United States
Agriculture

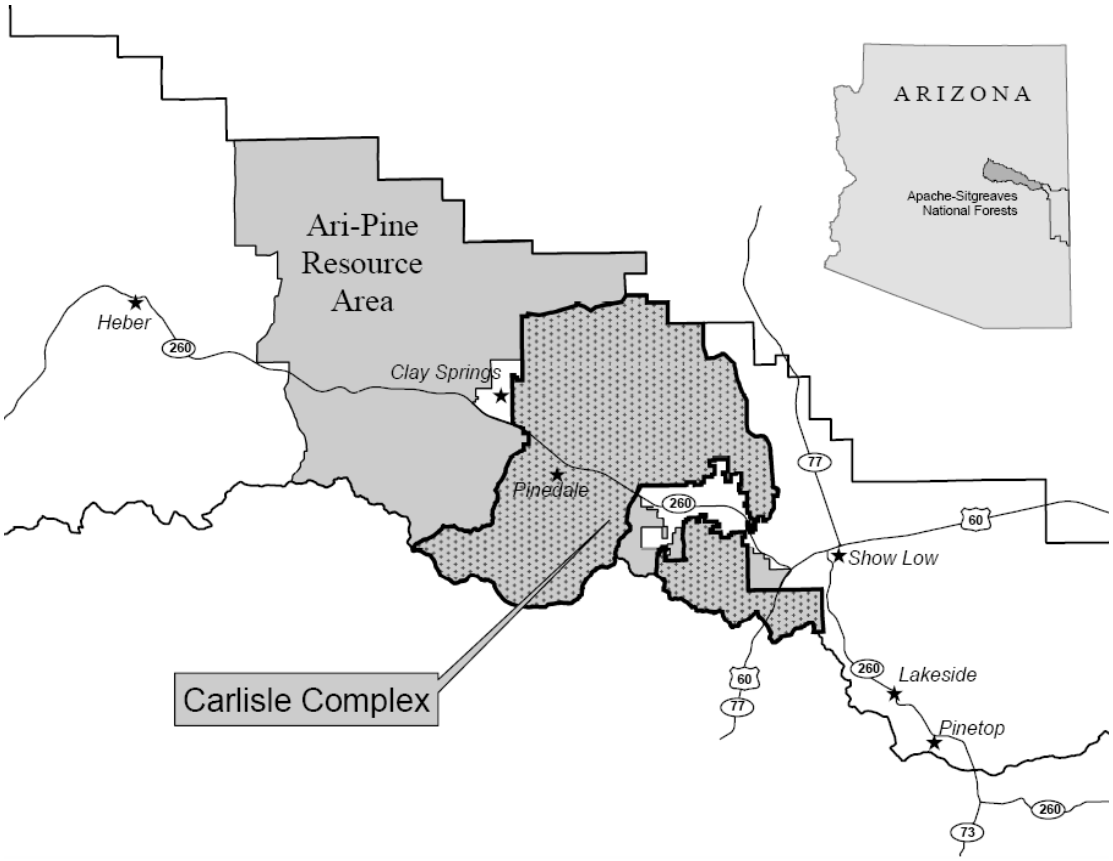
Forest
Service

Southwestern
Region

Environmental Assessment for the Carlisle Complex Allotment Management Plan

Apache-Sitgreaves National Forests
Lakeside Ranger District

September 7, 2007



Content

LIST OF TABLES

LIST OF FIGURES

Chapter 1 – Purpose and Need

Background

The Forest Service has prepared this Environmental Assessment [EA] in compliance with the National Environmental Policy Act [NEPA] and other relevant federal and state laws and regulations. This EA discloses the direct, indirect, and cumulative environmental effects that would result from the proposed action and alternatives. Supporting documentation, including more detailed analyses of project-area resources, may be found in the Project Planning Record located at the Lakeside Ranger District Office in Pinetop-Lakeside, Arizona. References to supporting documentation are shown in {}parentheses. For example, a reference "{Doc 21}" indicates a passage in the EA is linked to information found in that document number in the Project Record.

In 1993, the Ari-Pine Resource Coalition was formed to encourage open communication among various users of the National Forest. The area covers the Aripine-Pinedale elk herd unit of the Arizona Game and Fish Department [AGF] as shown on the cover page. Together, over two dozen groups and individuals collaborated to address vegetative and watershed conditions, riparian needs, and the allocation of forage to livestock and the elk herd in the area. The Ari-Pine Resource Area Desired Future Conditions {Doc. 2A} was developed to provide direction for 14 allotments on the Lakeside and Heber Ranger Districts (RD). The 8 allotments on the Lakeside RD included the 6 allotments that make up the Carlisle Complex, Town Tank and Cottonwood allotments. The entire Ari-Pine area is 233,675 acres. This document uses those Desired Future Conditions as additional management direction for the Carlisle Complex.

