulatively, the above actions may have a negative effect on the integrity of rangeland and riparian ecosystems despite the presence of grazing livestock.

3-4: INVASIVE SPECIES

Exotic and Noxious Plants

Roads are a primary corridor for the transport and spread of exotic and noxious weeds. The road system is probably contributing somewhat to the spread of such weeds through road maintenance and by motorized vehicle traffic. This statement applies to all roaded areas on the Forest, however, not just this Analysis Area. Noxious weeds documented in the Analysis Area are Canada thistle, ox-eye daisy, defuse knapweed, leafy spurge and yellow toadflax.

Annual monitoring and treatment of infestations occurs along roadways. Chemical treatment of these sites has taken place over the past several years, resulting in no additional spread beyond the known locations.

The long-term ecological implications of exotic plants are unclear, as stated in the Forest Plan FEIS. Many of these invasive plants will never be eradicated. The presence of exotic and noxious weeds has the potential to displace native-plant species.

3-5: CLIMATE, SOILS, AND ECOLOGICAL UNITS

Affected Environment

Climate and Geology

Six climatic zones are present in the project area. They are semi-arid; lower montane, dry; montane, dry; montane; subalpine; and alpine. In all zones, the prevailing winds are from the south-southeast. Typical of a true continental climate, the sun shines 77 percent of the time in the summer and 72 percent in the winter. The elevation ranges from approximately 6,000 to 14,000 feet.

Geology for those allotments whose watersheds empty into the South Platte drainage is dominated by Paleozoic Pennsylvanian black shale and Missippian gray limestone. West of Trout Creek Pass, in the Arkansas River Valley, surficial shales and limestone give way to weathered, ancient granite and tertiary gravel.

Soil and Ecological Units

In the last 160 years the soils of the area have gone through significant changes, particularly in the drainages or historic erosional channels. These changes are related to human use of the soil resources. Logging, mining and grazing from the 1840's to the 1920's altered erosional and soil development patterns on a spatial and temporal scale that was different from pre-European conditions. Fire suppression and fenced grazing has more recently altered the natural disturbance patterns and created different vegetative spatial and temporal patterns that existed prior to European settlement

Short periods (1-5 years) of drought or wetter conditions now have significant impacts to overall ecosystem and soil health of the area. These short disturbance patterns can cause erosional events in natural surface conditions as well as accelerate erosion in disturbed areas such as roads and trails. These soil losses are generally not acceptable to current demands and use of the landscape.

New equilibriums of soil and vegetation relationships now occur in areas that had different soil and vegetative types and conditions before settlement. There is evidence that many of the current channels that are now downcut were once shallow low gradient drainages. The evidence is found in the dark organic horizons of the banks of the channels indicating wet soil conditions higher in the soil profile than those that currently exist.

Although the degree of soil impacts is varied across the analysis area, the greatest severity occurs in areas that are heavily used such as trail corridors, water developments, salting locations, springs and seeps, and stream corridors and their associated riparian areas. These areas are particularly sensitive to disturbance during the early portion of the grazing season when soils are typically wet or moist, while some areas may remain wet or moist throughout the year. Areas that are currently in an unacceptable condition are

discontinuous and compromise small portions of the allotments. In some locations of the project area there is a slow progression of deposition in the channels. An increase in riparian vegetation within and adjacent to the channels will allow for additional sediment to be captured. Maintenance, improvement, and protection of the soil resources will allow more natural patterns to develop over time.

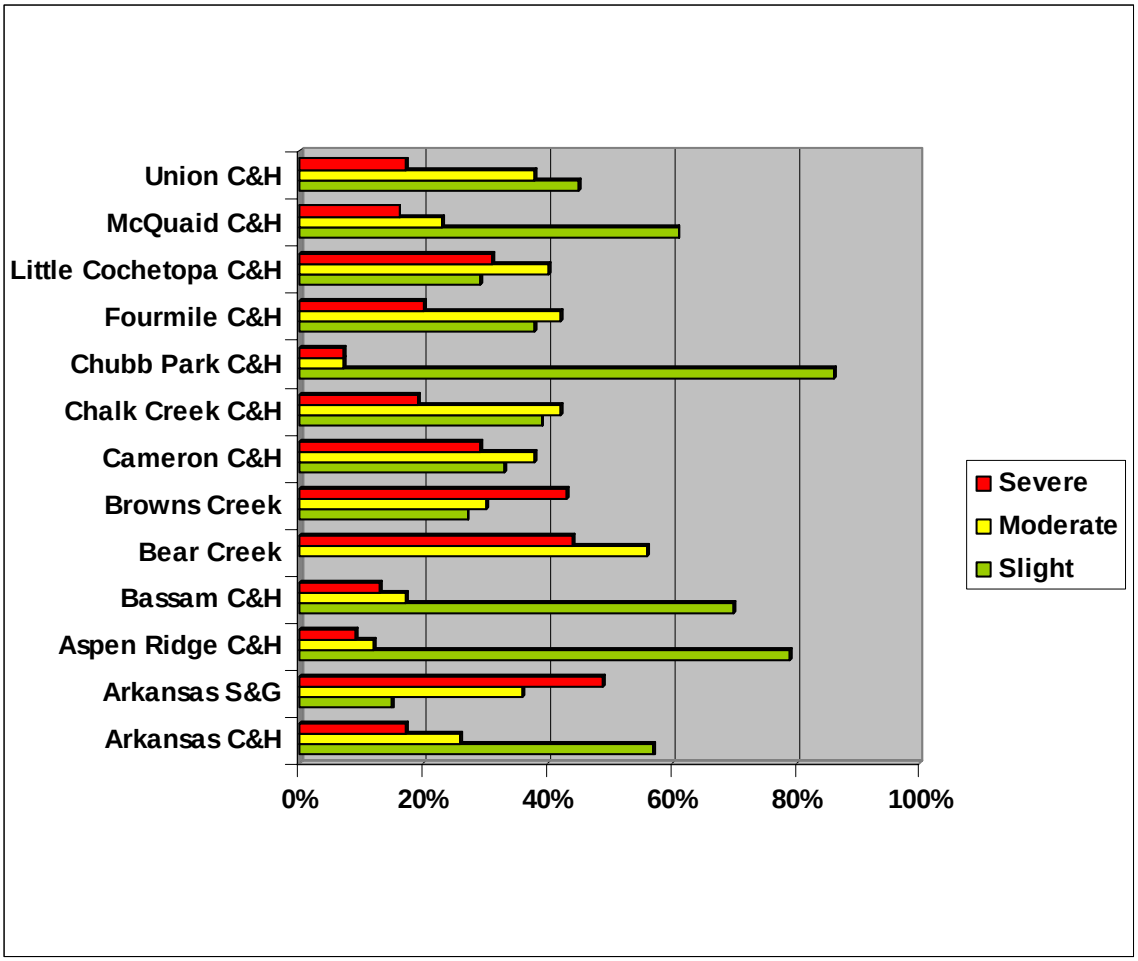
Soil Erosion Hazard Rating

A detailed soil survey of the project area was completed in 1995. This survey provides information about the suitability of the soil for specific land uses and provides information as to the general physical and chemical characteristics of the soil. The Soil Erosion Hazard Rating system was used to describe the current potential of the soils in the project area. This rating system, based upon the hazard of soil loss due to water erosion following disturbance activities that expose the soil surface, is summarized by Allotment. Additional land use interpretations and soil suitability information can be found in the draft soil survey for the Northern San Isabel and Western Pike National Forests Soil and Ecological Land Unit Survey Area (Bruggink, et.al. unpublished)

Erosion Hazard Rating By Allotment

The percent of each erosion hazard rating class by allotment is shown in Table 3-9**,** Erosion Hazard Potential by Total Allotment Area. The ratings by allotment are used to indicate the sensitivity of a particular allotment to grazing uses. More than 40 percent of the land area in each of Arkansas S&G, Bear Creek C&H, and Browns C&H Allotments is rated as a Severe Erosion Hazard . Arkansas C&H, Aspen Ridge C&H, Bassam C&H, Chalk Creek C&H, Chubb Park C&H, Fourmile C&H, McQuaid C&H, and Union C&H all have less than 20 percent of their land areas rated as Severe. The ratings provide an indication of the suitability of each allotment to specific land uses that may cause surface soil disturbance. If grazing were to occur throughout these allotments, Arkansas S&G, Bear Creek C&H, and Browns C&H would have greater use restrictions in effect than the other allotments.

Table 3-9: Erosion Hazard Potential by Total Allotment Area



SLIGHT-erosion is unlikely to occur that is detrimental to the long term health of the soil if proper soil protection measures are taken
MODERATE-some erosion is likely, control measures may be needed as well as mitigation of soil disturbances and uses.
SEVERE-erosion is expected when the surface soil is exposed. Off-site and cumulative damage by sediment movement is likely. Control measures and mitigation of uses are generally required. Long term soil health may be detrimentally impacted.

When allotment areas are reduced as a function of capable grazing areas, erosion hazard potential changes markedly. Because soils with high erosion hazard potential are found on steep slopes (greater than 40% slopes), excluding these lands from capable grazing areas effectively reduces the potential for soil loss and sediment yield provided sufficient vegetative cover, litter, etc., remains in place on the moderate and slight erosion potential areas.

***Environmental Consequences* Climate, Soils, and Ecological Units**

The soil resources environmental consequences of the Proposed Alternatives were evaluated through a review of the existing soil survey information for the project area. This included the evaluation of the suitability of the area for the uses described in the alternatives and a qualitative evaluation of the potential soil loss impacts of each alternative. The information contained in the Effected Environment Report was used to assist in determining the alternative consequences.

The analysis was based upon qualitative information of the current condition of the soil resources and the potential impacts each alternative may have to the current condition if any.

Effects Common to All Alternatives

The effects common to all alternatives include a general susceptibility of soil loss due to grazing use. The magnitude of the potential losses varies between alternatives. The allotments with greater grazing intensity or with higher proportions of easily eroded soils have greater potential to experience direct and indirect effects. The cumulative effects are also similar for each alternative. However, much like the direct and indirect effects, the magnitude of cumulative effects also varies by alternative. Management practices, constraints, and mitigation measures for soil, water, and riparian improvement should be considered under all action alternatives. These mitigation measures include improvements such as gully rehabilitation, riparian vegetation restoration, bank stabilization, and road maintenance. All of the current alternatives affect the potential for riparian vegetation establishment, soil loss, and sediment yield.

Allotment Improvements

Excluding fences, pipelines, and other linear improvements, there are 289 existing or proposed improvements in the allotments which comprise this analysis. Of these improvements, two hundred fifty-four are located on soils with an erosion hazard of one (low erosion hazard); twenty-five are located on soils with an erosion hazard of two (moderate erosion hazard); and ten are located on soils with an erosion hazard of three (high erosion hazard).

Of those improvements located on soils with an erosion hazard of three, five are gates; four are developed ponds; and one is a spring. The soils upon which the improvements are located are generally located on dry, south-facing slopes. There is a mixture of fine soil material and rock outcrop/loose rock. The soils are used for livestock grazing. Maintaining and enhancing the potential natural plant community adjacent to these improvements can reduce the erosion hazard.

Alternative A: No Action – No Livestock Grazing

Direct Effects

Under this alternative overall soil erosional losses would be reduced. In the short term, soil losses would continue to occur in those areas that have been identified as having poor range condition or showing signs of soil loss. These losses would decline over time with increases in plant density, plant vigor, and a shift in species diversity towards more desirable perennial grasses and forbs. Damage to stream banks would gradually decrease as vegetation is reestablished. Damage to willows and other riparian vegetation would be reduced, although elk would continue to exert some impacts on the vegetation.

Indirect Effects

Long-term soil productivity would increase due to a lessening of soil compaction and decreases in sheet and rill erosion and in areas where range condition and soil health are poor. Soils would be allowed to develop and recover at a more optimum rate, without additional pressures from livestock grazing.

With a reduction in soil compaction, soil bulk density at impacted sites would gradually decrease. A gradual reduction in soil bulk density would increase infiltration and percolation rates, and help contribute to greater vegetative biomass production. With an increase in vegetative biomass, litter, organic matter, and organic carbon would also increase. Increases surface litter and organic matter and soil organic carbon would assist in stabilizing soils, decreasing erosion rates and subsequent sediment yields within the analysis area, and contributing to the development of more productive soils. Herbage production levels would increase. Riparian health and streambank stabilization would improve in the complete absence of impacts by livestock.

Cumulative Effects Climate, Soils, and Ecological Units

Water quality and watershed health are likely to improve. Elimination of livestock grazing permits in this locality could jeopardize the viability of the ranches associated with those permits. Conversion of land use from ranching to housing developments with associated road building within watersheds could lead to increased rapid runoff and greater stream sediment loads. Increases in OHV and other recreational uses could also lead to increased runoff and sediment loads in streams.

Alternative B -Grazing Under Current Allotment Management

Direct Effects

Under this alternative grazing management would continue as permitted without additional requirements for protection or improvement of soil and riparian resources. The direct effects would be a continuation or an increase of soil erosion losses on allotments that are in fair to poor range condition. There would be no emphasis on improvement of current soil and vegetation conditions relative to livestock grazing practices. Riparian areas identified as impaired or at risk would continue to show signs

of soil loss and limitations of woody riparian vegetation growth unless they were dealt with under separate programs and practices.

Indirect Effects

The indirect effects would be a loss of long term soil productivity on allotments and areas that have a fair to poor range condition or vegetative cover. The current or an increased level of soil transport and sedimentation would occur. Downstream sediment loads would remain the same or increase. Riparian areas in poor or degraded conditions would continue unnatural bank erosion and require greater time periods for recovery to a properly functioning condition.

Cumulative Effects Climate, Soils, and Ecological Units

Under this alternative the allotments would incur current or increased levels of potential soil losses. Roads in all areas and grazing in riparian areas currently show the greatest risk for soil losses in the project area. This alternative adds cumulatively to the potential soil losses of the area and to the potential impacts on the watersheds. Many of the upland and riparian areas had soil and water improvement projects during the 1960'-1970's. Since that time there has been an overall improvement in the health of the watersheds. More recently, several potential improvements to the watershed have been identified including road maintenance, soil and water project work, and changes in grazing management. This alternative does not emphasize any additional improvement or grazing alternatives to increase the level of watershed restoration or protection.

Alternative C - Adaptive Management

Permitted grazing within allowable levels based on current range analysis data and implementation of more intensive standards and guidelines on all allotments and specific utilization standards would be implemented in riparian pastures. Limiting grazing to capable areas, placement of salt in upland locations, water improvements, fencing, and frequent rotation of cattle could be added to allotment management. Research to evaluate the effects of experimental grazing strategies is possible under this alternative. Effectiveness monitoring and a feedback loop that would provide for further adjustments in grazing management where identified is implied and integral to successful implementation of this alternative.

Direct Effects

Because of the changes in management (timing, intensity frequency, shortening of seasons), vegetative cover should be increased on all upland and riparian areas. Soil retention on sites should be improved. Potential soil erosion losses would be reduced from current levels in selected riparian and upland areas that are shown to be in poor condition. The restoration of riparian soils and vegetation would be emphasized. Implementation of rangeland improvements and fencing may include construction or minor disturbance to surface and subsurface soils. Minor amounts of soil loss are

probable during construction of range improvements if such construction involves heavy equipment. This is likely to be very limited. This could cause short-term sediment transport and changes to vegetation to areas where the surface soil is disturbed.

Indirect Effects

The indirect effects include an improvement of downstream water quality, reduction of sediment transport, enhancement of riparian vegetation, and improvement of long-term soil productivity on selected areas. Forage production would increase in areas identified as having poor condition. Riparian vegetation diversity would increase.

Cumulative Effects Climate, Soils, and Ecological Units

Under this alternative the health of the watersheds should improve. The changes to the grazing management would improve conditions of the areas outside of the National Forest boundary by lessening the total potential soil losses and sediment transport within a watershed.

Compliance with the Forest Plan

The current level of management, as described in Alternative B, would perpetuate degradation of vegetative cover, unnatural bank erosion, and losses of soil productivity on uplands and riparian areas. Such impacts are outside of Forest Plan management direction under this alternative. Alternatives A and C are in compliance with the Forest Plan.

3-6: HERITAGE RESOURCES

Terms Used in the Analysis
"Heritage Resources" are sites, features, and values having scientific, historical, educational, and/or cultural significance. They include concentrations of artifacts, structures, landscapes, or settings for prehistoric or historical events.

A "Heritage Resource Inventory" is a systematic, on-the-ground search designed to identify and formally record the content and locations of heritage resources. Heritage resources identified in such inventories are recorded on State of Colorado cultural-resource-site forms that include a determination of significance for each heritage-resource site.

Desired Future Condition

Historic properties determined eligible for listing in the National Register of Historic Places (NRHP) are protected from adverse effects from all sources, including Forest Service activities in all program areas. Avoiding historic properties or lessoning potential effects will be considered on a specific project basis if the project has the potential to affect historic properties; and, mitigation plans will be implemented, as needed. Historic properties will be preserved and protected and made available for public use if such public use will not result in adverse effects. Individual desired future conditions in terms of stock grazing and range management are listed as follows:

Erosion, trampling, surface wear, and other damages to archeological deposits resulting from livestock use or livestock management at National Register listed or eligible historic properties are minimal, or such damages are treated when the integral characteristics of the site are potentially affected.

Standing buildings and other cultural sites with standing structural components are protected from rubbing, bedding, and other damage by livestock. When such damage is noted, it is evaluated and treated if it potentially affects the integrity of the building or other standing structure or feature of the site.

Rangeland improvements related to livestock management, such as tanks, impoundments, corrals, fences, access roads, etc., are not situated on archeological sites or in the near proximity of such sites. The planning process for proposed rangeland improvements and rangeland management projects includes provisions for identification and protection of significant heritage properties.

Heritage properties in grazing allotments that exhibit impacts from livestock use are monitored for changes in existing condition. Also, those allotments that contain range management improvements and historic properties are monitored for such changes.

Environmental Effects

Alternative A

Direct Effects

There would be no direct effects on archeological or historical sites if Alternative A were implemented. If grazing was curtailed, then the direct effects described for Alternative B would cease. If grazing improvements such as fences and stock ponds were removed, the removal process should be designed so that impacts on significant historic properties during the physical removal are minimal. The difference in direct effects between Alternative A and B is measurable because the “moderate” effects estimated for the implementation of Alternative B would cease. There would be no livestock trailing, trampling, or bedding/congregating if Alternative A was implemented. Also, if grazing improvements were removed, the damage to archeological soils at prehistoric sites adjacent to the locations of the former improvements would cease.

Indirect Effects

Implementation of Alternative A would have an indirect beneficial effect on archeological and historical sites by increasing vegetative cover and height through no use of the allotments for livestock grazing. Improvement of vegetative cover will result in less soil erosion and decrease the sizes of bare areas vulnerable to collecting and erosion. The channeling common to some livestock trails should cease to be a factor. However, the comparative benefit is only slight when compared to Alternative B.

Cumulative Effects

Cumulative effects resulting from the implementation of Alternative A would be similar to those described for Alternative B.

Alternative B

Direct Effects

Direct impacts on historic properties classified as archeological sites can result from the actions of livestock, from the construction and use of range improvements, or from both sources. When considering archeological remains, grazing can affect archeological soils (that is, soils deposited or modified by a prehistoric or historic group or individuals during their use of the site area) and/or the archeological artifacts and materials within such deposits. Other cultural phenomena within the area of the Salida allotments that might be directly affected by grazing and grazing management include prehistorically used (scarred) trees, historic standing structures and features, and historic roads and trails.

Most, if not all, soil types in the Salida allotments can be characterized as friable and easily eroded, with fragile plant covers. Thus, the cultural soils integral to archeological sites in these allotments are extremely vulnerable to loss by direct wear and erosion; this type of loss is accelerated in locations where cattle and other stock congregate. Livestock behaviors that contribute to soil wear and damage to artifacts and materials contained in archeological soils are mainly of three types: trampling, trailing and bedding. Trampling, especially in a confined area, will result in breakage, abrasion and other damage to artifacts within archeological soils. Also, these artifacts and materials may be displaced by trampling and the original provenience of the item will be lost. Trailing is a customary behavior of livestock; the animals will established habitually-used travel routes within their range, thus creating trails and associated soil wear. If the trails cross archeological sites, wear and loss of archeological soils is the inevitable result. Bedding at traditional locations also can wear away archeological soils if the beds are located on an archeological site.

Construction of grazing management-related improvements on archeological sites directly destroys archeological soils. Then, after establishment, the construction and use of vehicle roads for access to the improvement, and the creation and use by livestock of trails to and from the improvement will gradually wear away archeological soils. Range

management improvements are also locations preferred by livestock for establishment of bedding areas. Areas near range management improvements (like stock ponds) become worn and trampled and thus archeological sites in the near vicinity are more vulnerable. The trampling and soil wear will be exacerbated and more damaging if the soil near the improvement is wet, which is the case for stock ponds, tanks, and improved springs.

Cattle and other stock rub against log cabin walls, corral posts, and other standing wood construction at mining camps, sawmills and other historic sites, thus hastening their deterioration. Livestock may use the interiors of abandoned cabins and the areas adjacent to standing walls common to some historic sites as bedding grounds. These activities might affect historic structures and the archeological deposits in their vicinity through the accretion of wear resulting from rubbing and erosion of foundations through congregation. Also, livestock rub against standing trees, and animals may seek shelter in thick groves of trees during storms; this may result in trampling of the soil in these protected areas. These types of activities may affect culturally scarred trees and the archeological soils in their vicinities.

Historic trails and roads are quite vulnerable to the activities of stock. In addition to direct wear, livestock use may accelerate the destruction of the original trail surface indirectly through channel erosion. Several historic travel routes including one historic wagon road were recorded during the course of the sample inventory done for this analysis and are vulnerable to this effect.

If Alternative B (continuing current grazing management practices) was implemented without mitigation treatments, the direct effects would be a continuation of several grazing-related impacts as described above. The sample cultural site inventory conducted for the analysis of the Salida grazing allotments yielded fifteen historic properties with direct impacts. These impacts are affecting archeological soils at prehistoric sites, and the impacts have resulted from several livestock activities including trailing, trampling and bedding/congregating. Hence, continuing current grazing practices would result in a continuing and incremental loss of archeological information for some sites. In total, the current effects are characterized as “moderate”; most trampling and trailing are limited in area and depth, and to date these vectors have not affected archeological deposits to the extent that information loss is significant. However, the effects have been more severe at three sites where bedding is combined with trampling and/or trailing and stock ponds are present.

Alternative B would continue the present use of cow trails and continued trampling on the archeological sites where impacts from these sources has been recorded. Continuing the present use practices might lead to increased erosion from combined stock wear and water erosion, and continued breakage and displacement of materials. Unless treated, the losses from these sources might become both measurable and damaging in terms of their effects on archeological deposits and materials.

Indirect Effects

In general, indirect effects of maintaining current grazing practices include the persistence of thin vegetative covers and related incremental soil wear and erosion in some allotments; these factors may contribute to gradual loss of archeological soils and the displacement of the materials and artifacts therein. Livestock trailing creates conduits for surface runoff; these conduits result in the formation of drainage channels, which cause soil erosion and hastens the loss of archeological soils. Bare soil areas or areas with very sparse vegetation cover are susceptible to water and wind erosion and loss of archeological soils if the bare areas are on archeological sites. Such loss will be accelerated if livestock congregate in these locations.

Four archeological sites with these types of indirect effects were identified during the cultural resources sampling survey for the Salida allotments analysis; however, the total indirect effects are only slight in their measurable effects. Given the nature of these indirect effects, including their active condition, the potential for future indirect effects with the implementation of Alternative A will continue, and the total effects will be slight or moderate. The effects have the potential to become damaging in the context of significant information loss if mitigation treatments are not implemented.

Cumulative Effects

Under current management practices, there is slight to moderate loss of archeological soils and materials, especially in allotments characterized by fair to poor range conditions. Any related management projects that affect range conditions will also affect the rate of loss of archeological soils and materials. If current management practices were to continue, there will be no foreseen effects to archeological or historical sites resulting from cumulative effects.

Alternative C

Direct Effects

The direct effects of implementing Alternative C will be similar to Alternative B. No grazing in riparian areas, fewer grazing days and more rotations would improve range conditions and decrease erosion including potential soil loss on archeological sites. However, none of the examined cultural properties are situated in riparian zones; therefore, only slight positive effects would occur in comparison with the implementation of Alternative B. Damage to archeological soils caused by livestock trailing, trampling and bedding would continue, albeit at a lesser rate; therefore implementation of Alternative C would be more favorable to cultural resources management when compared to Alternative B. However, there would be more direct effects with the implementation of this alternative when compared with Alternative A.

Indirect Effects

The indirect effects on archeological and historical sites if Alternative C was implemented are greater than those resulting from Alternative A and similar to those

predicted for Alternative A. Continued loss of archeological deposits through the indirect effects of water and wind erosion on exposed soils in stock trails and where stock congregate is a concern with the implementation of either Alternative B or C. However, because this type of indirect damage is currently exhibited at only four archeological sites, the probability of future significant damage from indirect sources is low. Since such effects would cease to be a factor if Alternative A were implemented; this alternative is preferable to Alternative C.

Cumulative Effects

Cumulative effects of implementing Alternative C will be similar to those described for Alternative B.

3-7: RECREATION

Affected Environment

The SLS provides a diverse range of recreation opportunities to the rural communities in the upper Arkansas Valley River Basin east of the Continental Divide and to a lesser extent to the large population centers along the Front Range including the Denver and Colorado Springs metropolitan areas that are within a two to two and-a-half hour drive. The primary recreation acitivities include disperse camping, OHV trail riding, driving for pleasure, early season hunting, multiple trail uses (mountain biking, hiking, horseback riding, and motorcycling) and four-wheel driving. There are three long distance trails, one national trail (Continental Divide National Scenic Trail, CDNST) and two Regional trails (Colorado Trail and Rainbow Trail) that bisect several allotments within the SLS. These trails are highly sought after for recreation activities and highly sensitive due to their national and regional status. The Fourmile Travel Management Plan involving close to 100,000 acres was approved in October 2002. This plan includes all of the Fourmile C&H, most of the Chubb Park C&H and Bassam C&H, and a small portion of the Aspen Ridge C&H.

The amount of recreation use ranges anywhere from light to heavy. Disperse camping along perennial streams is increasing and causing resource damage as is OHV activity. General public as well as outfitting and guiding activities include rock climbing, horseback rides, llama treks, mountain biking, fishing, backpacking, ATV rentals, scenic tours, four wheel driving, and hunting. Physical barriers and special order restrictions have been implemented in certain areas to limit motorized use

There are an increasing number of conflicts between recreational users and livestock grazing. As the population becomes more urban and less connected with agricultural, there is less tolerance for livestock grazing and less understanding of the needs associated with grazing on the National Forest. This leads to complaints, some of which are justified when cattle are in O'Haver Lake Campground. It is difficult to keep gates closed and

fences up. This also extends to criminal acts of vandalism on range improvements and harassing livestock. Many users are unaware that grazing is an acceptable practice in Wilderness areas that forbid most forms of resource extraction. Operators of motorized vehicles may not be familiar with the concept of open range grazing.

There are two designated wildernesses Buffalo Peaks, and Sangre De Cristo within the grazing allotments. There is a Bill in congress proposing a 20,000 acre Browns Canyon Wilderness east of the Arkansas River.

Through decades of neglect, many fences, gates and cattleguards are in disrepair and no longer serve their purposes of confining livestock. This allows animals to access roads, campgrounds and trails, leading to unnecessary conflict and complaints from the recreation community. Old fencing has been left in place on vacant allotments, where it may, in some cases, present a long-term safety issue for the public and wildlife. In addition, some see these fences as aesthetically unpleasing.

The responsibility for maintenance, funding, and possible removal of range improvements structures such as fencing, gates, and cattleguards needs to be fully defined. Improvements such as fencing in inactive or closed allotments are property of the Forest Service and priority should be put on finding funds to remove these improvements when an allotment is no longer in use.

In general, and where possible, conflicts between recreationists and livestock need to be reduced. This is especially true in high use recreation areas, developed sites and trailheads inside allotments. Conflicts outside allotments would need to be addressed separately.

Recreation users need to be educated about the role and requirements of livestock grazing. Using signs, posters publications and web sites to alert and explain the presence of livestock may make users aware of the necessity of livestock grazing. People may be less inclined to leave gates open, vandalize range improvements, or harass livestock. Illegal motorized use can be responsible for moving livestock to areas where they do not belong or for significant damage to vegetation, soil and water. This directly affects the range resource. Education and enforcement will help reduce this resource damage. As range improvement and maintenance projects are performed, permittees often leave system roads and trails causing new routes easily seen by the recreation public. When this happens a certain curious public will follow the routes to see where they go. Often these temporary routes become permanent routes that are very difficult to close.

Alternative A: No Livestock Grazing

Direct Effects: Without grazing livestock, fencing, gates and other range improvements, recreation users may have a more natural and less restrictive experience. There may be fewer conflicts or complaints from recreation users.

Indirect Effects: The price of beef may rise if this trend becomes more wide spread. People could lose the connection of grazing on federal lands as a part of our history and culture. There could be an increase in fire spread do to the heavier fuel loading caused by livestock not grazing the grasses down and this could effect recreationist by having to leave the area or closing the area for fire restoration work.

Alternative B: Grazing with Current Management
Direct Effects: Conflicts will continue between recreation users and livestock grazing because of fencing, gates and cattle guards. The public will remain uneducated about the role and needs of livestock grazing on National Forest lands. Recreational users will continue to harass livestock and potentially move them to areas they are not permitted.
Indirect Effects: There may be a historic sense of place with the role of grazing clearly visible.

Alternative C: Grazing using Adaptive Management
Direct Effects: By improving fencing, gates, and cattle guards and adjusting the timing and placement of cattle there may be fewer conflicts with recreation users. By educating the public they may expect to see grazing on National Forest System lands and they may better understand the role of grazing on public lands.
Indirect Effects: Recreation users may have a sense of place with the historic role of grazing clearly visible and more likely to be viewed in a positive way.

3-8: ECONOMICS / FINANCE

Economic importance of Grazing NFS Lands in Chaffee County.

We will limit the economic discussion to Chaffee County since this is the county most affected by this analysis. The other counties, Fremont, Lake, Park, and Saguache, are also affected, but to a much less extent by this analysis. We only address one allotment in each of these counties. In Chaffee County we address all of the Forest Service allotments so the economic effect is much greater.

Using National Agricultural Statistic Service (NASS) data for 2006, we find that there were approximately 6,000 head of beef cattle in Chaffee County. Currently under FS permit in the nine allotments in Chaffee County, the permittees are allowed to run a total of 2,536 head. That is 42% of all beef cattle in the county. Assuming a full 12 months grazing for each head, the county total head-months for 2006 was 72,000. The current head-months under permit on NFS lands is 9,370. That equals 13 % of the total head-months of grazing for the county. With the average cost of grazing per head in Colorado being $15.00 on private land, these permits have a replacement-in-kind value of $140,000. The current cost for one head-month on a federal permit is $1.35. The combined cost for the nine allotments is $12,649.50 for all the permitted head-months.

Although most ranches in the West are only partially dependent on federal land grazing for forage, this forage source is often a critical part of their livestock operation. Greer (1994) and Taylor et al (1992) both found that while the reliance of ranchers on forage from federal land grazing can appear relatively unimportant when calculated on an acreage or animal-unit-month (AUM) basis, they become quite important when calculated on a seasonal dependency basis. The rigidity of seasonal forage availability means that the optimal use of other forages and resources are impacted when federal AUMs are not available. Dozens of researchers over the last 25 years have found that potential reductions in income and net ranch returns are greater than just the direct economic loss from reductions in federal grazing. Because ranching operations have economic linkages with other sectors of the area's economy, changes in federal grazing can also have implications for the overall economy.

Results from ranch level analyses suggest that there are at least three possible approaches to evaluating the economic importance of federal grazing to local communities: 1) evaluating federal AUMs only, 2) evaluating federal AUMs and the effects on total ranch production, and 3) evaluating federal AUMs and their effect on the economic viability of the ranch operation. Taylor et al (2005) found in Park County, Wyoming that the effects of federal grazing to the local economy were roughly twice as large when considering total ranch production compared to federal AUMs only. From the perspective of ranch viability, effects to the local economy were roughly twice as large compared to total ranch production – or four times larger than federal AUMs only. Which of these approaches is the most relevant in a particular situation depends on a number of factors including the individual ranch's level of dependency on federal grazing, the magnitude of the proposed change in grazing, the financial solvency of the ranch, the availability of alternative sources of forage, and the desire of the rancher to remain in ranching.

Although a definitive assessment is not possible for this analysis, it is recognized that adjustments to federal grazing, whether in terms of AUM adjustments, or cost changes, can have important consequences to individual ranch operations and ranch viability, as well as implications to families, social structure, local economies, and land use.

FINANCIAL ANALYSIS

Forest Service Manual 2210.2, Range Management Planning, directs us to "Integrate rangeland resources with other resources to achieve Multiple-Use, Sustained-yield in an environmentally sound and Cost-effective manner." Cost effectiveness is measured by Present Net Value (PNV) of the costs and benefits displayed by alternative. The following table shows Forest Service value for all of the active permits over a 10 year projected permit period. Permittee values are not shown due to the large number of variables and the subjective nature of ranch business management.

Table 3-11: Present Value – Forest Service

	Alternative A	Alternative B	Alternative C
PV-Benefits	**$9,111.15**	**$76,855.57**	**$76,855.57**
PV-Costs	**-$6,000.00**	**-$52,396.47**	**-$82,994.23**
PNV-Net Value	**$3,111.15**	**$24,459.10**	**-$6,138.66**

Benefits are primarily derived from grazing fees paid by the permittees. Intangible benefits not included here are things like improved range condition. Costs include items like permit administration, allotment inspections, range improvement materials, and meeting expenses. These costs and benefits were projected out over the 10 year life of a typical range permit. Alternative A is the no grazing alternative, but it was assumed that grazing would continue for one more year under a term permit before the allotments were shut down. Alternative B includes very few range improvements, primarily maintenance for existing facilities. Alternative C includes many range improvements programmed out over the life of the permits. These improvements are identified as adaptive options in the alternative description in Chapter 2. For this analysis we assumed that some of the options would be implemented to improve resource conditions in the pastures. We did not assume that all of them would be done.

At first glance it appears that Alternative C is a poor choice financially. But what this alternative includes that the others do not aggressively deal with, is active resource problem management. With that management come the twin benefits of continued livestock grazing and improved range condition. Alternative A brings improved range conditions, but at the cost of no grazing. Alternative B allows the grazing, but does little to aggressively improve conditions. As a land management agency, the Forest Service must consider the intangible benefits along with the tangible ones in the decision-making process.

3-9: THREATENED, ENDANGERED AND SENSITIVE SPECIES

For the species addressed in this assessment, the direct and indirect effects, effects from interdependent and interrelated activities, and cumulative effects of the proposed action have been added to the environmental baseline for each species as stated previously. The following table summarizes the effect determinations for each alternative and species evaluated. The rationale for the determinations is discussed in the *Effects to Evaluated Species* (Section 9.0) of the Biological Evaluation Report. No proposed or designated critical habitat is present within the Analysis Area nor will it be affected.

Table 3-12. Effect determinations for each species addressed in this assessment for each alternative.

[1] **STATUS CODES: E**=federally listed endangered; **T**=federally listed threatened; **C**=federally proposed/candidate for listing; and **S**=FS sensitive

[2] **NE**=no effect; **NLAA**=may effect, not likely to adversely affect; **NLAA –B**=may effect, not likely to adversely affect – wholly beneficial; **LAA**=may effect, likely to adversely affect; **BI**=beneficial impact; **NI**=no impact; **MAII**=may adversely impact individuals, but not likely to result in a loss of viability on the Planning Area, nor cause a trend toward federal listing; and **LRLV**=likely to result in a loss of viability on the Planning Area, or in a trend toward federal listing.