The analysis of the project area began in 1999. This analysis area is the last complex of range allotments within the Aripine Resource area to be analyzed. A change in priority areas delayed the initial analysis. The District Ranger reinitiated the analysis with a new Interdisciplinary Team [Team] in February, 2002 {Doc. 2}. The Rodeo-Chediski Fire [RC Fire], rehabilitation and salvage efforts, and subsequent commitments to fire efforts nationwide in the last five years resulted in a longer than planned timeframe to complete the analysis. Because most of the analysis of range and watershed condition and forage production had been completed, capacity figures outside the Rodeo-Chediski burn area are based on the forage production data collected prior to 2002, with limited field checks in 2003 and monitoring yearly {Doc. 13, 48}. Fire-affected pasture forage averages were updated in 2007 and considered forage production clipping in 2005 {Doc. 64, 75, 76}. The present Team reviewed and updated data already in the project files and collected missing data before beginning the analysis and throughout the process as circumstances and/or additional information was received.

Purpose and Need for Action

The allotments within the Carlisle Complex encompass lands identified as suitable for domestic livestock grazing in the Apache-Sitgreaves National Forest Land and Resource Management Plan [LRMP]. Where consistent with the goals, objectives, standards and guidelines of LRMPs, it is Forest Service policy to make forage from lands suitable for grazing available to qualified livestock operators {FSM 2202.1, FSM 2203.1, 36 CFR 22.2(C), Multiple Use and Sustained Yield act of 1960, Wilderness Act of 1964, Forest and Rangeland Renewable Resources Planning Act of 1974}.

The primary purpose of this analysis is to assess what level and type of livestock management will best move the resources within the Complex toward desired future conditions. The purpose of the proposed action is to authorize livestock grazing in a manner that maintains or improves project area resource conditions and achieves the objectives and desired conditions described in the Apache-Sitgreaves National Forest LRMP. This authorization is needed here and now because:

- The allotments currently lack sufficient environmental analysis to comply with the Rescission Act {P.L. 104-19, 1995}.
- There is a need for change from current permitted use on some of the allotments in order to move toward desired conditions. Specifically:
    - Additional waters and fences are needed to improve distribution and to provide opportunities for pasture rest or deferment.
    - Permitted use on the combined allotments exceeds estimated capacity. LRMP direction to balance permitted use with capacity is not being met.
    - Range and watershed conditions are in need of improvement over portions of the allotments.

In addition, existing authorizations do not provide sufficient flexibility to allow the Forest and the permittee to adapt easily to changing resource conditions. There is a need to incorporate additional flexibility in the management of the allotments in order to practice adaptive management. The current management within the last five years is not a factor in current conditions, except that the current grazing strategy has been light use with conservative stocking and improving conditions are noticeable.

A related purpose is to assess any potential vegetative treatments needed to improve forage production and watershed, soil, and wildlife habitat conditions. There is a need to improve watershed condition through vegetation treatments designed to reduce bare ground, increase understory density and diversity, and improve the amount and distribution of litter.

The final purpose is to analyze the existing road system with regard to Forest Plan standards, and to recommend which roads will be maintained for public use or for restricted administrative use (permittee access or for fire-fighting equipment); the remainder will be recommended for obliteration. There is a need to better manage roads and off-highway vehicle [OHV] use in order to improve range and watershed condition while providing Forest users with adequate access.

Existing Conditions

Location and Setting. The Carlisle Complex [Complex] or project area [area] consists of six allotments currently permitted to a single operator. Located in the western portion of the District, it covers a large portion of the Lakeside Ranger District [District], encompassing 88,630 acres of National Forest System lands within a 96,089 acre area {Front Cover}.

Several steep, north-south ridges separated by fairly wide drainages characterize local topography. As one moves north, the land becomes less steep with more rolling hills but with some incised canyons. Elevations range from about 6,000 to 7,000 feet. The allotments are within two fifth-code watersheds, Cottonwood-Dodson and Show Low Creek. About half of the annual precipitation occurs during the growing season, from April into October. The major vegetation types are pinyon-juniper woodland (48%), ponderosa pine forestland (39%), and grassland and juniper savannah (13%). In general, ponderosa pine forestland occurs mostly south of Highway 260. The majority of lands north of Highway 260 are pinyon-juniper (70%) or a mix of grassland and juniper savannah (24%). The remainder is ponderosa pine, usually in stringers along drainages.