SPECIES NAME	SCIENTIFIC NAME	STATUS CODE[1]	DETERMINATIONS OF EFFECT [2]		
			ALTERNATIVE A	ALTERNATIVE B	ALTERNATIVE C (PROPOSED ACTION)
PLANTS					
Golden columbine	*Aquilegia chrysantha* var. *rydbergii*	S	BI	MAII	**MAII**
Siberian sea thrift	*Armeria maritima* ssp. *sibirica*	S	BI	MAII	**MAII**
Park milkvetch	*Astragalus leptaleus*	S	BI	MAII	**MAII**
Narrow-leaved moonwort	*Botrychium lineare*	C, S	NLAA/BI	LAA/MAII	**NLAA/MAII**
Arctic braya	*Braya glabella*	S	BI	MAII	**MAII**
Lesser panicled sedge	*Carex diandra*	S	BI	LRLV	**MAII**
Livid sedge	*Carex livida*	S	BI	LRLV	**MAII**
Lesser yellow lady's slipper	*Cypripedium parviflorum*	S	BI	MAII	**MAII**
Clawless draba	*Draba exunguiculata*	S	BI	MAII	**MAII**
Gray's peak whitlow-grass	*Draba grayana*	S	BI	MAII	**MAII**
Smith whitlow-grass	*Draba smithii*	S	BI	MAII	**MAII**
Roundleaf sundew	*Drosera rotundifolia*	S	BI	LRLV	**MAII**
Giant helleborine, stream orchid	*Epipactis gigantea*	S	BI	MAII	**MAII**
Brandegee's buckwheat	*Eriogonum brandegeei*	S	BI	MAII	**MAII**
White-bristle cottongrass	*Eriophorum altaicum* var. *neogaeum*	S	BI	LRLV	**MAII**

Species Name	Scientific Name	Status Code[1]	Determinations of Effect [2]		
			Alternative A	Alternative B	Alternative C (Proposed Action)
Chamisso's cottongrass	*Eriophorum chamissonis*	S	BI	LRLV	**MAII**
Slender cottongrass	*Eriophorum gracile*	S	BI	LRLV	**MAII**
Penland alpine fen mustard	*Eutrema penlandii*	T	NLAA-B	LAA	**NLAA**
Plains rough fescue, Hall fescue	*Festuca hallii*	S	BI	LRLV	**MAII**
Globe gilia	*Ipomopsis globularis*	S	BI	MAII	**MAII**
Simple bog sedge	*Kobresia simpliciuscula*	S	BI	MAII	**MAII**
Colorado tansy-aster	*Machaeranthera coloradoensis*	S	BI	MAII	**MAII**
White adder's-mouth orchid	*Malaxis brachypoda*	S	BI	MAII	**MAII**
Weber's monkeyflower	*Mimulus gemmiparus*	S	BI	MAII	**MAII**
Rock-loving neoparrya	*Neoparrya lithophila*	S	BI	MAII	**MAII**
Kotzebue's grass of parnassus	*Parnassia kotzebuei*	S	BI	MAII	**MAII**
Degener's beardtongue	*Penstemon degeneri*	S	BI	MAII	**MAII**
Rocky Mountain cinquefoil	*Potentilla rupincola*	S	BI	MAII	**MAII**
Greenland primrose	*Primula egaliksensis*	S	BI	LRLV	**MAII**
Colorado false needlegrass/Porter feathergrass	*Ptilagrostis porteri*	S	BI	LRLV	**MAII**
tundra buttercup	*Ranunculus karelinii*	S	BI	MAII	**MAII**
Northern blackberry	*Rubus arcticus* ssp. *acaulis*	S	BI	MAII	**MAII**
Arizona willow	*Salix arizonica*	S	BI	LRLV	**MAII**
Sageleaf willow	*Salix candida*	S	BI	LRLV	**MAII**
Blueberry willow	*Salix myrtillifolia*	S	BI	LRLV	**MAII**
Autumn willow	*Salix serissima*	S	BI	LRLV	**MAII**

Species Name	Scientific Name	Status Code[1]	Determinations of Effect [2]		
			Alternative A	Alternative B	Alternative C (Proposed Action)
Club spikemoss	*Selaginella selaginoides*	S	BI	MAII	**MAII**
Lesser bladderwort	*Utricularia minor*	S	BI	LRLV	**MAII**
Selkirk's violet	*Viola selkirkii*	S	BI	MAII	**MAII**
Invertebrates					
Hudsonian emerald dragonfly	*Somatochlora hudsonica*	S	BI	MAII	**MAII**
Rocky Mountain capshell snail	*Acroloxus coloradensis*	S	BI	LRLV	**MAII**
Uncompahgre fritillary butterfly	*Boloria acrocnema*	E	NLAA-B	LAA	**NLAA-B**
Fish					
Greenback cutthroat trout	*Oncorhynchus clarki stomias*	T	NE, NI	LAA	**NLAA**
Amphibians					
Boreal toad	*Bufo boreas boreas*	S	BI	LRLV	**MAII**
Northern leopard frog	*Rana pipiens*	S	BI	MAII	**MAII**
Birds					
Bald eagle	*Haliaeetus leucocephalus*	T	NLAA-B	NLAA	**NLAA**
Black swift	*Cypseloides niger*	S	BI	MAII	**MAII**
Boreal owl	*Aegolius funereus*	S	BI	MAII	**MAII**
Brewer's sparrow	*Spizella breweri*	S	BI	MAII	**MAII**
Flammulated owl	*Otus flammeolus*	S	BI	MAII	**MAII**
Gunnison sage grouse	*Centrocercus minimus*	S	BI	MAII	**MAII**
Lewis' woodpecker	*Melanerpes lewis*	S	BI	MAII	**MAII**
Loggerhead shrike	*Lanius ludovicianus*	S	BI	MAII	**MAII**
Mexican spotted owl	*Strix occidentalis*	T	NLAA	LAA	**NLAA**
Northern goshawk	*Accipiter gentilis*	S	BI	MAII	**MAII**
Northern harrier	*Circus cyaneus*	S	BI	MAII	**MAII**
Olive-sided flycatcher	*Contopus cooperi*	S	BI	MAII	**MAII**
Peregrine falcon	*Falco peregrinus anatum*	S	BI	MAII	**MAII**
Purple martin	*Progne subis*	S	BI	MAII	**MAII**
Three-toed woodpecker	*Picoides dorsalis*	S	BI	MAII	**MAII**

Species Name	Scientific Name	Status Code[1]	Determinations of Effect [2]		
			Alternative A	Alternative B	Alternative C (Proposed Action)
White-tailed ptarmigan	*Lagopus leucurus*	S	BI	MAII	**MAII**
Three-toed woodpecker	*Picoides dorsalis*	S	BI		
Mammals					
American marten	*Martes americana*	S	BI	MAII	**MAII**
Canada lynx	*Felix lynx canadensis*	T	NLAA-B	LAA	**NLAA**
Common hog-nosed skunk	*Conepatus leuconotus*	S	BI	MAII	**MAII**
Fringed myotis	*Myotis thysanodes*	S	BI	MAII	**MAII**
Gunnison's prairie dog	*Cynomys gunnisoni*	S	MAII	MAII	**MAII**
North American wolverine	*Gulo gulo*	S	BI	MAII	**MAII**
Pygmy shrew	*Sorex hoyi*	S	BI	MAII	**MAII**
Townsend's big-eared bat	*Plecotus townsendii*	S	BI	MAII	**MAII**

ORGANIZATION OF THE BELOW EFFECTS ANALYSIS

The below effects analysis is divided into two main sections: effects to threatened and endangered species, and effects to Region 2 Sensitive species. Threatened, and endangered species are analyzed individually. Sensitive species are grouped into guilds for analysis or addressed individually as well. Under each guild or group of species, any species-specific information of the effects of livestock grazing is first noted. An analysis of how members of the guild or their habitats are impacted or changed by livestock grazing is then presented by alternative. In many cases, little information exists on the effects of livestock grazing to individual species of concern, and the effects of livestock grazing must be inferred from an analysis of the impact to their habitat or inferred from impacts to other species occupying the habitat.

FEDERALLY LISTED, THREATENED AND ENDANGERED SPECIES

Plants

Eutrema penlandii (Alpine fen mustard)

Eutrema penlandii occupies wet habitats at or above 12,000 ft. No information is available on the impact of livestock grazing to the species. It is unlikely the species would be grazed due to its short stature, but trampling of its wet habitat would be highly detrimental. Populations are typically small and even short-term livestock trampling poses a threat of extirpation from the site.

ALTERNATIVE A (NO GRAZING)

Direct and Indirect Effects
Under this alternative, no livestock grazing would occur within any of the allotments assessed here. Ground disturbance and herbivory would be lessened. Plants would not be smothered by cattle feces. Soils would not be disturbed or eroded, and plants would not be uprooted. Hummocking and pedestaling would be lessened, and no rangeland developments would be placed in the alpine zone. Finally, shifts in species composition to graminoids or forbs tolerant of disturbance would be lessened in rate and magnitude or reversed.

Cumulative Effects:
Cumulative effects are discussed under Alternative B below. The primary difference in cumulative effects between Alternatives A and B is the absence of livestock grazing under Alternative A. All other factors would remain at similar levels of impact.

Determination (No Grazing)
The effect of implementing Alternative A is wholly beneficial to *Eutrema penlandii.* A determination of "*may affect, is not likely to adversely affect*" made for *Eutrema penlandii* is based on the previous discussion and following rationale:

Cessation of livestock grazing would remove the risk of severe trampling of wet habitats in the alpine zone.
Smothering of plants by long-lived (over 3 years in alpine habitats) cow feces would not take place.

ALTERNATIVE B (CURRENT MANAGEMENT)

Direct and Indirect Effects
Eutrema penlandii will be directly affected by herbivory, trampling, and smothering by cow feces. Herbivory may lead to reduced vigor and reproduction as the species compensates for lost tissues and energy. Alpine growing seasons are short and opportunities for regrowth and reproduction following herbivory are limited. Plants may

also be uprooted. Alpine soils are fragile, and trampling by livestock often leads to uprooting of individuals.

Cumulative Effects
Cumulative effects in the alpine zone are primarily related to seven factors: climate change, mining, introduction of mountain goats, recreation, roads and trails, livestock grazing, and human development.

Determination (Current Management)
A determination of "*may affect, is likely to adversely affect*" for *Eutrema penlandii* is based on the previous discussion and following rationale:

Although cattle are rarely observed at elevations over 11,500 ft, the impacts from even short-term presence of cattle in a *Eutrema penlandii* site would be highly detrimental, killing individuals and altering water relations at the site. Small populations could be extirpated.
Livestock impacts (particularly impacts to soil and species composition changes) in the alpine zone are detrimental, and changes induced by livestock grazing are extremely slow to heal.

ALTERNATIVE C (PROPOSED ACTION)

Direct and Indirect Effects
Under Alternative C, adaptive management would be implemented to ensure alpine habitats are maintained at or moving toward the desired condition. Ground disturbance and detrimental impacts to the alpine flora would be minimized. Design criteria to protect alpine sites (Appendix 1) would be fully implemented. Adequate, timely, and frequent effectiveness monitoring would be carried out to ensure that design criteria designed to protect and maintain fragile alpine habitats are implemented.

Cumulative Effects
Cumulative effects and interrelated and interdependent effects are discussed under Alternative B below. Cumulative effects and interrelated and interdependent effects would remain the same except for altered management of livestock grazing. Undesirable increases in bare ground, decreases in cover, and shifts in species composition will be identified and addressed through adaptive management.

Determination (Proposed Action)
A determination of "*may affect, is not likely to adversely affect*" for *Eutrema penlandii* is based on the previous discussion and following rationale:

Design criteria as specified in Appendix 1 will be fully implemented and move alpine habitats toward desired condition, minimizing impacts on *Eutrema penlandii*.
Frequent quantitative monitoring shall be performed, allowing rangeland managers ample time to adjust management to avert negative impacts to *Eutrema penlandii*.
No livestock grazing would take place above 11,500 ft.

FISHERIES

Greenback Cutthroat Trout

Greenback cutthroat trout have been documented from eight locations across the PSICC, none within the Analysis Area. Intensive surveys have been conducted by the CDOW, FS, and FWS to document populations of greenbacks across the PSICC, but no specific project surveys were conducted. Recent discoveries have been made in close proximity to the Analysis Area, and suitable habitat exists, but many streams within the Analysis Area have yet to be surveyed.

ALTERNATIVE A (NO GRAZING)

Direct and Indirect Effects

The effect of this alternative would result in improved riparian systems and greenback habitat in the Analysis Area. However, other forest management activities would continue to impact/degrade these same systems, limiting riparian recovery. Overall, riparian systems would move toward the desired condition. As riparian systems improve, the quantity of suitable habitat for greenback cutthroat trout would increase, leading to greater fish production and higher likelihood of successful greenback reintroduction projects and would contribute towards eventual recovery and delisting.

Effects from Interrelated and Interdependent Actions

There are no interrelated or interdependent actions associated with this alternative; therefore, there are no anticipated adverse effects.

Cumulative Effects

The primary difference in cumulative effects between Alternative A and Alternatives B and C is the absence of livestock grazing under Alternative A. All other factors would remain at similar levels of impact. This alternative would not add to the cumulative effects to greenback cutthroat trout.

Determination (No Grazing)

Implementation of Alternative A will improve and contribute to properly functioning riparian systems, improving and protecting fish habitat as well. Implementation of Alternative A would have wholly beneficial effects to this species; therefore, it "*may affect, not likely to adversely affect*" riparian systems, greenback cutthroat trout, and their habitat.

ALTERNATIVE B (CURRENT MANAGEMENT)

Direct and Indirect Effects
Fish assemblages, including greenback cutthroat trout populations would rarely be directly affected from livestock grazing. Rather, the impact to greenbacks is primarily from indirect effects such as the degradation of riparian systems and water quality, increased water temperatures, destabilization of stream banks, increased erosion and sedimentation, loss of stream cover, etc.

Many other forest management activities affect fish habitat and production similarly. Therefore, it would be difficult, if not impossible, to isolate and quantify the impacts on greenback populations that are solely related to livestock grazing. Because of the confounding nature of impacts from the suite of management activities, we chose to evaluate the impact of livestock grazing on riparian systems as an index for greenback production. For this analysis to accurately reflect impacts on greenback cutthroat trout, we assume that the quality of riparian systems is directly related to fish production. This concept is widely accepted by fishery biologists.

Cumulative Effects
In areas of concentrated public recreation use such as roads, formal and dispersed camping areas, hiking trails, etc., effects to greenback cutthroat trout habitat will contribute to the cumulative impacts from this project. Roads, in particular, contribute to habitat fragmentation, increased erosion and sediment deposited into nearby streams. The presence of fine sediments in streams adversely effects fish assemblages. Formal and dispersed camping, in general, contribute to loss of riparian vegetation because preferred camping areas are often located near streams. The concentrated use in and around these riparian zones results in trampling riparian vegetation and an increase in bare ground. The loss of riparian vegetation and an increase in bare ground will cause elevated erosion rates and increased sedimentation into nearby streams.

Determination (Current Management)
Implementation of Alternative B will allow livestock grazing to continue under current management strategies. The downward trends in rangeland condition would likely continue, resulting in further degradation of riparian systems and fish habitat in the Analysis Area. Alternative B is "*likely to adversely affec*t" greenback cutthroat trout habitat and recovery.

ALTERNATIVE C (PROPOSED ACTION)

Direct, Indirect and Cumulative Effects
Negative impacts to riparian systems from implementation of Alternative C will be similar in scope to those of Alternative B, but the magnitude of these impacts would be less severe because of the monitoring and implementation plans developed for use with this alternative.

Determination (Proposed Action)
Implementation of Alternative C will allow livestock grazing to continue with adaptive management to achieve the desired condition for riparian systems. However, riparian systems and fish habitat will continue to be impacted from livestock grazing until the desired condition is met. Therefore, implementation of Alternative C "*may effect, not likely to adversely effect*" riparian systems, greenback cutthroat trout or their habitat.

WILDLIFE

For this analysis, all areas within the allotments addressed in this assessment are considered to have the potential of being grazed by livestock. Cattle have been observed in higher elevations (greater than 11,000 ft), steep slopes (greater than 40% slope), and in other areas that were not considered under the "capable acres" calculations in the EA; therefore, this analysis and the effect determinations includes the entire allotment for each of the alternatives as it pertains to the species addressed.

If adverse effects are not minimized at the local level, cumulative effects may occur. Past and present forest management activities have caused changes in plant community structure and composition across the forests. These management activities have altered the present landscape to various degrees and have had direct, indirect, and possibly cumulative effects on TEPS species. These effects can be minimized by following Forest Service standards and guidelines and by implementing the design criteria to monitor or offset impacts. With these protective measures in place, cumulative effects are less likely to be adverse.

The mere presence of livestock does not mean that long-term destruction is occurring to wildlife or their habitats. Instead, the degree to which grazing affects habitat, depends on several factors including: 1) number of animals grazing in an area; 2) the time of grazing; and 3) grazing system used. Under Alternative B, greater habitat changes would occur as grazing intensities increase compared to Alternatives C or A.

Riparian woodlands are habitats that provide the highest diversity and abundance of bird species (Bock et al. 1992), many of which are prey for the species addressed here. Therefore, management of riparian ecosystems has a high potential for significantly affecting these dependant species (Bock et al. 1992) both directly and indirectly.

Elmore and Kauffman (1994) found that if cattle are allowed to graze with little or no regard to willow regeneration, the woody vegetation can slowly decline to the point it may no longer be present while sedges, rushes, and grasses prosper. Such is the case in many of the riparian areas in many of the allotments, particularly in Little Cochetopa, Cameron, Aspen Ridge, Bassam, Chubb, and Four-mile allotments, although this has been observed in other allotments as well (M. Wrigley pers. obs. 2005). This has substantially degraded or eliminated suitable habitat for these wildlife species, and will continue to do so under current management (Alternative B).

Grazing during the spring and early summer may directly decrease the reproductive success of some breeding birds and other wildlife addressed in this section through destruction or disturbance of nests or dens on the ground or in low shrubs. Grazing during other seasons can indirectly affect bird and other wildlife species through habitat changes. High grazing intensity (high stocking rates and/or utilization levels) and grazing during the critical breeding season are perhaps the most significant management practices that alter avian habitats in riparian and upland habitats.
Federally Listed Species

Uncompahgre Fritillary Butterfly (UFB)

Even though this species occurs at the upper elevational limits that livestock grazing occurs, the possibility exists that potential effects may occur from these activities; therefore, they are addressed here in this assessment. UFB have not been confirmed within the Analysis Area; however, a purported sighting was made in the Little Cochetopa Allotment in the 1980s (District Files). Other large areas of suitable habitat (alpine areas) within the Sawatch Range (containing some of the allotments in this analysis) consisting of their primary habitat have in some cases been surveyed to varying intensities, while others have not. Potentially suitable habitat may be present within the Arkansas S&G, Union, Four-mile, McQuaid, Chalk Creek, Browns Creek, Arkansas C&H, and Little Cochetopa allotments. Limited surveys have been conducted by the FWS and others in some of the areas within suitable habitat, although not all areas have been surveyed (District Files).

ALTERNATIVE A (NO GRAZING)

Direct, Indirect, and Cumulative Effects
A large, well-developed understory of snow willow is critical for the UFB, since females deposit their eggs on snow willow, and the larvae feed on it exclusively. There would be no removal or trampling of snow willow by livestock grazing under this alternative resulting in no effects to this species. Species composition, the number of herbaceous species in the understory including snow willow, and the volume of the understory would remain unchanged or improve. The abundance, composition, and richness of this species' habitat would remain unchanged or improve. The presence and abundance of a dense cover of snow willow, necessary for UFB would remain or increase. Existing habitat conditions would not deteriorate from the lack of livestock grazing, and degraded habitats would improve where possible. The exclusion of livestock grazing in general from these areas can have substantial short-term (one year or less), long-term (multiple years), and permanent improvements such as vegetation species composition shifts back to more native species if possible, increased cover, and structural diversity. These changes in vegetative communities from the lack of livestock grazing indirectly, directly, and cumulatively would benefit this species.

Determination (No Grazing)

Based on the above rationale, this alternative would have wholly beneficial effects to this species; therefore, it "*may affect, not likely to adversely affect*" the Uncompahgre fritillary butterfly.

ALTERNATIVE B (CURRENT MANAGEMENT)

Direct, Indirect, and Cumulative Effects
Livestock influence wildlife habitat by modifying: 1) plant biomass; 2) structural components such as plant height and cover; and 3) plant species composition (Kie and Loft 1990). As a result, livestock grazing causes changes in habitat that alter species abundances and composition in wildlife communities (Block and Finch 1997). Large, well-developed understory of snow willow is critical for the UFB as mentioned above because females deposit their eggs on, and larvae feed on snow willows exclusively. This plant is critical for the development and survival of the UFB for their two-year development – from egg, to larvae, into adult. Any removal or trampling of snow willow by livestock grazing would have substantial adverse effects to this species. Livestock grazing would alter vegetative species composition, reduce the number of herbaceous species in the understory including snow willow, and decrease the volume of the understory. Changes in the abundance, composition, and richness of this species' habitat would likely occur in grazed areas. Such changes may involve a decrease in abundance or the disappearance of a dense cover of snow willow. As a result, suitable habitats would be substantially degraded and adversely affected. Trends in these areas would continue to decline as a result of continued browse and trampling of snow willow by livestock.

Determination (Current Management)
Based on the above rationale, this alternative "*may effect, likely to adversely affect*" the Uncompahgre fritillary butterfly.

ALTERNATIVE C (PROPOSED ACTION)

Direct, Indirect, and Cumulative Effects
In general, livestock influence wildlife habitat by modifying: 1) plant biomass; 2) structural components such as plant height and cover; and 3) plant species composition (Kie and Loft 1990). As a result, livestock grazing causes changes in habitat that alter species abundances and composition in wildlife communities (Block and Finch 1997). Large, well-developed understory of snow willow is critical for the UFB, as mentioned above since females deposit their eggs on them and the larvae feed on them exclusively. This plant is critical for the development and survival of the UFB for their two-year development – from egg, to larvae, into an adult. Any removal or trampling of snow willow by livestock grazing would have substantial adverse effects to this species.

However, under the Proposed Action, specific design criteria listed in the BE Appendix 1 exclude livestock grazing within UFB potential habitats that are larger than one-quarter acre in size and above 12,000 ft in elevation. Therefore, under the Proposed Action,

these design criteria would protect existing UFB habitat and move degraded habitats toward the desired condition, avoiding any effects from this action.

Determination (Proposed Action)
Based on the above rationale, this alternative would have wholly beneficial effects to this species; therefore, it "*may affect, not likely to adversely affect"* the Uncompahgre fritillary butterfly.

Bald Eagle

There are no known bald eagle nest or roost sites within any of the allotments considered under this analysis; however, no specific surveys have been conducted. Potential summer and winter roost sites may be present within or adjacent to Bear Creek, Arkansas C&H, Browns Creek, Chalk Creek, Union, Four-mile, Cameron, and McQuaid allotments. Bald eagles are frequently observed during the winter along the ice-free portions of the Arkansas River, and lakes including Twin Lakes and the Forebay within the Analysis Area, but outside of any allotment assessed here (District Files). Suitable nesting, roosting, and foraging habitats with sufficient prey are present in these areas.

ALTERNATIVE A (NO GRAZING)

Direct, Indirect, and Cumulative Effects
Eagles prey within riparian areas and elsewhere on a variety of animal species such as waterfowl and other birds, mammals, amphibians, reptiles, and carrion. Prey species abundance, composition, and distribution would likely increase or improve above current levels due to improved habitat conditions, providing the vegetative structure, cover, and overall habitat quality for prey species, particularly in riparian areas where eagles concentrate their foraging activities, ultimately benefiting bald eagles.

Increased plant diversity and cover would increase prey species abundance and diversity, and improve the foraging potential. In addition, actions that directly affect habitat such as nest or roosting habitat or the recruitment of such habitat would not occur due to the lack of grazing, allowing tree regeneration that would not diminish or alter potential or future nesting or roosting habitat. Conversely, recruitment is expected to increase, improving habitat conditions. Each of the above factors would result in increased and/or improved habitat conditions for this species.

Determination (No Grazing)
Based on the above rationale, this alternative would have wholly beneficial effects to this species; therefore, it "*may affect, not likely to adversely affect*" the bald eagle.

ALTERNATIVE B (CURRENT MANAGEMENT)

Direct, Indirect, and Cumulative Effects
Livestock grazing would affect prey species habitat and indirectly affect bald eagles by reducing the amount or quality of prey habitat, limiting the abundance of prey, and

changing prey distribution. Prey species abundance, composition, or distribution would be reduced with the reduction of vegetative structure, cover, and overall habitat quality. Prey species habitat, abundance, composition, and distribution would likely be maintained at current levels or reduced. A reduction of cover and overall habitat quality to the level that could affect prey species (forage habitat) would occur. Where current shrub and tree distribution is scattered with plants that are mushroom-shaped because of heavy livestock use, grazing under current management would likely increase this effect. Poorly developed understories would remain, where present which would impact the abundance and species composition of insects and other prey that depend on specific plants and structure to provide food and reproduction sites. Major shifts in plant species composition from desirable species to less or undesirable species has been observed in many allotments. This would continue in both uplands and riparian habitats, affecting prey species. Plant species composition shifts to a more natural array of grasses and forbs is less likely to occur under this alternative. Lastly, livestock gathering activities during critical periods of the year (such as nesting or winter roosting) that cause eagles to flush or abandon an area are expected to occur. As a result of the above impacts, adverse effects would occur to this species

Determination (Current Management)
Based on the above rationale, this alternative "*may affect, not likely to adversely affect*" the bald eagle.

ALTERNATIVE C (PROPOSED ACTION)

Direct, Indirect, and Cumulative Effects
Eagles prey on a variety of animal species such as waterfowl and other birds, mammals, amphibians, reptiles, and carrion. Because of adaptive management measures (BE Appendix 1), prey species abundance, composition, and distribution would likely be maintained or improve above current levels due to improved vegetative structure, cover, and overall habitat quality for prey species, particularly in riparian areas where eagles concentrate their foraging activities, ultimately benefiting bald eagles. A reduction of cover and overall habitat quality to the level that could affect prey species (forage habitat) from livestock grazing would not occur.

The Proposed Action would result in generally improved habitat conditions and trends on these allotments. No suitable habitat would be made unsuitable under this Proposed Action. The function of important habitat components (discussed above) such as foraging, roosting, and potential nesting habitats would not be adversely affected.

Determination (Proposed Action)
Based on the above rationale, the Proposed Action "*may affect, not likely to adversely affect*" the bald eagle.

Mexican Spotted Owl (MSO)

Protocol surveys have been completed in suitable habitats within portions of the Cameron, Bassam, and Four-mile allotments in 1995 and 1996. No MSO were located; however, there was an unconfirmed report from a non-Forest Service individual of a four-note hoot possibly from a MSO within the Cameron Allotment in 2005. Limited non-protocol surveys of this area did not locate any MSOs in 2006. The closest known MSO site is on the BLM lands, approximately 43 miles to the east of this potential detection. The last time owls were documented at this BLM site was in 2000. Eleven documented MSO sites, and nine sites on the Pike National Forest are located approximately 40-75 miles to the east and southeast in the Front Range Region in Colorado. No proposed or designated critical habitat is within the Action Area, or would be affected by any of the alternatives considered here. No Protected Activity Centers (PACs) are located within the Action Area – the closest is approximately 40 miles to the east and southeast on the Pike and San Isabel National Forest and BLM lands. Restricted Areas with potential nesting roosting, foraging, and dispersal habitat are present within the Analysis Area.

Recovery Plan Guidelines
The Mexican Spotted Owl Recovery Plan (U.S. Fish and Wildlife Service 1995) lists three livestock grazing guidelines that should be applied to Restricted Areas as follows (no PACs are located within the Action Area):

Monitor grazing use by livestock and wildlife in key grazing areas (riparian areas, meadows, and oak types).
Implement and enforce grazing utilization standards that would attain “good” to “excellent” range conditions within key grazing areas.
Implement management strategies that will restore “good” range condition to degraded riparian communities as soon as possible.

As noted above, steep slopes and rugged terrain are not generally accessible to livestock and these areas are not grazed, or little utilization by cattle occurs in these areas. Many of these areas within these allotments do not provide the habitat characteristics needed by this owl.

ALTERNATIVE A (NO GRAZING)

Direct, Indirect, and Cumulative Effects
Under this alternative, no livestock grazing would occur within any of the allotments assessed. With the exclusion of grazing, prey species abundance, composition, and distribution would likely increase or improve above current levels due to improved habitat conditions for these species that would ultimately benefit MSO. There would be no change in nesting habitat conditions since there is little overlap of nest habitat and livestock use. Cover and prey habitat necessary for movement of MSO would likely improve from the lack of grazing by cattle due to greater grass, forb, shrub, and tree cover and recruitment.

The four primary influences the Recovery Plan identified as to how livestock grazing affects MSO would generally be improved from the baseline condition. Prey availability and their habitat conditions would generally improve and the trend to a more natural condition would occur. Vegetation shifts caused by livestock grazing that would increase the susceptibility of MSO habitats to increased fire and changes in fire intensities would not occur under this alternative, although other factors discussed below would still cause impacts. The health and condition of riparian communities would benefit from the lack of livestock herbivory in these important habitats. Lastly, the development of MSO nesting, roosting, foraging, and dispersal habitats would occur in these areas due to the lack of livestock grazing. Each of these factors would improve current habitat conditions, restore degraded habitats, and benefit MSOs directly and indirectly within these allotments.

Determination (No Grazing)
Based on the above rationale, this alternative would have wholly beneficial effects to this species; therefore, it "*may affect, not likely to adversely affect*" the Mexican spotted owl.

ALTERNATIVE B (CURRENT MANAGEMENT)

Direct, Indirect, and Cumulative Effects
Under this alternative, rangeland health trends and habitat conditions for MSO and their prey would continue to be degraded and trends would continue in their current downward trajectories, perhaps at a higher rate. As a result, substantial adverse effects would occur to this species indirectly and directly to their prey.

Under this alternative livestock grazing in general would cause substantial short-term (one year or less), long-term (multiple years), and permanent changes such as vegetation species composition shifts to non-native or undesirable species, down-cutting, erosion, or changes/lowering of the water table, and others. These impacts to vegetative communities from livestock grazing discussed above would directly and indirectly adversely affect MSO potential nesting, roosting, foraging, and dispersal habitats.

Determination (Current Management)
Based on the above rationale, this alternative "*may affect, likely to adversely affect*" the Mexican spotted owl.

ALTERNATIVE C (PROPOSED ACTION)

Direct, Indirect, and Cumulative Effects
Specific studies as to the effects of livestock grazing on MSO are lacking. As we have done for other species in this assessment, until this information becomes available, the potential effects to the owl from grazing include changes in the vegetation in important habitats where possible. For example, the Recovery Plan (U.S. Fish and Wildlife Service 1995) states that livestock may not affect MSO roost and nest sites immediately, but could alter riparian habitats by reducing, eliminating, or suppressing regeneration. Over time, this would limit the structure needed for nesting, roosting, and other life history

requirements in addition to the long-term sustainability of these habitats. Additionally, adverse effects to their prey from habitat degradation from livestock grazing in riparian areas may potentially occur.

The Recovery Plan identified four primary influences livestock grazing can have on the MSO by altering 1) prey availability, 2) susceptibility of habitats to increased fire, 3) health and condition of riparian communities, and 4) development of habitats.

The Proposed Action would address the MSO Recovery Plan livestock grazing guidelines within Restricted Areas as follows:

Monitoring of grazing use by livestock and wildlife in key grazing areas (riparian areas, meadows, and oak types would be achieved by measures in the Monitoring Plan and the design criteria listed for MSO in the BE Appendix 1.
Implementation and enforcement of grazing utilization standards listed as design criteria would attain "good" to "excellent" range conditions, or move those areas in an upward trend within key grazing areas, meeting this measure.
Management strategies that would restore "good" range conditions to degraded riparian communities as soon as possible would be met by implementing design criteria, monitoring, and timely use of the proper adaptive management options to reach the desired conditions.

Each of the above effects would occur under the Proposed Action during critical periods such as breeding, foraging, roosting, dispersal, etc., and would positively affect shelter and other important components of their life history. Livestock grazing under this alternative would occur within suitable habitats and cause minor changes as described above. It is not expected that any suitable habitat would be substantially degraded, nor its development by the Proposed Action.

Determination (Proposed Action)
Based on the above rationale, the Proposed Action "*may affect, not likely to adversely affect*" the Mexican spotted owl.

Canada Lynx

Lynx are likely to be present at least to some degree in portions of the following allotments: Arkansas S&G, Union, McQuaid, Four-mile, Chubb, Bassam, Chalk Creek, Browns Creek, Little Cochetopa, and Bear Creek allotments. Since augmentation efforts were initiated in 1999 by CDOW, they have been monitoring lynx movements and their locations. Over 200 lynx have been released during this period and 50 documented offspring (kittens) produced in Colorado (CDOW 2006). No location data is available at this time from the CDOW or elsewhere as to specific areas lynx may be using in relation to any of these allotments. However, for this assessment, we assume lynx use is occurring within these allotments. Suitable denning, foraging, winter, and other lynx habitats are present on portions of each of the allotments listed above.

Lynx prey primarily on snowshoe hare and to a lesser degree on red squirrels, other small mammals, and birds. Forage and cover for these prey species are critical, and impacts to their habitat components can indirectly affect lynx. With the exception of snowshoe hare, many of the other prey species for lynx also depend on standing dying trees, snags, and downed logs for survival. Habitat connectivity is also an important consideration for this species.

LAU Habitat Information

The Analysis Area contains portions of several Canada Lynx Analysis Units (LAUs), including the Buffalo Peaks, Cottonwood Pass, Monarch Pass, Sangres, and Tennessee Pass LAUs. Table 3-13 below lists lynx habitat acreages based on the Pike and San Isabel National Forest revised lynx habitat map (USDA Forest Service 2006), which reflects current definitions for denning, winter foraging habitat, other, and unsuitable areas. "*Other habitats*" are defined by the PSICC as:

coniferous forests with less than 40% canopy cover (cc);
pure aspen stands within 500 meters (m) of denning or winter foraging habitat;
aspen mixed forests in a small size class more than 40% cc;
lodgepole pine medium size class with greater than 40% cc;
willow within 500 m of denning or winter foraging habitat; and
sagebrush within 500 m of denning or winter foraging habitat.

Table 3-13. Approximate area (acres[1]) of Canada lynx habitat types present in each allotment for each LAU

Lynx Habitat Type	Lynx Analysis Unit (LAU)					
	Buffalo Peaks	Cottonwood Pass	Monarch Pass	Sangres	Tennessee Pass[3]	Total[1]
Denning Habitat	15,200	300	17,700	3,400	3,300	**39,900**
Unsuitable/Non-Habitat	35,300	1,500	27,600	2,100	4,700	**71,200**
Winter Forage Habitat	20,700	100	7,600	500	2,300	**31,200**
Other Habitat [2]	11,500	400	18,400	1,000	6,600	**37,900**
Total	**82,700**	**2,300**	**71,300**	**7,000**	**16,900**	**180,200**

[1] *includes National Forest Lands only – no data available for other ownerships*

[2] *lands that are lynx habitat but are not classified as denning or winter habitat*

Table 3-14 below shows the amount of suitable lynx habitat (i.e., denning, winter forage, and other) and unsuitable lynx habitat, both inside and outside of each LAU for each allotment for the Proposed Action. A total of approximately 40,000 ac of denning, 71,000 ac of unsuitable habitat, 31,000 ac of winter forage, and 38,000 ac of other habitat

are within the allotments that would be grazed under the Proposed Action. Note that the Upper Pasture (Buffalo Meadows) of the McQuaid Allotment would be closed with the Proposed Action and open under Alternative B; therefore, this area will not be considered under the Proposed Action.

Table 3-14. Approximate area (acres[1]) of Canada lynx habitat types present in each allotment inside and outside LAUs

Allotment	Denning Habitat	Unsuitable/ Non Habitat	Other[2] Habitat	Winter Forage	Inside LAU	Outside LAU
Arkansas C&H	1,000	3,800	2,600	1,900	9,300	900
Aspen Ridge	0	0	0	0	0	16,400
Bassam	500	2,000	500	900	3,900	31,400
Bear Creek	3,400	2,000	1,000	500	7,000	0
Brown's Creek	1,200	5,800	2,500	2,300	11,800	1,400
Cameron	0	0	0	0	0	64,300
Chalk Creek	1,600	4,900	1,500	1,600	9,600	0
Chubb Park	1,900	5,200	800	3,200	11,200	0
Four-mile	2,800	12,700	3,600	4,500	23,500	400
Little Cochetopa	14,100	14,300	12,000	2,000	42,400	400
McQuaid	10,000	15,800	6,600	12,100	44,500	100
Union	3,300	4,700	6,600	2,300	17,000	0
Total	**39,800**	**71,200**	**37,700**	**31,300**	**180,200**	**115,300**

[1] *includes National Forest Lands only – no data available for other ownerships*

[2] *lands that are lynx habitat but are not classified as denning or winter habitat*

Lynx Conservation Assessment Strategy (LCAS)
Per the Lynx Conservation Agreement (2000), the Forest Service as a committed signatory with the FWS agreed to adhere to each of the following:

Minimizing/avoiding adverse effects to lynx and incidental take of lynx by considering the information and recommendations in the LCAS to plan and evaluate management proposals.
Deferring projects that are likely to adversely affect the lynx until those forest plans are amended/revised regarding lynx topics, except when there are risks to human health or safety or where third parties are involved.
Semiannual interagency meetings for lynx management and research coordination and monitoring progress.

This agreement applies until individual Forest Plans (such as the PSICC LRMP) are revised or amended to include measures specifically for lynx conservation. The Conservation Agreement applies only in "occupied" lynx habitat. The San Isabel National Forest meets both of the criteria set forth in the agreement, which are 1) there have been at least two verified lynx observations or records since 1999, and 2) there has

been verified lynx reproduction on the Forest. As such, the Forest under this agreement must consider effects to lynx and their habitat from projects proposed in mapped lynx habitat, and must apply the following measures as specified in the LCAS.

PROJECT PLANNING – OBJECTIVES

- *Manage livestock grazing within riparian areas and willow carrs in lynx habitat to provide conditions for lynx and lynx prey.*
- *Maintain or move towards native composition and structure of herbaceous and shrub plant communities.*
- *Ensure that ungulate grazing does not impede the development of snowshoe hare habitat in natural or created openings within lynx habitat.*

PROJECT PLANNING – STANDARDS

- *Do not allow livestock use in openings created by fire or timber harvest that would delay successful regeneration of the shrub and tree components. Delay livestock use in post-fire and post harvest created openings until successional regeneration of shrub and tree components occurs.*
- *Manage grazing in aspen stands to ensure sprouting and sprout survival sufficient to perpetuate the long-term viability of the clones.*
- *Within the elevational ranges that encompass forested lynx habitat, shrub-steppe habitats should be considered as integral to the lynx habitat matrix and should be managed to maintain or achieve mid seral or higher condition.*
- *Within lynx habitat, manage livestock grazing in riparian areas and willow carrs to maintain or achieve mid seral or higher condition to provide cover and forage for prey species.*

CONSERVATION MEASURES TO PROVIDE MOVEMENT AND DISPERSAL

Livestock grazing within shrub-steppe habitats in such areas should be managed to maintain or achieve mid seral or higher condition, to maximize cover and prey availability. Such areas that are currently in late seral condition should not be degraded.

ALTERNATIVE A (NO GRAZING)

Direct, Indirect, and Cumulative Effects
Under this alternative, no livestock grazing would occur within any of the allotments assessed or within any of the suitable habitats for lynx or their prey. As discussed above, lynx prey primarily on snowshoe hare and to a lesser degree on red squirrels, other small mammals, and birds. With the exclusion of grazing, prey species abundance, composition, and distribution would likely increase or improve above current levels due to improved habitat conditions for these species. This would ultimately benefit lynx. There would be no change in denning habitat conditions since there is little overlap of denning habitat and livestock use. Cover and prey habitat necessary for movement of lynx would likely improve from the lack of grazing by cattle due to greater grass, forb,

shrub, and tree cover. The lack of grazing would improve plant regeneration or existing of coniferous trees, snags, or logs. Furthermore, the absence of grazing would eventually allow degraded areas in riparian and upland habitats to move towards an upward trend and a more natural plant community as native trees, shrubs, forbs, and grasses recolonize former pastures, although this could take many decades, where possible. All of these factors would contribute to generally improved habitat for these lynx compared to the baseline condition.