The majority of woodland overstory is dense, closed canopy pinyon-juniper woodlands. The midstory component, where present, is composed primarily of browse shrub species, including mountain mahogany, Gambel oak, shrub live oak, Fremont barberry, and cliffrose and manzanita.

The herbaceous understory component is dominated by blue grama. Blue grama is a warm season grass, with most of its growth occurring after the onset of summer rains. Secondary grasses, which are not common throughout most of the project area, include warm season species such as pine dropseed and various *Muhlenbergia* species, and cool season species such as squirreltail. A wide variety of annual and perennial forbs also occupy the understory.

Management History. Livestock grazing has occurred within the project area since at least the 1870s. Review of historical District records shows that areas within the Complex were assigned livestock numbers as much as 50% above estimated livestock capacity since at about 1916 (Pinedale District records) until at least 1960 {Doc 112}. By 1950, most of the allotments within the Complex were in Poor condition with declining trends {District 2210 files}. Linden and Juniper Ridge Allotments appear to have been properly stocked; Linden Allotment was increased from 115 head to 172 head in 1980 {Doc 112, District 2210 files}. Today the Complex is rated as being in mostly Poor range condition, often with declining trends, especially in the allotments north of Highway 260 (northern pastures) {Doc 1B, 1C, 47A, 57A, B, 59, 60}. However, since 2002, numbers have been significantly lower and use has been light {Doc 72-77}.

The RC Fire of 2002 affected almost all pastures in the southern portion of the Complex {Maps 1 and 2}. The fire burned some 38,167 acres (43%) of the Complex. About 21,720 acres (25%) burned at intensities which killed most existing trees {Map 2}. All pastures containing significant amounts of area that burned with moderate to high severity are referred to, throughout this document, as the "fire-affected" pastures.

Current permitted numbers are equivalent to 461 cattle (cow/calf) yearlong. Actual use has varied substantially over the past decade, averaging about 300 cow/calf yearlong for the period {Table 1}. The decreased numbers in 2001 were requested as the former permittee prepared to waive his permit. Numbers were reduced in 2003 due to no grazing being allowed on the fire-affected pastures. The current permittee took over the permit in 2002, and initially ran 200 head, but soon decreased due to the fire. In 2006, that number was raised to 150 head. In 2007, the number of cow/calf pairs was raised again to 200 head. In addition, the permittee runs about 10 bulls.

Table 1: Actual livestock use for the Carlisle Complex, averaged over each calendar year.

Year	Stocking (Cow/calf)	Year	Stocking (Cow/calf)
1995	475	2001	180
1996	501	2002	180
1997	501	2003	120
1998	501	2004	120
1999	289	2005	120
2000	470	2006	133

Current Management. The Complex is divided into 25 pastures and is currently managed with one herd under a deferred-rest rotation grazing system throughout the year. Stocking since the RC Fire has been light, around 120 head, because the fire-affected pastures were closed for resource protection. Numbers were increased to 150 cow/calf yearlong in 2006 based on monitoring showing light use combined with increased forage {Doc 57A, B, 58-60, 72-77}.

Linden, Dodson, and Pinedale allotments were historically yearlong. The northern pastures are considered best suited for winter use because of the current range condition rating and because they

are lower elevation and do not normally support snow cover during winter months. The pastures south of Highway 260 cannot normally be used in winter because of snow cover. Because yearlong use was requested by the permittee after the Rodeo-Chediski fire, the ranger decided to keep numbers light to allow sufficient rest after grazing. Because of the light stocking rate, several of the northern pastures have received extra rest and/or longer deferment. Monitoring over the last six years indicates light use {Doc. 72-77}. By 2007, greater vigor, more litter and a greater variety of species are present in the southern pastures {Doc 46A, 57A, 57B, 59, 60}. Similar observations of greater vigor and more litter in the northern pastures have been made {Doc 82, although no monitoring data has been collected to confirm these observations.

The areas south of Highway 260 were planned to be rested from domestic livestock grazing until the soils were stabilized, vegetation recovered, and improvements repaired; by some estimates, a period of 3-5 years. Erosion control measures, including seeding with native and non-native grasses, were implemented by the Burned Area Emergency Rehabilitation team. Removal of hazard trees along roads, utility lines and private land boundaries has been accomplished. Salvage of dead or dying trees is mostly completed. Reconstruction of Forest/private land boundary fences has been completed; some reconstruction of livestock fences is still in progress.