Determination (No Grazing)
Based on the above rationale, this alternative would have wholly beneficial effects to this species; therefore, it "*may affect, not likely to adversely affect*" the Canada lynx.

ALTERNATIVE B (CURRENT MANAGEMENT)

Direct, Indirect, and Cumulative Effects
The adverse effects under this alternative are incrementally higher than those discussed under the Proposed Action, due to the lack of implementation of the design criteria in BE Appendix 1. Domestic livestock and/or wild ungulates have been identified as a factor that may change the structure and/or composition of native plant communities, thus changing their ability to support lynx and their prey above in this section. Major shifts in plant species composition from desirable to less or undesirable species have been observed in many allotments. This would continue in both upland and riparian habitats. Under this alternative, rangeland health trends and habitat conditions for lynx and their prey would continue to be degraded and trends would continue in their current downward trajectories, perhaps at a higher rate in many areas.

Denning habitat would not be affected by continued livestock grazing due to the lack of grazing in these areas. However, suitable habitats for lynx and their prey, particularly within riparian areas, shrubby areas, meadows, and openings in forested areas where livestock tend to concentrate would continue to be grazed under current management, further degrading habitat conditions.

Determination (Current Management)
Based on the above rationale, this alternative "*may affect, likely to adversely affect"* the Canada lynx.

ALTERNATIVE C (PROPOSED ACTION)

Direct, Indirect, and Cumulative Effects
Denning habitat would not be affected by livestock grazing due to the lack of grazing in these areas. However, suitable habitat within riparian areas, shrubby areas, meadows, and openings in forested areas where livestock tend to concentrate would continue to be grazed; however, specific design criteria listed in Appendix 1 would be implemented by using adaptive management to minimize adverse effects. Overall, implementation of these criteria in areas that are currently in poor condition and/or in a downward trend would improve conditions to some degree, but less than if livestock grazing ceased

(Alternative A). A gradual trend towards a diverse mix of grasses, forbs, shrubs, and trees with complex and well-developed vertical and horizontal structure would improve where degraded. A wider and thicker corridor of riparian/wetland vegetation, compared to narrower and linear strips which currently exist in many areas would develop, thus benefiting this species. Improved understory vegetation from the use of design criteria would increase the abundance and species composition of insects and other prey that depend on specific plants and structure for food and reproduction. Plant species composition shifts to a more natural array of grasses and forbs is more likely to occur under this alternative, if a potential exists; however, these changes may take decades in seriously degraded areas. Where current shrub and tree distribution is scattered with individual plants that are mushroom-shaped from heavy livestock use, grazing under the Proposed Action would allow filling in, forming thickets that are more continuous with individual plants having crowns extending to or near the ground. This alternative would allow the regrowth of willows and other woody species. This would result in improved habitat for all riparian shrub-dependant species directly or indirectly benefiting Canada lynx.

Determination (Proposed Action)
Based on the above rationale, the Proposed Action "*may affect, not likely to adversely affect*" the Canada lynx.

FOREST SERVICE SENSITIVE SPECIES

Plants

Alpine Guild
Species included in the alpine guild include: *Armeria maritima* ssp. *sibirica* (Siberian sea thrift), *Braya glabella* (arctic braya), *Draba exunguiculata* (clawless draba), *Draba grayana* (Gray's Peak whitlow grass), *Ipomopsis globularis* (globe gilia), *Kobresia simpliciuscula* (simple bog sedge), *Parnassia kotzebuei* (Kotzebue's grass of parnassus), and *Ranunculus karelinii* (tundra buttercup).

ALTERNATIVE A (NO GRAZING)

Direct and Indirect Effects
Under this alternative, no livestock grazing would occur within any of the allotments assessed here. Ground disturbance and herbivory would be lessened. Plants would not be smothered by cattle feces. Soils would not be disturbed or eroded, and plants would not be uprooted. Hummocking and pedestaling would be lessened, and no rangeland developments would be placed in the alpine zone. Finally, shifts in species composition to graminoids or forbs tolerant of disturbance would be lessened in rate and magnitude or reversed.

Cumulative Effects
Cumulative effects are discussed under Alternative B below. The primary difference in cumulative effects between Alternatives A and B is the absence of livestock grazing under Alternative A. All other factors would remain at similar levels of impact.

Determination (No Grazing)
A determination of "*beneficial impact"* made for *Armeria maritima* ssp. *sibirica, Braya glabella, Draba exunguiculata, Draba grayana, Ipomopsis globularis, Kobresia simpliciuscula, Parnassia kotzebuei,* and *Ranunculus karelinii* is based on the previous discussion and following rationale:

Cessation of livestock grazing would remove the risk of trampling and grazing of the above species.
Smothering of plants by long-lived (over 3 years in alpine habitats) cow feces would not take place.
Species composition changes such as that seen in the alpine zone on the Union Allotment would be slowed or reversed.

ALTERNATIVE B (CURRENT MANAGEMENT)

Direct and Indirect Effects
Members of the alpine guild will be directly affected by herbivory, trampling, and smothering. Herbivory may lead to reduced vigor and reproduction as members of the guild compensate for lost tissues and energy. Alpine growing seasons are short and opportunities for regrowth and reproduction following herbivory are limited. Plants may also be uprooted. Alpine soils are fragile, and trampling by livestock often leads to uprooting of individuals. Plants may also be smothered by cow feces which are remarkably long-lived in the alpine and subalpine zones. Solid and intact cow feces were seen in the upper Brown's Creek area (Browns Creek Allotment) after three years of rest. All plants under such intact cow feces were smothered. Slow growing alpine species will not recover quickly from smothering.

Cumulative Effects
Cumulative effects in the alpine zone are primarily related to seven factors: climate change, mining, introduction of mountain goats, recreation, roads and trails, livestock grazing, and human development.
Determination (Current Management)
A determination of "*may adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward federal listing*".

ALTERNATIVE C (PROPOSED ACTION)

Direct and Indirect Effects
Under Alternative C, adaptive management would be implemented to ensure alpine habitats are maintained at or moving toward the desired condition. Ground disturbance and detrimental impacts to the alpine flora would be minimized. Design criteria to

protect alpine sites (BE Appendix 1) would be fully implemented. Adequate, timely, and frequent effectiveness monitoring would be carried out to ensure that design criteria designed to protect and maintain fragile alpine habitats are implemented.

Cumulative Effects
Cumulative effects are discussed under Alternative B above. Cumulative effects would remain the same except for altered management of livestock grazing. Undesirable increases in bare ground, decreases in cover, and shifts in species composition will be identified and addressed through adaptive management.

Determination (Proposed Action)
A determination of "*may adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward federal listing*".

Forest Guild

Species included in the forest guild include *Cypripedium parviflorum* (yellow lady's slipper orchid) and *Viola selkirkii* (Selkirk's violet).

ALTERNATIVE A (NO GRAZING)

Direct and Indirect Effects
Under this alternative, no livestock grazing would occur within any of the allotments assessed here. Ground disturbance and herbivory would be lessened. Plants would not be smothered by cattle feces. Soils would not be disturbed or eroded, and plants would not be uprooted. Hummocking and pedestaling would be lessened, and no rangeland developments would be implemented. Finally, shifts in species composition to unpalatable species would be lessened in rate and magnitude or reversed.

Cumulative Effects
Cumulative effects are discussed under Alternative B below. The primary difference in cumulative effects between Alternatives A and B is the absence of livestock grazing under Alternative A. All other factors would remain at similar levels of impact.

Determination (No Grazing)
A determination of "*beneficial impact"* made for *Cypripedium parviflorum* and *Viola selkirkii* is based on the previous discussion.

ALTERNATIVE B (CURRENT MANAGEMENT)

Direct and Indirect Effects
Members of the forest guild will be directly affected by herbivory, trampling, and smothering. Herbivory may lead to reduced vigor and reproduction as members of the guild compensate for lost tissues and energy. Plants may also be uprooted or smothered by cow feces which may last for more than one season, smothering all plant life beneath it.

Cumulative Effects
Cumulative effects impacting members of the forest guild are primarily related to eight factors: climate change, timber harvest, fire suppression, mining, roads and trails, recreation, livestock grazing, and human development.

Determinations (Current Management)
A determination of *"may adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward federal listing"* made for *Cypripedium parviflorum* and *Viola selkirkii* is based on the previous discussion.

ALTERNATIVE C (PROPOSED ACTION)

Under Alternative C, adaptive management would be implemented to ensure forest habitats are maintained at or moving toward the desired condition. Ground disturbance and detrimental impacts to the flora would be minimized. Design criteria to protect forested sites (BE Appendix 1) would be fully implemented. Adequate, timely, and frequent effectiveness monitoring would be carried out to ensure that design criteria designed to protect and maintain forest habitats are implemented.

Cumulative effects are discussed under Alternative B above. Cumulative effects would remain the same except for altered management of livestock grazing. Undesirable increases in bare ground, decreases in cover, and shifts in species composition will be identified and addressed through adaptive management.

Determinations (Proposed Action)
A determination of *"may adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward federal listing"* made for *Cypripedium parviflorum* and *Viola selkirkii* is based on the previous discussion.

Generalist Guild

Five species inhabit several habitats or ecotones between habitats and are thus resistant to placement in any one guild. The generalist guild includes: *Botrychium lineare* (narrow-leaved moonwort), *Machaeranthera coloradoensis* (Colorado tansy-aster), *Neoparrya lithophila* (rock-loving neoparrya), *Penstemon degeneri* (Degener's beardtongue), and *Potentilla rupincola* (Rocky Mountain cinquefoil).

ALTERNATIVE A (NO GRAZING)

Direct and Indirect Effects
Under this alternative, no livestock grazing would occur within any of the allotments assessed here. Ground disturbance and herbivory would be lessened. Plants would not be smothered by cow feces. Soils would not be disturbed or eroded, and plants would not be uprooted. Hummocking and pedestaling would be lessened, and no rangeland developments would be placed in the alpine zone. Finally, shifts in species composition

to graminoids or forbs tolerant of disturbance would be lessened in rate and magnitude or reversed.

Cumulative Effects
Cumulative effects are discussed under Alternative B below. The primary difference in cumulative effects between Alternatives A and B is the absence of livestock grazing under Alternative A. All other factors would remain at similar levels of impact.

Determinations (No Grazing)
A determination of "*beneficial impact"* made for *Botrychium lineare, Machaeranthera coloradoensis, Neoparrya lithophila, Penstemon degeneri*, and *Potentilla rupincola* is based on the previous discussion.

ALTERNATIVE B (CURRENT MANAGEMENT)

Direct and Indirect Effects
Members of the generalist guild will be directly affected by herbivory, trampling, and smothering. Herbivory may lead to reduced vigor and reproduction as members of the guild compensate for lost tissues and energy. Plants may also be uprooted or smothered by cow feces which may last for more than one season, smothering all plant life beneath it. When generalists occupy specialized substrates, the opportunity for regrowth after herbivory may be limited since those substrates are typically of low productivity, being low in nutrients and organic matter, and often high in toxic compounds. Since specialized substrates are often characterized by high levels of bare and erosive soils, trampling may lead to uprooting of individuals. Being of low productivity and often with little vegetation these sites are less often grazed by livestock but trailing may occur in the habitat as livestock traverse it.

In forested habitats livestock grazing will indirectly impact members of the generalist guild through influencing forest density. The effect of livestock grazing on forest density is complex, being influenced by forest type, grazing intensity, and other management actions such as fire suppression.

Livestock grazing will also indirectly affect members of the generalist guild in open sites such as forest openings, meadows, and parklands, resulting in four primary indirect effects: shifts in species composition, introduction of invasive species, rangeland developments, and effects to soils. One potential beneficial effect of livestock grazing in these habitats is maintenance of the site in a more open condition. Many of these sites are currently being encroached by trees and shrubs, mostly as a result of fire suppression.

Cumulative Effects
Cumulative effects impacting members of the generalist guild are primarily related to eight factors: climate change, livestock grazing, timber harvest, fire suppression, mining, roads and trails, recreation, and human development.

Determination (Current Management)

A determination of *"may adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward federal listing"* made for *Botrychium lineare, Machaeranthera coloradoensis, Neoparrya lithophila, Penstemon degeneri,* and *Potentilla rupincola* is based on the previous discussion.

ALTERNATIVE C (PROPOSED ACTION)

Under Alternative C, adaptive management would be implemented to ensure habitats occupied by members of the generalist guild are maintained at or moving toward the desired condition. Ground disturbance and detrimental impacts to sites inhabited by members of the guild would be minimized. Design criteria to protect sites (Appendix 1) would be fully implemented. Adequate, timely, and frequent effectiveness monitoring would be carried out to ensure that design criteria designed to protect and maintain habitats occupied by members of the guild are implemented.

Cumulative Effects
Cumulative effects are discussed under Alternative B above. Cumulative effects would remain the same except for altered management of livestock grazing. Undesirable increases in bare ground, decreases in cover, and shifts in species composition will be identified and addressed through adaptive management.

Determinations (Proposed Action)
A determination of *"may adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward federal listing"* made for *Botrychium lineare, Neoparrya lithophila, Machaeranthera coloradoensis, Penstemon degeneri,* and *Potentilla rupincola* is based on the previous discussion

Meadow Guild

Members of the meadow guild inhabit open sites such as montane parklands and forest openings. The group consists of three members: *Draba smithii* (Smith whitlow grass), *Festuca hallii* (plains rough fescue or Hall fescue), and *Mimulus gemmiparus* (Weber's monkeyflower).

ALTERNATIVE A (NO GRAZING)

Under this alternative, no livestock grazing would occur within any of the allotments assessed here. Ground disturbance and herbivory would be lessened. Plants would not be smothered by cow feces. Soils would not be disturbed or eroded, and plants would not be uprooted. Hummocking and pedestaling would be lessened, and no rangeland developments would be implemented. Finally, shifts in species composition to graminoids or forbs tolerant of disturbance would be lessened in rate and magnitude or reversed.

Cumulative Effects

Cumulative effects are discussed under Alternative B below. The primary difference in cumulative effects between Alternatives A and B is the absence of livestock grazing under Alternative A. All other factors would remain at similar levels of impact.

Determinations (No Grazing)
A determination of "beneficial impact" made for *Draba smithii, Festuca hallii,* and *Mimulus gemmiparus* is based on the previous discussion.

ALTERNATIVE B (CURRENT MANAGEMENT)

Direct and Indirect Effects
Members of the meadow guild will be directly affected by herbivory, trampling, and smothering. Herbivory may lead to reduced vigor and reproduction as members of the guild compensate for lost tissues and energy. Plants may also be uprooted or smothered by cow feces which may last for more than one season, smothering all plant life beneath it.

Livestock grazing in forest openings, meadows, and parklands results in four primary indirect effects: shifts in species composition, introduction of invasive species, rangeland developments, and effects to soils. One potential beneficial effect of livestock grazing in these habitats is maintenance of the site in a more open condition. Many of these sites are currently being encroached by trees and shrubs, mostly as a result of fire suppression.

Cumulative Effects
Cumulative effects impacting members of the meadow guild are primarily related to seven factors: climate change, fire suppression, livestock grazing, roads and trails, recreation, human development, and mining.

Determinations (Current Management)
A determination of "*may adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward federal listing*" made for *Draba smithii* and *Mimulus gemmiparus* is based on the previous discussion.

ALTERNATIVE C (PROPOSED ACTION)

Direct and Indirect Effects
Under Alternative C, adaptive management would be implemented to ensure meadow habitats are maintained at or moving toward the desired condition. Ground disturbance and detrimental impacts to the meadow flora would be minimized. Rangeland developments would be placed to draw livestock away from sensitive sites. Design criteria to protect meadow sites (BE Appendix 1) would be fully implemented. Adequate, timely, and frequent effectiveness monitoring would be carried out to ensure that design criteria designed to protect meadow habitats are implemented.

Cumulative Effects:

Cumulative effects are discussed under Alternative B above. Cumulative effects would remain the same except for altered management of livestock grazing. Undesirable increases in bare ground, decreases in cover, and shifts in species composition will be identified and addressed through adaptive management.

Determinations (Proposed Action)
A determination of "*may adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward federal listing*" for *Draba smithii, Festuca hallii,* and *Mimulus gemmiparus* is based on the previous discussion

Riparian Guild

Within the Analysis Area are nineteen members of the guild, including *Aquilegia chrysantha* var. *rydbergii* (golden columbine), *Astragalus leptaleus* (Park milkvetch), *Carex diandra* (lesser panicled sedge), *Carex livida* (livid sedge), *Drosera rotundifolia* (roundleaf sundew), *Epipactis gigantea* (giant helleborine), *Eriophorum altaicum* var. *neogaeum* (white-bristle cottongrass), *Eriophorum chamissonis* (Chamisso's cottongrass), *Eriophorum gracile* (slender cottongrass), *Malaxis brachypoda* (white adder's-mouth orchid), *Primula egaliksensis* (Greenland primrose), *Ptilagrostis porteri* (Porter's feathergrass), *Rubus arcticus* ssp. *acaulis* (northern blackberry), *Salix arizonica* (Arizona willow), *Salix candida* (sageleaf willow), *Salix myrtillifolia* (blueberry willow), *Salix serissima* (autumn willow), *Selaginella selaginoides* (club spikemoss) and *Utricularia minor* (lesser bladderwort).

ALTERNATIVE A (NO GRAZING)

Direct and Indirect Effects:
Under this alternative, no livestock grazing would occur within any of the allotments assessed here. Ground disturbance and herbivory would be lessened. Plants would not be smothered by cow feces. Soils would not be disturbed or eroded, and plants would not be uprooted. Nutrient loading would be decreased. Hummocking and pedestaling would be lessened, and no rangeland developments would be placed in the riparian zone. Finally, shifts in species composition to graminoids or forbs tolerant of disturbance would be lessened in rate and magnitude or reversed.

Cumulative Effects
Cumulative effects are discussed under Alternative B below. The primary difference in cumulative effects between Alternatives A and B is the absence of livestock grazing under Alternative A. All other factors would remain at similar levels of impact.

Determinations (No Grazing)
A determination of "*beneficial impact"* made for *Aquilegia chrysantha* var. *rydbergii, Astragalus leptaleus, Carex diandra, Carex livida, Drosera rotundifolia, Epipactis gigantea, Eriophorum altaicum* var. *neogaeum, Eriophorum chamissonis, Eriophorum gracile, Malaxis brachypoda, Primula egaliksensis, Ptilagrostis porteri, Rubus arcticus*

ssp. *acaulis, Salix arizonica, Salix candida, Salix myrtillifolia, Salix serissima, Selaginella selaginoides,* and *Utricularia minor* is based on the previous discussion.

ALTERNATIVE B (CURRENT MANAGEMENT)

The discussion of direct and indirect effects below is split into two sections: Effects to Plants in Riparian Habitats and Effects to Plants in Wetland Habitats.

Direct and Indirect Effects to Plants in Riparian Habitats
Members of the riparian guild will be directly affected by herbivory, trampling, and smothering. Herbivory may lead to reduced vigor and reproduction as members of the guild compensate for lost tissues and energy. Plants may also be uprooted. Cattle, in particular, congregate and loiter in the riparian zone, resulting in a concentration of herbivory, trampling, and smothering in that habitat. Utilization is generally measured in riparian areas as a result of concentrated impacts. Herbivory may be severe with extremely low stubble heights and little or no opportunity for regrowth and reproduction. Trampling and churning is also more severe on wet soil leading to effects ranging from hoof-punching to churning the soil into an organic muck with no plant species present.

Indirect effects from livestock grazing will also impact members of the riparian guild. Indirect effects considered here include:

Changes in hydrology and water quality, including downcutting, lowered water tables, decreases in the extent, intensity, and duration of wetted soils, hummocking, pedestaling, changes in stream morphology and other characteristics, and nutrient enrichment.
Changes in species composition, including changes in seral stages, replacement of individual species, invasion by noxious weeds or invasive plant species, and invasion by xeric species.
Changes in soil characteristics, including compaction, erosion, bank sloughing, unstable banks, and nutrient enrichment.
Changes in riparian habitat resulting from rangeland developments.

Wetland habitats may escape some direct impacts from livestock grazing due to livestock preferences. Cattle and horses, in particular, tend to avoid wet or boggy habitats, so herbivory and trampling may be less pronounced. Margins of wet habitats, however, may be severely impacted from livestock seeking water, and recent droughts may have allowed easier access into formerly mucky sites.

Cumulative Effects
Cumulative effects impacting members of the riparian guild are primarily related to ten factors: ditching and draining, climate change, livestock grazing, roads and trails, fire suppression, recreation, timber harvest, fire suppression, urban development, and mining.

Determinations (Current Management)
A determination of "*likely to result in a loss of viability in the Planning Area, or in a trend toward federal listing*" made for inhabitants of fens, wetlands, and willow carrs

Carex diandra, Carex livida, Drosera rotundifolia, Eriophorum altaicum var. *neogaeum, Eriophorum chamissonis, Eriophorum gracile, Primula egaliksensis, Ptilagrostis porteri, Salix arizonica, Salix candida, Salix myrtillifolia, Utricularia minor* and *Salix serissima* is based on the previous discussion.

Determinations (Current Management)
A determination of "*may adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward federal listing*" made for riparian and spring-dwelling species *Aquilegia chrysantha* var. *rydbergii, Astragalus leptaleus, Epipactis gigantea, Malaxis brachypoda, Rubus arcticus* ssp. *acaulis* and *Selaginella selaginoides* is based on the previous discussion.

ALTERNATIVE C (PROPOSED ACTION)

Direct and Indirect Effects
Under Alternative C, adaptive management would be implemented to ensure riparian habitats are maintained at or moving toward the desired condition. Ground disturbance and detrimental impacts to the habitat would be minimized. Rangeland developments would be placed to draw livestock away from sensitive sites. Design criteria to protect riparian zones (Appendix 1) would be fully implemented. Adequate, timely, and frequent effectiveness monitoring would be carried out to ensure that design criteria designed to protect riparian habitats are implemented.

Cumulative Effects
Cumulative effects are discussed under Alternative B above. Cumulative effects would remain the same except for altered management of livestock grazing. Undesirable increases in bare ground, decreases in cover, and shifts in species composition will be identified and addressed through adaptive management.

Determinations (Proposed Action)
A determination of "*may adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward federal listing*" made for *Aquilegia chrysantha* var. *rydbergii, Astragalus leptaleus, Carex diandra, Carex livida, Drosera rotundifolia, Epipactis gigantea, Eriophorum altaicum* var. *neogaeum, Eriophorum chamissonis, Eriophorum gracile, Malaxis brachypoda, Primula egaliksensis, Ptilagrostis porteri, Rubus arcticus* ssp. *acaulis, Salix arizonica, Salix candida, Salix myrtillifolia, Salix serissima, Selaginella selaginoides,* and *Utricularia minor* is based on the previous discussion.

Substrate Specialists Guild

Within the Analysis Area is one substrate specialist, *Eriogonum brandegeei* (Brandegee buckwheat), that inhabits soil derived from Dry Union Formation and lower Morrison Formation.

ALTERNATIVE A (NO GRAZING)

Direct and Indirect Effects
Under this alternative, no livestock grazing would occur within any of the allotments assessed here. Ground disturbance and herbivory would be lessened. Plants would not be smothered by cow feces. Soils would not be disturbed or eroded, and plants would not be uprooted, and no rangeland developments would be placed in the Dry Union Formation soils. Finally, shifts in species composition to graminoids or forbs tolerant of disturbance would be lessened in rate and magnitude or reversed.

Cumulative Effects
Cumulative effects are discussed under Alternative B below. The primary difference in cumulative effects between Alternatives A and B is the absence of livestock grazing under Alternative A. All other factors would remain at similar levels of impact.

Determinations (No Grazing)
A determination of "*beneficial impact"* made for *Eriogonum brandegeei* is based on the previous discussion.

ALTERNATIVE B (CURRENT MANAGEMENT)

Direct and Indirect Effects
Eriogonum brandegeei will be directly affected by herbivory, uprooting, trampling, and smothering. Herbivory may lead to reduced vigor and reproduction as it compensates for lost tissues and energy. Substrates occupied by substrate specialists are typically of low productivity being low in nutrients and organic matter, and often high in toxic compounds. Thus, opportunity for regrowth and reproduction following herbivory may be limited. Since the habitat is characterized by high levels of bare and erosive soils, trampling may lead to uprooting of individuals. Being of low productivity and often with little vegetation these sites are less often grazed by livestock but trailing may occur in the habitat as livestock traverse it.

Eriogonum brandegeei will also be indirectly impacted, primarily through erosion, invasion by exotic species, and placement of rangeland developments within the habitat.

Cumulative Effects
Several factors impacting other guilds do not apply to the substrate specialists guild and *Eriogonum brandegeei,* the sole member of the guild analyzed here. Climate change has had less impact to this habitat as plants inhabiting such sites are stress-tolerators and thus are quite drought-tolerant. Fire suppression is not an issue since these habitats are unproductive and generally unable to carry fire. Timber harvest has not impacted the guild as little timber, and virtually no merchantable timber, grows on the sites. Cumulative effects that have impacted members of the substrate specialists guild are primarily related to five factors: livestock grazing, recreation, roads and trails, mining, and urban development.

Determinations (Current Management)
A determination of "*may adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward federal listing*" made for *Eriogonum brandegeei* is based on the previous discussion.

ALTERNATIVE C (PROPOSED ACTION)

Direct and Indirect Effects
Under Alternative C, adaptive management would be implemented to ensure substrate specialist habitats are maintained at or moving toward the desired condition. Ground disturbance and detrimental impacts to the habitat would be minimized. Rangeland developments would be placed to draw livestock away from sensitive sites. Design criteria to protect fragile soils (BE Appendix 1) would be fully implemented. Adequate, timely, and frequent effectiveness monitoring would be carried out to ensure that design criteria designed to protect these habitats are implemented.

Cumulative Effects
Cumulative effects are discussed under Alternative B above. Cumulative effects would remain the same except for altered management of livestock grazing. Undesirable increases in bare ground, decreases in cover, and shifts in species composition will be identified and addressed through adaptive management.

Determinations (Proposed Action)
A determination of "*may adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward federal listing*" made for *Eriogonum brandegeei* is based on the previous discussion.

AQUATICS

Rocky Mountain Capshell Snail

ALTERNATIVE A (NO GRAZING)

Direct and Indirect Effects
The effect of this alternative would result in improved riparian systems and Rocky Mountain capshell snail habitat in the Analysis Area. However, other forest management activities would continue to impact/degrade these same systems, limiting riparian recovery. Overall, riparian systems would move toward the desired condition. As riparian systems improve, the quantity of suitable habitat for *A. coloradensis* would increase, likely leading to greater production.

Cumulative Effects

This alternative would not add to the cumulative effects to Rocky Mountain capshell snail.

Determination (No Grazing)
Implementation of Alternative A will improve and contribute to properly functioning riparian systems across the Analysis Area, improving and protecting habitat for *A. coloradensis* as well. Implementation of Alternative A will have a "*beneficial impact"* on Rocky Mountain capshell snail by improving riparian systems and their habitat.

ALTERNATIVE B (CURRENT MANAGEMENT)

Direct, Indirect and Cumulative Effects
Effects of Alternative B on Rocky Mountain capshell snail populations would primarily be from indirect rather than direct impacts. Individual snails could be trampled by livestock wading and watering in lakes, ponds and pools inhabited by *A. coloradensis*. However, this would not likely be significant if not for the indirect effects of this activity. Impacts from degradation of riparian systems and water quality, increased water temperatures, destabilization of stream banks, increased erosion and sedimentation, loss of stream cover, etc., would impact *A. coloradensis* negatively. Many other forest management activities would also affect *A. coloradensis* similarly. Therefore, it would be difficult, if not impossible, to isolate and quantify the impacts to *A. coloradensis* populations that are solely related to livestock grazing. Because of the confounding nature of impacts from the suite of management activities, we chose to evaluate the impact of livestock grazing on riparian systems as an index for *A. coloradensis* production. For this analysis to accurately reflect impacts on *A. coloradensis*, we assume that the quality of riparian systems is directly related to *A. coloradensis* production.

Determination (Current Management)
Implementation of Alternative B will allow livestock grazing to continue under current management strategies. The downward trends in rangeland condition described in Section 8.2 and Appendix 2 of the BE would likely continue, resulting in further degradation of riparian systems and snail habitat in the Analysis Area. Therefore, implementation of Alternative B is "*likely to result in a loss of viability in the Planning area, or in a trend toward federal listing"*.

ALTERNATIVE C (PROPOSED ACTION)

Direct and Indirect Effects
Negative impacts to riparian systems and snail habitat from implementation of Alternative C will be similar in scope to those of Alternative B discussed above, but the magnitude of these impacts would be less severe because of the Monitoring and Implementation plans developed for use with this alternative.

Implementation of Alternative C should result in reversing the downward trends in rangeland condition described in Section 8.2 and Appendix 2 of the BE, and more rapidly

than under Alternative B (Current Management). However, Alternative A (No Grazing) will likely achieve the desired condition more quickly than either Alternative B or C.

Moreover, Alternative C is the only alternative which meets the twin objectives of the Forest Service mission of caring for the land and serving the people (i.e., the desired condition for riparian systems in the Analysis Area can be met and the cultural/traditional practice of livestock grazing will continue). Alternative A does not meet these twin objectives because grazing would not be allowed and permit holders would not be able to continue their cultural/traditional practices. Alternative B likely does not meet the twin objectives because it is questionable if the desired condition for riparian systems can be met in a reasonable time frame.

Cumulative effects
Under Alternative C, the cumulative effects would be similar in scope and magnitude to those described previously for Alternative B .

Determination (Proposed Action)
Implementation of Alternative C will allow livestock grazing to continue with adaptive management to achieve the desired condition for riparian systems. However, riparian systems and Rocky Mountain capshell snail habitat will continue to be impacted from livestock grazing until the desired condition is met. Therefore, implementation of Alternative C "*may adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward federal listing*".

WILDLIFE

The wildlife species below have been grouped together because of their similar habitats and/or potential effects for each alternative including the Proposed Action.
Hudsonian Emerald Dragonfly, Boreal Toad, Northern Leopard Frog, Pygmy Shrew, and White-Tailed Ptarmigan

These species are grouped because of their similar vegetation communities and habitats in higher (7,000 ft and higher) elevational habitats such as alpine tundra, sub-alpine grasslands, boreal forests, and associated riparian areas. Each of these species are closely tied to permanent and ephemeral waters and/or adjacent riparian vegetation including lentic-littoral (bogs), lotic-depositional (springs), marshes, ponds, kettles, beaver ponds, lakes, reservoirs, streams, and other bodies of water.

Hudsonian Emerald Dragonfly – All know locations of this rare dragonfly are within a 40-mile radius of Boulder, Colorado; however, no surveys have been completed within the Analysis Area. Suitable unsurveyed habitat is present within the Analysis Area and

this species may be present within grazed or potentially grazed areas considered in this assessment.

Boreal Toad – Only one population of boreal toads in Colorado (Sawatch Range) is considered a viable breeding population by the Boreal Toad Recovery Team, and that is located within the Analysis Area (Keinath and McGee 2005). There are fifteen known breeding sites in Chaffee County, of which the CNHP (2005) considers one of the few remaining strongholds of this species in the state. Boreal toads have been documented in alpine and higher elevation riparian areas within the Chalk Creek, McQuaid, Four-mile, and Browns Creek allotments and suitable but unsurveyed habitats are also present on the Arkansas S&G, Union, Chalk Creek, Arkansas C&H, Little Cochetopa, McQuaid, Four-mile, and Browns Creek allotments (see BE, Table 6 in Boreal Toad Section 9.3.3). Surveys have been conducted by the Forest Service, CNHP, and CDOW for boreal toads in portions of the Analysis Area (District Files); however, many areas of suitable habitat remain unsurveyed. In the Analysis Area, roughly 150 stream miles with riparian vegetation between approximately 8,000 –12,000 ft have been identified as potential/suitable boreal toad breeding habitat within the Analysis Area (Table 6). Suitable summer and wintering habitat is likely much greater of an area extending up to approximately five miles from suitable streams, pond, lakes, etc. encompassing upland forests, wetlands, meadows, and other areas. Limited surveys have been conducted elsewhere within the Analysis Area on other allotments, therefore presence is assumed until adequate surveys are completed.

Northern Leopard Frog – They are documented to occur on all National Forests in the region. In addition, this species occurs off Forest Service lands throughout its range (Hammerson 1982). No breeding areas have been located or recorded; however, specific surveys for leopard frogs have not been conducted in any of the allotments within the Analysis Area. They may be present on all allotments within the Analysis Area.

Pygmy Shrew – This species has been either documented in some or all allotments during protocol and non-protocol wildlife surveys, or otherwise documented or suspected within allotments within the Analysis Area. Suitable unsurveyed habitat is present in each allotment. Therefore, this species is assumed present in each allotment assessed here where suitable habitat exists.

White-tailed Ptarmigan – This species can be found widely distributed throughout the alpine and higher elevation riparian areas within the Analysis Area on the Arkansas S&G, Union, McQuaid, Four-mile, Chalk Creek, Browns Creek, Arkansas C&H, and Little Cochetopa allotments. Both confirmed and possible breeding and winter-concentration areas have been recorded in each of these allotments. No systematic protocol surveys have been conducted for this analysis; however, isolated surveys conducted in a few drainages in Little Cochetopa, Browns Creek, and Arkansas S&G allotments documented presence of ptarmigans during 2004-2006.

ALTERNATIVE A (NO GRAZING)

Direct, Indirect, and Cumulative Effects

Elimination of grazing would allow riparian areas in poor condition due to past heavy use (as has been documented within these allotments) to improve. Riparian plant composition and vigor would increase and move toward becoming a potential natural community. Over time, the accumulation of plant litter would increase, providing greater cover and improving habitat conditions for these species and others that rely on them as prey.

The exclusion of livestock grazing in general can have substantial short-term (one year or less), long-term (multiple years), and permanent changes such as vegetation species composition shifts back to native species, and improved channel, and water table conditions. These impacts and other changes in vegetative communities from no livestock grazing would indirectly, directly, and cumulatively benefit these species. All of the above factors would contribute to increased and/or improved habitat conditions for these species, compared to the baseline condition. There would be no direct, indirect, or cumulative adverse impacts from this alternative to these species due to the lack of livestock grazing; rather, habitat conditions would be expected to improve for these species.

Determinations (No Grazing)
Based on the above rationale, this alternative would have a *"beneficial impact"* on Hudsonian emerald dragonfly, boreal toad, northern leopard frog, pygmy shrew, and white-tailed ptarmigan.

ALTERNATIVE B (CURRENT MANAGEMENT)

Direct, Indirect, and Cumulative Effects
Although livestock (cattle) commonly do not graze in alpine, subalpine, and other high elevation areas, these vegetative communities are within several allotments and they have been and potentially could be grazed under this alternative.

To avoid or minimize impacts, domestic livestock grazing in alpine and sub-alpine areas should be carefully controlled to avoid reduction in vegetative cover. It is particularly important that livestock grazing be excluded from identified ptarmigan wintering areas (Braun et al. 1976). Livestock grazing would affect this species by trampling the nests located on the ground or competing for forage in summer and winter concentration areas.

This alternative would add to the cumulative effects to these species. Other cumulative effects of past and on-going federal, state, private, and other activities include mining, livestock grazing, fire suppression, road construction and maintenance, motorized and non-motorized recreation, water developments, timber harvesting, and human development. Direct and indirect short-term, long-term, and permanent impacts to these species from each of these activities would continue to occur. Please refer to cumulative

effects discussion above in this section for a further discussion of the effects from these activities.

Determinations for Hudsonian Emerald Dragonfly, Northern Leopard Frog, Pygmy Shrew, and White-Tailed Ptarmigan (Current Management)

All of the impacts discussed above are likely to occur under this alternative, adversely impacting these species during critical periods such as breeding, foraging, and hibernation, and impacting their shelter and other important components of their life history. These impacts would be short-term, long-term, and permanent, as livestock grazing under this alternative would cause changes to their habitats and increase mortality as described above for each species. Based on these rationale, this alternative *"may adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward federal listing"* of these species.

Current management under this alternative would continue to have substantial negative impacts on toad habitat: vegetation, stream banks, and wetlands. Under this alternative, suitable habitat comprised of streams, ponds, and lakes having sedges, grasses, forbs, shrubs, and trees would continue to be degraded by livestock. Trampling and compaction can damage the shrub, sedge and grass components of these systems, as well as damage stream banks. Rodent burrows, which are heavily used by toads for winter hibernation, would be lost due to increased compaction, thereby reducing the ability of toads to burrow underground in order to prevent desiccation or freezing (Duellman and Trueb 1986, Swanson et al. 1996). Elimination of aquatic emergent vegetation in breeding ponds would preclude egg survival to hatching. Livestock grazing, by changing the amount, structure, and composition of vegetation would negatively impact food sources for boreal toads, by reducing the number of insect prey upon which these amphibians depend (Fleischner 1994) (see discussions elsewhere in this section for more information). Summer habitat or movement corridors may also be impacted from changes in the vegetation and habitat structure, and trampling of young would cause direct mortality.

Determination for Boreal Toad (Current Management)
All of the impacts discussed above are likely to occur under this alternative, adversely impacting this species during critical periods such as breeding, foraging, and hibernation, and impacting their shelter and other important components of its life history. These impacts would be short-term, long-term, and permanent, as livestock grazing under this alternative within their suitable habitats would cause substantial changes to their habitats and increase mortality as described above. Any decline in this subpopulation would likely result in a loss of viability of boreal toads within the Planning Area (San Isabel and Pike National Forests), and would likely warrant listing under the ESA. Based on this and the above rationale, this alternative is *"likely to result in a loss of viability in the Planning Area, or in a trend toward federal listing"* for the boreal toad.