Livestock grazing was suspended on all of the fire-affected pastures for resource protection; this represents about one-third of grazing capacity for the Complex. Inspections in 2005 and 2006 have shown that there have been increases in herbaceous production in many areas that were burned at moderate to high severity in the RC Fire {Doc. 64, 66, 75, 77}. Pastures significantly affected by the RC Fire received no livestock grazing until deemed recovered by the Range Conservation Officer {Doc. 42A, 46A, 57A, 57B, 59, 60}. Grazing resumed, based on monitoring, in the Owens pasture in 2004, the East Cottonwood pasture in 2005, and the rest of the fire-affected pastures in 2006. Some pastures still need some repairs to improvements {Doc. 68}.

Livestock movements are planned at the beginning of each grazing season and are continually modified based on monitoring and resource conditions. Since the fire-affected pastures have been put into the rotation, the northern pastures are being moved toward dormant season grazing because the southern pastures are normally used only in summer due to snowfall cover in winter.

Current Condition. Areas not affected by the RC Fire, mainly in the northern pastures, remain in Poor to Very Poor range condition. (Note that "Fair", "Poor" and "Very Poor" are relative classifications of the land's ability or value for grazing livestock (USDA 1988); since Poor or even Very Poor range may be grazed under proper management, such ratings do not mean that domestic livestock grazing should be discontinued. These classes are standard range nomenclature describing the value of the land for livestock grazing.) By 2007, greater vigor, more litter, and a greater variety of species are present in the southern pastures {Doc 46A, 57A, 57B, 59, 60}. No condition monitoring data has been collected in the northern pastures to confirm similar observations.

The fire-affected areas that were burned with moderate to high severity mostly show Fair or better range condition, although a few transects still rated in Poor condition {Doc. 57A, 57B, 59, 60}. In some areas of the fire where little ground cover existed before RC, the main ground cover now consists of cheatgrass, thistle, mullein, and other invasive weeds, in addition to some perennial grasses. There has been regeneration of many shrub species, including oak, manzanita, ceanothus, and mountain mahogany. Watershed conditions appear to have stabilized in the fire-affected pastures, and riparian areas are recovering as well. Riparian areas have regeneration of willow, narrowleaf cottonwood and false indigo.

Grazing Capacity: The alternatives below differ largely in terms of the proposed grazing levels, but these numbers were not derived arbitrarily. There is a commonality in terms of the process leading to

the different proposals. Grazing capacity figures are based on a number of factors which are used to calculate the amount of available forage across the complex {Doc. 38}.

To start this analysis, Range condition surveys, also known as Parker 3-Step Cluster analyses, were completed for the entire allotment in 1999 and 2000. Then beginning those same years, forage production was estimated {Doc.38, 48, 64, 66, 75, 76} by a team of watershed and range professionals. First, the team clipped grass samples at several different areas on the Carlisle Complex and other allotments and determined forage production based on standard methods. The team members then went to several new areas to estimate forage production, which was then confirmed by more clipping studies. Finally, after all members of the team had calibrated their eye for different 100 pound forage production classes on the Carlisle Complex, they visited each grass, woodland, and forest stand as laid out on aerial photographs and maps and estimated forage across the entire allotment. The results of this extensive effort were then transferred stand by stand to a Geographic Information System (GIS) that calculated total gross forage across the entire Complex {Doc 48}. Field checks by the original team members who estimated forage production were made in 2003 and again in 2007 {Doc 12, 82}.

After forage production was calculated across the Complex, reductions in forage availability to livestock were made in a few areas based on slope and distance to water (Holechek1988). Allowable use was calculated at several levels, with the final calculation at 32%, the average based on Holechek's studies (2004). Allowable use was multiplied by gross forage to give available forage. The available forage was then multiplied by .70 to provide 70% of the available forage to livestock and 30% to wildlife, based on the Ari-pine Agreement {Doc. 2A}. Finally, available forage for livestock was divided by 7,911 lbs., an average amount of consumption of forage used by a 900 lb. cow/calf pair in one year {Doc 48}. The resulting figure is the estimated capacity of the Complex for livestock. All capacity figures assume that all available forage throughout the entire complex will be used.