ALTERNATIVE C (PROPOSED ACTION)

Direct, Indirect, and Cumulative Effects
Under this alternative, changes in plant composition to less palatable species, reduction of species that are palatable, and change in vegetative structure would not likely occur due to the *Monitoring Plan* and design criteria. In a variety of different habitats, there is a positive relationship between volume and structure diversity of vegetation and density of birds and other wildlife, which would generally improve and be greater than under Alternative B. Livestock grazing would continue to alter vegetative species composition, reduce the number of herbaceous species in the understory, decrease the volume of the understory, and change the abundances, compositions, and richness of wildlife species; however, these effects would be less than under Alternative B.

Livestock grazing under this alternative would have some short-term (one year or less) and long-term (multiple years) impacts; however, permanent changes such as vegetation composition shifts to non-native or undesirable species, down-cutting and erosion of streams, or changes/lowering of the water table would not occur due to the design criteria. These impacts and other changes in vegetative communities from livestock grazing would indirectly, directly, and cumulatively affect the species addressed here.

Approximately 139 miles of known or potential habitat within riparian and upland areas are within the Arkansas S&G, Union, Chalk Creek, Arkansas C&H, Little Cochetopa, McQuaid, Four-mile, and Brown;s Creek allotments. Alternative C would withdraw (be closed to) livestock grazing from one known breeding population of boreal toads and approximately 25 stream miles of potential boreal toad habitat in the upper pasture (Buffalo Meadows) of the McQuaid Allotment. As a result, these known/potentially occupied areas would be protected from adverse impacts from livestock grazing as outlined above, benefiting this species, although impacts would not be eliminated through the design criteria.

This alternative would add to the cumulative effects to these species. Other cumulative effects of past and on-going federal, state, private, and other activities include mining, livestock grazing, fire suppression, road construction and maintenance, motorized and non-motorized recreation, water developments, timber harvesting, and human development. Direct and indirect short-term, long-term, and permanent impacts to these species from each of these activities would continue to occur. Please refer to cumulative effects discussion above in this section for a further discussion of the effects from these activities.

Determinations for the Hudsonian Emerald Dragonfly, Boreal Toad, Northern Leopard Frog, Pygmy Shrew, and White-Tailed Ptarmigan (Proposed Action)

All of the impacts discussed above are likely to occur under this alternative, adversely impacting these species during critical periods such as breeding, foraging, hibernation, etc., and would impact their shelter and other important components of their life history. These impacts would be short-term, long-term, and permanent, as livestock grazing under

this alternative within their suitable habitats would cause changes to these habitats and increase mortality as described for each species. However, the design criteria and the desired condition as identified in BE Appendix 1, together with the measures specified in the Monitoring Plan and Implementation Plan, would minimize potential impacts to a level that would not be substantial for each of these species. Based on these rationale, the Proposed Action *"may adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward federal listing"* for these species.

Brewer's Sparrow, Gunnison Sage Grouse, Loggerhead Shrike, Northern Harrier, and Gunnison's Prairie Dog

These species are grouped because of their similar habitats and vegetation communities such as montane meadows, grasslands, sagebrush, shrublands, and associated riparian areas.

ALTERNATIVE A (NO GRAZING)

Brewer's Sparrow, Gunnison Sage Grouse, Loggerhead Shrike, and Northern Harrier

Direct, Indirect, and Cumulative Effects
Generally, the lack of grazing in uplands, riparian, shrubby areas, meadows, and openings in forested areas, where livestock tend to concentrate their use, would improve habitat conditions for these species. Areas that are currently in poor condition and/or in a downward trend would improve overall. A trend towards a diverse mix of grasses, forbs, and shrubs with complex and well-developed vertical and horizontal structure would improve where degraded. An improved understory of vegetation from the lack of grazing would increase the abundance and species composition of insects and other prey, as they depend on specific plants and structure to provide food and reproduction sites, benefiting these species. Plant species composition shifts to a more natural array of grasses and forbs is more likely to occur under this alternative, if a potential exists; however, these changes may take decades or longer, if even at all, where seriously degraded. This alternative would allow the regrowth of shrubs and other woody species that would result in improved habitat for species analyzed here.

The exclusion of livestock grazing in general can have substantial short-term (one year or less), long-term (multiple years), and permanent changes such as vegetation species composition shifts back to native species, and improved channel, and water table conditions. These impacts and other changes in vegetative communities from no livestock grazing would indirectly, directly, and cumulatively benefit these species. All of the above factors would contribute to increased and/or improved habitat conditions for these species, compared to the baseline condition. There would be no direct, indirect, or cumulative adverse impacts from this alternative to these species due to the lack of livestock grazing; rather, habitat conditions would be expected to improve for these species.

Determinations (No Grazing)

Based on the above rationale, this alternative would have a *"beneficial impact"* on these species.

Gunnison's Prairie Dog (No Grazing)
The lack of livestock grazing would eliminate direct impacts caused by trampling burrows or compacting soils. Prairie dogs are typically found in colonies, living beneath the ground and foraging upon roots, grasses, and forbs. Livestock grazing is thought to aid the expansion of prairie dog towns by lowering vegetation height (which enables better predator detection and dispersal). Short (less than 8 inch) vegetation facilitates colony expansion, while periodic cattle exclusion or reduced stocking rates may reduce prairie dog populations (Augustine 2004). Through their multiple effects on plant biomass, nutrient content, and species composition, prairie dogs create patches in the landscape that are preferentially used by large grazers such as bison but they can also compete with cattle for forage (Augustine 2004). The exclusion of cattle in areas where prairie dogs are present would negatively impact this species to some degree, although this would not in itself limit their presence, abundance, or distribution within the Analysis Area.

Determination (No Grazing)
Based on the above rationale, this alternative *"may adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward federal listing"* for the Gunnison's prairie dog.

ALTERNATIVE B (CURRENT MANAGEMENT

Direct, Indirect, and Cumulative Effects
Walsberg (2005) found that in areas grazed by livestock, fledgling (nest) success of birds in open ponderosa pine and pine savanna in Arizona was reduced by 75% in grazed areas compared to adjacent ungrazed areas. Walsberg determined that cattle grazing reduced vegetation cover over nests (on the ground and lower structural levels) by an average of 41%, exposing nests to more extreme climatic conditions. Livestock cropped grasses exposing ground nests to more extreme microclimates such as increased wind speed, more intense solar radiation during daylight hours, and greater radiative heat loss at night. This is particularly detrimental to ground nesting birds, or species addressed here that depend upon them for prey as the reduction in overhead cover may expose birds to increased. Direct mortality in the form of trampling of young in nests has been documented. In addition, cattle may cause adult birds to flush from their nests, increasing the attraction of predators.

In addition to general effects of the removal of herbaceous cover, the season of use by livestock can have substantial short- and long-term impacts to ground nesting birds. In particular, spring and early summer grazing can have substantially more impact than other times of the year. Grazing during the spring and early summer may directly decrease the reproductive success of breeding birds (and other wildlife) through destruction or disturbance of nests or dens on the ground or in low shrubs.

This alternative would add to the cumulative effects to these species. Other cumulative effects of past and on-going federal, state, private, and other activities include mining, livestock grazing, fire suppression, road construction and maintenance, motorized and non-motorized recreation, water developments, timber harvesting, and human development. Direct and indirect short-term, long-term, and permanent impacts to these species from each of these activities would continue to occur.

Determinations (Current Management)
Each of the impacts discussed above are likely to occur under this alternative, adversely impacting these species during critical periods such as nesting/denning and foraging, and would impact their shelter and other important components of their life histories. These impacts would be short-, long-term, and permanent, as livestock grazing under this alternative would cause substantial changes and increase mortality as described above. Based on the above rationale, this alternative *"may adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward federal listing"* for these species.

ALTERNATIVE C (PROPOSED ACTION)

Direct, Indirect, and Cumulative Effects
Under this alternative, changes in plant composition to less palatable species, reduction of species that are palatable, and change in vegetative structure would not likely occur due to the *Monitoring Plan*, design criteria, and desired condition. Thus, these characteristics would improve from the current condition. Livestock grazing would continue to alter vegetative species composition and reduce the number of herbaceous species in the understory. Decreases in the volume of the understory, and changes in the abundances, compositions, and richness of wildlife species may still occur; however, less so than under Alternative B.

Grazing during the spring and early summer would directly decrease the reproductive success of breeding birds and other species through destruction or disturbance of nests or dens on the ground or in low shrubs. Grazing during other seasons can indirectly affect bird and other wildlife species through habitat changes. However, utilization levels, stubble height requirements, and other design criteria in BE Appendix 1 would minimize these impacts.

Abundance and species composition of insects that are prey for some of these species would be reduced by changes in the understory vegetation, as many insect species depend on specific plants to provide food and reproduction sites. The implementation of the design criteria would minimize these impacts.

Trampling of burrows and compacted soil by livestock, competition for food, alteration of the vegetative structure or species composition would occur, but to a limited degree due to the design criteria.

This alternative would add to the cumulative effects to these species. Other cumulative effects of past and on-going federal, state, private, and other activities include mining, livestock grazing, fire suppression, road construction and maintenance, motorized and non-motorized recreation, water developments, timber harvesting, and human development. Direct and indirect short-term, long-term, and permanent impacts to these species from each of these activities would continue to occur.

Determinations (Proposed Action)
Each of the above impacts are likely to occur under this alternative, adversely impacting these species during critical periods such as breeding and foraging, as well as their shelter and other important life history components. These impacts would be short-term and long-term, but not permanent. Livestock grazing under this alternative within their habitats would cause these changes and increase mortality as described above for each species. However, the above measures including the design criteria for Gunnison sage grouse, Riparian Species Guild, and Montane Meadow Guild, and the desired condition for each as identified in BE Appendix 1, together with the measures specified in the Monitoring Plan and Implementation Plan, would minimize potential impacts to a level that they would not be substantial for each species. Based on the above rationale, the Proposed Action *"may adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward federal listing"* for these species.

Black Swift, Olive-Sided Flycatcher, Purple Martin, Lewis' Woodpecker, Three-Toed Woodpecker, Boreal Owl, Flammulated Owl, Northern Goshawk, Peregrine Falcon, Fringed Myotis, Townsend's Big-Eared Bat, Common Hog-Nosed Skunk, American Marten, and North American Wolverine

These species are placed in this broad group due to their use of similar vegetation communities, common habitats, and/or similar responses to livestock grazing. They utilize a wide variety of habitats including openings, forested areas, and riparian areas containing both permanent and ephemeral streams and open waters. These species are found in various vegetation communities including alpine tundra, montane meadows, openings in forests, and along edges and the interior of several forest communities such as piñon-juniper, ponderosa pine, mixed conifer, aspen, and boreal forests.

Black Swift – This Neotropical migrant species nests behind waterfalls and in riparian areas that contain water spray habitats. Surveys have been conducted within suitable nesting habitat within the Analysis Area and one site is located outside of a grazing allotment in the Chalk Creek drainage. There is no potentially suitable nesting habitat within any allotment; however, other habitats such as foraging habitat are present.

Purple Martin – This species breeds in ponds, lakes, and riparian areas. There are no documented occurrences within the Analysis Area; however, no specific surveys have been conducted. They have the potential to occur in suitable habitat, which is present on each of the allotments. No species or site-specific surveys have been conducted for this species within the Analysis Area.

Brewer's Sparrow, Loggerhead Shrike, and Northern Harrier – Both Brewer's sparrow and loggerhead shrike have been documented and/or are likely to occur in portions of each of the allotments where there are suitable grasslands and sagebrush habitats. There are no records of northern harriers in any of the allotments considered in this assessment. Portions of the Arkansas River Valley, San Luis Valley, and South Park outside of National Forest lands but adjacent to each of the allotments in this assessment contain known or suspected populations and suitable habitat for harriers. No species or site-specific surveys have been conducted for any of these species within the Analysis Area.

Gunnison Sage Grouse (GSG) – They have been documented on the Little Cochetopa Allotment (District Files) which is adjacent to the CDOW Poncha Pass reintroduction area, where breeding leks and summer/wintering concentration areas are located approximately two miles away. Radio-telemetry relocations of some of the released birds have been documented on the Little Cochetopa Allotment (District Files). Protocol surveys have not been conducted within this allotment or elsewhere on the Salida District to determine presence or use areas. Therefore, suitable sagebrush, riparian areas, and adjacent uplands are assumed to potentially have GSG use during the summer and fall as they disperse from the spring breeding areas and before they return to their winter concentration areas either in the Poncha Pass Area or elsewhere such as the Gunnison Valley Reintroduction Site to the west.

Flammulated Owl, Three-toed Woodpecker, Olive-sided Flycatcher, Lewis' Woodpecker, Boreal Owl, and Pygmy Shrew – These species have been either documented in some or all allotments during protocol and non-protocol wildlife surveys, or otherwise documented or suspected within allotments within the Analysis Area. Suitable unsurveyed habitat is present in each allotment. Therefore, these species are all assumed present in each allotment assessed here where suitable habitat exists.

Peregrine Falcon – Surveys and monitoring of known peregrine falcon eyries (nest sites) have been conducted within suitable habitat areas such as cliffs and rocky outcrops within the Analysis Area. Known eyries are located in or adjacent to Chalk Creek, Cameron, Union, and Four-mile allotments.

Northern Goshawk – Goshawks have been documented during protocol surveys and incidental observations within the Analysis Area in many allotments and suitable nesting and foraging habitat – both surveyed (to protocol) and unsurveyed suitable habitat is present in all allotments. Therefore, goshawks are assumed present in each allotment assessed here where suitable habitat exists.

Fringed Myotis and Townsend's Big-eared Bat – No specific surveys for these bat species have been conducted and no historic records of their presence exist (CNHP 2005) within the Analysis Area. However, potential habitat is present in portions of each of the allotments within the Analysis Area with the exception of the Arkansas S&G, Union, and McQuaid allotments, which are too high elevation and outside of the distributional range of these species.

American Marten, Hog-nosed Skunk, and North American Wolverine – No site specific or protocol surveys have been conducted in the Analysis Area for any of these species, although they may be present within suitable habitats – particularly marten. Therefore, these species are assumed present in each allotment assessed here where suitable habitat exists.

ALTERNATIVE A (NO GRAZING)

Direct, Indirect, and Cumulative Effects
Generally, the lack of grazing within riparian, shrubby areas, meadows, forests, openings in forested areas, alpine areas including tundra, etc. would improve habitat conditions for these species. This alternative would allow the regrowth of willows and other woody species that would result in improved riparian habitat directly or indirectly benefiting these species. Each of the above would directly benefit species such as black swifts, flycatchers, purple martin, each of the woodpeckers, owls, and bats, and indirectly predators such as martens, hog-nosed skunk, falcon, and goshawk.

Many of these species such as the swift, flycatcher, martin, woodpeckers, owls, bats, marten, and wolverine depend on cavities for nesting and/or roosting and also require standing, dying trees, snags, and downed logs for foraging or prey habitat. Livestock grazing impacts the regeneration of riparian trees and shrubs such as willows, cottonwoods, and aspen, and the lack of grazing would improve their regeneration. No grazing will have no impact on regeneration or existing coniferous trees, snags, or logs.

The exclusion of livestock grazing in general can have substantial short-term (one year or less), long-term (multiple years), and permanent changes such as vegetation composition shifts back to native species, improved channel conditions, and the water table. These impacts and other changes in vegetative communities indirectly, directly, and cumulatively benefit the species addressed. There would be no direct, indirect, or cumulative adverse impacts to these species due to the lack of livestock grazing; rather habitat conditions would be expected to improve for each of these species.

Determinations (No Grazing)
Based on the above rationale, this alternative would have a ***"beneficial impact"*** on each of these species.

ALTERNATIVE B (CURRENT MANAGEMENT)

Direct, Indirect, and Cumulative Effects
A well-developed understory of grass, forbs, shrubs, and smaller/younger trees is critical for a variety of wildlife species, including owls, goshawk, peregrine, skunk, marten, and wolverine and their prey addressed here. In a variety of different habitats, there is a complex, both positive and negative relationship between volume and structure diversity of vegetation and density of birds and other wildlife. For example, some species or their prey are only found in areas with dense understory vegetation. As the understory is

reduced under this alternative, these species would be impacted. Conversely, others of these species or their prey that prefer a more open understory may colonize the area or increase in abundance and benefit. Many of these avian and mammalian species or their prey forage at least in part in open understories. Foraging may become more efficient in open understories due to reduced vegetation, although there may be less cover and forage for prey species, which would ultimately reduce their numbers in the long-term.

Grazing can alter the prey availability of certain predators such as owls, goshawk, falcon, marten, and wolverine by removing herbaceous vegetation that serves as food and cover for small mammals. Livestock could negatively impact wildlife populations directly and indirectly by harvesting seed heads and other plant parts while grazing, thus removing food resources that would otherwise be available to rodents and other small mammals. Hayward et al. (1997) and many others have found that grazing negatively affected populations of many small mammal species through reductions in cover. Livestock might also affect a wide variety of wildlife species indirectly by altering the species composition of the vegetation and food availability. Livestock can affect small mammals directly by trampling burrows, compacting soil, and competing for food, or indirectly by altering the structure or species composition of the vegetation in a manner that influences habitat selection by small mammals.

Insects are an important food source for each of these species addressed here or their offspring. Abundance and species composition of insects would be reduced by changes in the understory vegetation from grazing under this alternative, as many insect species depend on specific plants to provide food and reproduction sites. The structure and density of the vegetation may be more important when foraging for insects than the number or species of insects available. Foliage gleaners will probably be most affected by changes in the structure of the understory, though some species are capable of adapting foraging strategies in response to changes in the vegetative structure (Robinson and Holmes 1984). Often species will switch from one source of insect prey to another as these sources become available throughout the spring, summer, and fall. The lower vegetative strata can dictate the abundance and availability of many species of insects including *Coleoptera, Lepidoptera,* and *Orthoptera*. Livestock grazing can reduce the abundance of these insects by removing vegetative cover necessary for shelter, breeding, and feeding.

This alternative would add to the cumulative effects to these species. Other cumulative effects of past and on-going federal, state, private, and other activities include mining, livestock grazing, fire suppression, road construction and maintenance, motorized and non-motorized recreation, water developments, timber harvesting, and human development. Direct and indirect short-term, long-term, and permanent impacts to these species from each of these activities would continue to occur.

Determinations (Current Management)
Based on the above rationale, this alternative ***"may adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward federal listing"*** to these species.

ALTERNATIVE C (PROPOSED ACTION)

Direct, Indirect, and Cumulative Effects
Changes in plant composition to less palatable species, reduction of species that are palatable, and negative change, in vegetative structure would not likely occur due to the implementation of the *Monitoring Plan*, design criteria, and adaptive management options to achieve or move toward the desired condition. Livestock grazing would reduce the number of herbaceous species in the understory, and decrease the volume of the understory. Changes in the abundance, composition, and richness of wildlife species would occur; however, less than under Alternative B. In a variety of different habitats, there is a positive relationship between volume and structure diversity of vegetation and density of birds and other wildlife, and both would generally improve than under Alternative B.

Livestock grazing under this alternative would have some short-term (one year or less) and long-term (multiple years) impacts; however, permanent changes such as vegetation species composition shifts to non-native or undesirable species, down-cutting and erosion of streams, or changes/lowering of the water table would not occur due to the design criteria. These impacts and other would indirectly, directly, and cumulatively affect the species addressed.

This alternative would add to the cumulative effects to these species. Other cumulative effects of past and on-going federal, state, private, and other activities include mining, livestock grazing, fire suppression, road construction and maintenance, motorized and non-motorized recreation, water developments, timber harvesting, and human development. Direct and indirect short-term, long-term, and permanent impacts to these species from each of these activities would continue to occur.

Determinations (Proposed Action)
Based on the above rationale, the Proposed Action ***"may adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward federal listing"*** for these species.

3-10: MANAGEMENT INDICATOR SPECIES

The purpose of this report is to evaluate MIS that may be affected by the proposed project in light of known population trends, with the objective to maintain viable populations. In addition, we also address impacts to other wildlife species of special concern, mule deer and bighorn sheep, because there is management direction in the Forest Plan.

Table 3-15: Management Indicator Species

Species	Species expected in project area?	Habitat affected by project?	Further evaluation as MIS?	Primary Habitat type
Abert's Squirrel	Yes	Yes	Yes	Mature Ponderosa Pine
Brook Trout	Yes	Yes	Yes	Beaver Ponds, Streams
Elk	Yes	Yes	Yes	Widespread
Greenback Cutthroat Trout	Yes	Yes	Yes	High elevation lakes/streams

The following sections address MIS documented in the Analysis Area and/or whose habitat may be affected by the proposed alternatives.

Direct and Indirect Effects to Greenback Cutthroat Trout and Brook Trout

Fish assemblages are rarely impacted directly from livestock grazing. Rather, the impact to fish populations is primarily from indirect effects such as the degradation of riparian systems and water quality, increased water temperatures, destabilization of stream banks, increased erosion and sedimentation, loss of stream cover and etc. Many other forest management activities affect fish assemblages similarly. Therefore, it would be difficult, if not impossible, to isolate and quantify the impacts on fish production that are solely related to livestock grazing. Because of the confounding nature of impacts from a suite of management activities, we chose to evaluate the impact of livestock grazing on riparian systems as an index of fish production. For this analysis to accurately reflect impacts on greenback cutthroat trout, we assume that the quality of riparian systems is directly related to fish production. This concept is widely accepted by fishery biologists.

ALTERNATIVE A (NO GRAZING)

Under the No Grazing Alternative, no livestock grazing would be permitted on any of the allotments. Following current direction, existing permits would be phased out after giving permit holders notice as provided for in the Forest Service Handbook (FSH) 2209.13, Chapter 10, section 16.13, R2 Interim Directive (ID) of 1/20/2004 which says that "…the authorized officer shall provide one year's written notice before the modification takes effect, except in emergency situations."

The effect of this alternative would reverse downward trends in rangeland conditions on some allotments and result in improved riparian systems and increased greenback and brook trout production in the Analysis Area. However, other forest management activities would continue to impact/degrade these same systems, limiting riparian recovery. Overall, riparian systems would move toward the desired condition. As riparian systems improve, the quantity of suitable habitat for greenback and brook trout

would increase, leading to greater fish production and more stabile populations across the Analysis Area.

ALTERNATIVE B (CURRENT MANAGEMENT)

Under Alternative B, livestock grazing would continue with current allotment management plans or, in the absence of such a plan or if the existing plan is not being followed for a variety of reasons, under the annual operating instructions. Livestock negatively affect four general components of riparian systems: 1) streamside vegetation; 2) stream channel morphology; 3) shape and quality of water column; and 4) structure and streambank soil.

Under Alternative B, documented downward trends in rangeland conditions would continue, degraded riparian systems would continue to be negatively impacted from livestock grazing, limiting recovery of these systems. Consequently, suitable habitat and overall fish production would not likely improve. However, given the small scope of this project relative to the wide distribution and abundance of brook trout, combined with a stabile if not increasing population trend, we have no viability concerns.

Greenback cutthroat trout have not been documented and may be absent from the Analysis Area. However, the Analysis Area contains suitable habitat and some streams may later be identified as future reintroduction sites, leading to eventual recovery and delisting of greenback cutthroat trout. Therefore, it is necessary to protect and improve these habitats as if greenback cutthroat trout were currently present. Under Alternative B, these habitats will continue to be negatively impacted by livestock grazing. The suitable habitat available for reintroduction sites would remain limited and in jeopardy of further degradation. The recovery of greenback cutthroat trout can not be accomplished with the few known populations. More populations must be established over a greater geographic area before greenback delisting can be considered. Alternative B contributes to the degradation of riparian systems in the Analysis Area and, therefore, limits suitable habitat for future reintroduction of greenbacks. Livestock grazing under Alternative B may not result in a loss of population viability for greenback cutthroat trout across their range, but clearly would not support their recovery and delisting.

ALTERNATIVE C (PROPOSED ACTION)

Under the Proposed Action, current LRMP direction would guide livestock grazing management. Livestock grazing would be implemented incorporating adaptive management to meet the LRMP goals, objectives, standards, and guidelines. Adaptive management is defined as a process where land managers implement management practices that are designed to meet LRMP standards and guidelines, and would likely achieve the desired conditions in a timely manner. However, if monitoring shows that desired conditions are not being met, or if movement toward achieving the desired conditions in an acceptable timeframe is not occurring, then an alternate set of management actions would be implemented to achieve the desired results.

Implementation of Alternative C should result in reversing the downward trends in rangeland condition described in Section 8.2 of the BE/BA for this project, and more

rapidly than under Alternative B (Current Management). However, Alternative A (No Grazing) will likely achieve the desired condition more quickly than either Alternative B or C.

Cumulative Effects of the Proposed Action

Cumulative effects to brook trout from other activities within the project area are numerous, and include mining, fire suppression, recreation, timber harvest and urban development**.**

Each of the above activities has cumulatively impacted both greenback and brook trout populations through habitat fragmentation, habitat loss and habitat degradation. The implementation of the preferred alternative (Alternative C) will not contribute to the cumulative effects on brook trout, greenback cutthroat trout or their habitats; it will benefit both species by increasing suitable habitat and fish production.

Abert's Squirrel (*Sciurus aberti*)

Abert's squirrel is a species with specific habitat needs yet covers a significant portion of the forest in the landscape context. Forest-wide Abert's squirrel sign monitoring was initiated by the PSICC in 2006. Subsequent annual monitoring is planned and is needed to measure trends on the Forest as additional data have been collected.

Table 3-16: Abert's squirrel habitat.

Allotments	Acres of Abert's Squirrel Habitat*[1]			
	Forage	High	Moderate	Total
Fourmile	800	3,850	1,450	6,100
McQuaid	150	2,550	2,350	5,050
Bassam	650	2,000	1,800	4,450
Cameron	800	1,900	1,250	3,950
Little Cochetopa	0	2,500	700	3,200
Arkansas C&H	550	1,450	100	2,100
Chalk Creek	700	850	400	1,950
Aspen Ridge	200	900	650	1,750
Chubb Park	150	1,000	200	1,350
Bear Creek	0	500	50	550
Browns Creek	150	100	0	250
Union	0	0	0	0

*All habitat structural stages (HSS) are for ponderosa pine habitats only.

High quality = HSS 4B, 4C or 5
Moderate quality = HSS 4A
Forage = HSS 3A, 3B, or 3C
[1]Rounded to nearest 50 acres
Vegetation information was obtained from CVU data where available and RIS data for all other areas. This information does not account for recent mountain pine beetle activity.

Direct and Indirect Effects to Abert's Squirrels
The table above shows the acres of potential Abert's squirrel habitat. Essentially all of the potential habitat for the Salida Ranger District is within the allotments being analyzed.

ALTERNATIVE A (NO GRAZING)
The relationship between past anthropogenic activities such as livestock grazing, fire suppression, and timber harvest and their impacts on Abert's squirrel habitat are complex. In general, ponderosa stands are more dense and uniform in age than during pre-European settlement times. This stems in part from intense domestic livestock grazing in the early 1900's which reduced fine fuels and altered fire. Eliminating grazing would increase fine fuels and increase the probability of fire starts throughout the range allotments. An increased number of fires could be beneficial or detrimental to Abert's squirrel and the ponderosa pine ecosystem depending on current vegetation conditions.

Due to the degraded and unnaturally high fuel loading conditions currently present within many of these allotments, existing dense understories would likely continue to develop. Not until other treatments, including but not limited to thinning of the understory and use of prescribed fire to reduce ground and ladder fuels, these unnaturally high fuel conditions would continue to pose a threat of higher intensity fires than would occur otherwise and thus threatening Abert's habitat. If grazing was eliminated and vegetation management (forest thinning) projects were conducted in ponderosa pine habitats, then Abert's habitat may improve.

Ponderosa pine areas with multiple age classes, moderate to low densities, or experiencing very little mortality would benefit from more frequent fires. Fires in these areas would cause mortality in individual trees and small groups of trees, but large high intensity, high severity fires would not be expected. If fires are allowed to burn in these areas, then Abert's habitat would be maintained or improved over the long term; however, areas in this condition are relatively low currently. If aggressive fire suppression continues, then stands would remain dense or become more dense in the absence of fire and/or mechanical treatments. Abert's habitat quality would remain suppressed and fluctuate considerably with large-scale fires and insect epidemics. Grazing, or the lack of it, plays an indirect role in all these circumstances.

ALTERNATIVE B (CURRENT MANAGEMENT)
Ponderosa pine forests have been changed from more open park-like stands with an understory of grass to denser stands of pine with less understory. These changes are due

to many factors, primarily fire suppression and widespread logging, but livestock grazing has also played a role in the changes seen in montane forest types.
Grazing under current livestock grazing management would continue to remove fine fuels and alter species composition to plants that are more tolerant of grazing or less palatable. Fire frequencies would continue to be suppressed to some degree - in part from the fine fuel reduction associated with grazing. Fires that do get established would likely follow the paths described in Alternative A (e.g., larger and more intensive fires than typically occurred prior to Euro-American settlement).

ALTERNATIVE C (THE PROPOSED ACTION)
This alternative provides the most flexibility to tailor habitat manipulation with grazing management. On the surface, it may appear similar to current grazing management, but the benefits of Alternatives A and C would generally improve baseline conditions, improving natural ecological processes and habitat conditions if measures as described in Appendix 1 of the BE/BA are implemented. Pastures that need a prescribed burn would be rested pre and post burn to let fine fuels accumulate and vegetation recover without additional domestic grazing stress. Large, high intensity/severity fires described above are still possible in the Proposed Action, but several tools (e.g., prescribed fire, forest things, along with proper livestock grazing management) are available to move ponderosa pine communities to conditions that are more desirable. Additionally, the desirable grass communities should stabilize or improve condition if adequate monitoring that is proposed is realized. Large, high intensity/severity fires discussed in Alternative A and B are still possible, but are less likely than in Alternative B.

Cumulative Effects to Abert's Squirrels
Cumulative effects to this species come from many sources. Cumulative effects are defined in 40 CFR 1508.7 as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions."

Historic mining activities, fire suppression, construction of new roads, recreation, timber harvest, thinning, human development, and grazing have all had an influence on current Abert's squirrel habitat. In addition, to the activities outlined above, several hazardous fuels and salvage projects are currently being implemented and planned on the Salida, Leadville, and South Park districts within or immediately adjacent to the following allotments: Little Cochetopa, Arkansas C&H, Browns Creek, Chalk Creek, Cameron, Aspen Ridge, Bassam, Chubb, Fourmile, McQuaid, Union, and Arkansas S&G.
Each of the above activities has cumulatively impacted Abert's squirrel populations through habitat fragmentation, habitat loss and habitat degradation. The implementation of the proposed alternative (Alternative C) with the implementation of the design criteria and monitoring would not contribute to the cumulative effects Abert's or their habitats.

Elk (*Cervus elaphus*)
Elk tend to inhabit coniferous forests associated with rugged, broken terrain or foothill ranges. During summer elk spend most of their time in high mountain meadows in the

alpine or subalpine zones or in stream bottoms. Elk may use more open areas during spring and summer because of earlier spring green-up. During hot summer months, elk seek shaded, cool habitats. Winter range and calving areas include approximately 210,000 acres (62%) and 54,000 acres (16%) of the Analysis Area, respectively (Colorado Division of Wildlife 2005). The RAMPS allotments represents approximately 78% and 44% of the elk winter range on the Leadville/Salida Districts and San Isabel NF respectively. Mapped big game habitat acres for elk, mule deer, and bighorn sheep winter and calving /lambing areas are shown in the table below.

Table 3-17: Mapped big game habitat within allotments (rounded to the nearest 100).

Allotments	Acres of Big Game Habitat				
	Elk Winter[1]	Mule Deer Winter[1]	Bighorn Sheep Winter[1]	Elk Calving[1]	Bighorn Sheep Lambing[2]
Arkansas C&H	7,000	7,500	1,000	3,500	800
Aspen Ridge	16,500	16,500	4,500	2,500	0
Bassam	35,500	35,000	15,000	6,500	1,900
Bear Creek	3,500	3,000	0	2,000	0
Browns Creek	5,000	5,000	500	3,000	2,200
Cameron	54,000	64,500	38,000	1,000	2,200
Chalk Creek	4,000	4,500	1,000	2,000	200
Chubb Park	11,000	11,000	4,000	3,000	0
Fourmile	21,000	23,500	15,000	3,000	4,100
Little Cochetopa	21,500	19,000	0	11,000	200
McQuaid	27,500	32,500	7,500	12,000	100
Union	7,500	7,500	0	2,500	0
Total	**214,000**	**229,500**	**86,500**	**52,000**	**11,700**

[1]Rounded to the nearest 500 acres.

[2]Rounded to the nearest 100 acres.

Direct and Indirect Effects to Elk

Early summer grazing by cattle may improve forage quality of elk winter range. In Montana, elk selected sites that were grazed by cattle during the previous growing season under a rest-rotational grazing system. Spring forage utilization may be enhanced by removing standing dead litter late in the preceding grazing season (Willms et al. 1985). Similarly, springtime grazing may also help establish high quality early spring forage habitat for elk the following spring. Thus, domestic and/or wild herbivory during one year may affect subsequent forage availability, forage quality, and/or herbivore diet selection and the patch choice of cattle and elk the following season under a rest-rotation grazing system. Elk may be attracted to grazed areas because removal of dense overstory allows sunlight to stimulate forb production. However, if vegetation is reduced too much it can significantly reduce both foliage and seed production on winter range

ALTERNATIVE A (NO GRAZING)

Eliminating livestock grazing would generally increase forage availability for elk, especially vegetative species that are desired by domestic livestock and reduce any competition between these two herbivores. Allotments with stable or downward trends should improve as a result of reduced grazing pressure and forage competition. Available forage quality and quantity on winter ranges should increase since nearly seventy-five percent of Salida and Leadville's elk winter range is within livestock allotments and current management has caused a general negative trend in range condition. Improving winter range for ungulates increases the carrying capacity and reduces the chance for large-scale winter mortality, which is particularly important given the elk population trend from less than 200,000 elk in 1990 to nearly 300,000 elk by 2003. Additionally, noxious weed spread would not be exacerbated by domestic livestock and riparian areas should see an increase in woody species and improved elk calving habitat.

As stated above, increasing the fine fuels would increase the fire potential in and around the allotments. See the Abert's squirrel discussion above for more detailed discussion. Fires would increase early successional habitat, which would improve forage quantity and quality in many areas for elk. A reduced canopy cover would also increase visibility and reduce security habitat for elk. Overall, fires would be a great benefit to elk habitat.

ALTERNATIVE B (CURRENT MANAGEMENT)

Direct results of grazing include removal of vegetative cover (herbaceous plants – grasses, forbs, shrubs and trees), negatively affecting habitat structure and prey availability and trampling of grass and brush. Indirect or delayed effects include altered species composition, reduced vigor of plants, increased bare soils, accelerated soil erosion, and others. These effects may be caused by native ungulates, domestic livestock, or a combination of the two. However, the daily consumption rates are vastly greater for cattle and horses compared to native ungulates (elk and deer), so there is greater potential for negative impacts from domestic livestock even with close monitoring. The average daily consumption for cattle is 26 lbs, horses is 31 lbs, compared to elk which is 12 lbs, and deer 4.5 lbs (Forest Service 1996 ---- R2 *Rangeland Analysis and Management Training Guide*)

Coe et al. (2001) found that competition for forage could occur between elk and cattle in late summer and that species interactions may be stronger between elk and cattle than mule deer and cattle. They also state that both elk and deer may respond to cattle grazing at several levels or scales. When cattle are present, elk and mule deer may leave the pasture, shift distributions within the pastures but not change in how they select resources, stay within a pasture and select resources differently, or not respond in any measurable manner.

Continuing current livestock grazing management would eventually cause an elk population decline and/or reduction in carrying capacity to a limited degree and current downward trends continue. Even though proper grazing can be beneficial to ungulates, improper management, which has occurred for quite some time in many allotments can be even more detrimental. Overuse or repeated use during the same season without rest

or rotation has caused a downward trend in allotment conditions in many cases as indicated by the available monitoring data. An overall negative trend for allotments under current management coupled with the fact that elk winter range coincides with nearly three-quarters of all Leadville/Salida allotments and the current statewide elk population is approaching 300,000 causes great concern. Without immediate action and adequate monitoring this current downward range trend would negatively affect the elk population, especially on the Salida District where most allotments are located. In the short-term (10 years) elk habitat would diminish and support slightly fewer elk with an increased chance of winter mortality. This trend would continue in the long-term (over 10 years) and a large-scale winter die-off would become more likely. Additionally, the state would have an increasingly difficult time managing the elk for state population objectives as the population would be declining and fluctuate dramatically with winter mortality.

ALTERNATIVE C (PROPOSED ACTION)

Under the Proposed Action, specific design criteria have been developed to address protection and improvement of these downward trends. In addition, other design criteria listed in Appendix 1 of the BE/BA would also improve habitat conditions for elk as well. These measures, together with potential management options would be used to achieve the desired conditions. Potential impacts would be eliminated altogether or significantly reduced by the implementation of these criteria for elk.

The Proposed Action should improve the undesirable downward trends caused by the current grazing management due to the implementation of the design criteria listed above. Over time, range conditions would improve in all allotments and annual monitoring would indicate whether grazing management needs to be altered to continue improvements. Elk would benefit from proper grazing while avoiding conversion to less desirable/palatable vegetation and or bare ground. Habitat would be able to support the state's elk population objectives and the chance of large-scale winter mortality would be reduced. The greatest differences between the Proposed Action and Alternative A (No Grazing) is the continued risk for noxious weed spread by domestic livestock in the Proposed Action and the reduced forage available to wildlife. This alternative; however, is not expected to negatively impact the elk population in contrast to Alternative B.

Cumulative Effects

Historic mining activities, fire suppression, construction of new roads, recreation, timber harvest, thinning, human development, and grazing have all had an influence on current elk habitat. In addition, to the activities outlined above, several hazardous fuels and salvage projects are currently being implemented and planned on the Salida, Leadville, and South Park districts within or immediately adjacent to the following allotments: Little Cochetopa, Arkansas C&H, Browns Creek, Chalk Creek, Cameron, Aspen Ridge, Bassam, Chubb, Fourmile, McQuaid, Union, and Arkansas S&G.

Each of the above activities has cumulatively impacted elk populations through habitat fragmentation, habitat loss and habitat degradation. The implementation of the proposed

alternative (Alternative C) with the implementation of the design criteria and monitoring would not contribute to the cumulative effects on elk or their habitats.