The total estimated capacity for the complex was estimated at 321 cow/calf pairs, or 3,852 AM. The final alternative G3 is based on a 300 head herd of cows plus associated bulls, which is the permittee suggested alternative {Doc. 7}.

Management Direction

The Apache-Sitgreaves National Forests Plan [Plan] identifies the following goal for the range program on the Forest. Provide a program of range management that emphasizes high quality range forage and improvements. Benefits are improved watershed conditions, improved range forage production, improved wildlife habitat, and enhanced visual quality {Plan p. 15}.

On rangeland where available forage has been determined to be a limiting factor in achieving big game objectives, improved allotment management plans will be developed. Allow sufficient forage to accommodate wildlife, unless doing so would be inconsistent with multiple-use principles and with the Forest Plan {Plan p. 15}.

Management Direction. The Complex includes three Management Areas as defined in the Plan. Management Emphasis specific to those Areas follow. Specific Forest Plan standards and guidelines relating to this analysis are included in Appendix E. Page References are from the Forest Plan.

- Management Area 1: Forested Land (39% of Complex in ponderosa pine vegetation type). Emphasize a combination of multiple uses including a sustained yield of timber and firewood production, wildlife habitat, livestock grazing, watershed, and dispersed recreation {p. 119}.
- Management Area 2: Woodland (48% of Complex in pinyon-Juniper vegetation type). Emphasize fuelwood production, wildlife habitat, watershed condition, and livestock grazing {p. 45}.

- Management Area 3: Riparian (<1% of Complex). Recognize the importance and distinctive values of riparian areas. Give preferential consideration to riparian dependent resources. Manage to maintain or improve riparian areas to satisfactory condition {p. 155}.

- Management Area 4: Grasslands (12% of Complex). Emphasize wildlife habitat and visual quality, especially big game winter range {p. 165}.

Desired Future Conditions

Desired future conditions [DFCs] are the long-term management goals for a particular area. These goals include consideration of commodity production as well as other resource management requirements. The three main factors needing improvement are range condition and trend, watershed conditions, and riparian {Doc 2, 2A, 4, 5, 13A}. Stocking rate is not the only consideration in the Desired Future Condition statements; grazing duration, intensity, and season of use were also considered in defining these site-specific objectives. Other actions may be required to meet a condition in combination with or besides grazing management, such as thinning of tree canopies and roads management. See Table 2 for the site-specific DFCs for the Complex. Some portions of the Complex may already be in the desired condition, while others may require years of management to reach the stated objectives. Some objectives may not be met within the time frame of a 10-year Allotment Management Plan (AMP). Moreover, due to current resource condition, budget constraints or other factors, some objectives may never be met. Desired future conditions, along with site-specific objectives, and monitoring parameters for vegetation resources, soils, and riparian were developed (Table 2).

Proposed Actions

The Forest Service proposes the following actions in order to meet the purpose and need. Each action is analyzed separately from the others, and a decision on grazing, for instance, will not be affected by the decisions on vegetation treatments or the roads management plan.

Allotment Management Plan

The Lakeside Ranger District proposes to continue to authorize grazing on the Carlisle Complex. The allotments within the Complex will be combined into one allotment, administered under a single 10-year Term Grazing Permit. The new allotment will be renamed the Railroad Allotment in recognition of the 1920s and '30s Standard Railroad which ran through the Complex, from south of Pinedale to Snowflake. The following terms and conditions will apply.

- Duration and timing of grazing. Use on the allotment will be authorized year-round using rest rotational grazing. Grazing management will be designed to insure that pastures receive sufficient rest to provide for grazed plant recovery and for improvement of areas in less than Fair condition. The northern pastures will be used, whenever possible, only in the non-growing season (October through March) to promote the best chance of maximizing production potential. The sequence and timing of pasture moves will be based on monitoring of range readiness, relative utilization, and current and predicted weather patterns for the season.

- Frequency and intensity of grazing. Forage utilization will be managed at a level corresponding to light intensity[1] in order to provide for grazed plant recovery, increased herbage production, retention of herbaceous litter to protect soils, and improved range condition.

[1] See chapter 2 for a definition of light grazing intensity

Table 2: Carlisle Complex site-specific objectives.

Resource	Desired condition	Site-Specific Objective	Monitoring Parameters
Range	All pastures, except where tree canopy precludes, are moving towards or at Fair Range Condition Class with stable trend or better.	In grassland vegetation types, meet Fair or better condition within 10 years. In PJ vegetation types, show upward trend within 10 years. In pine stands with limited canopy, show Fair or better with stable trends in 10 years	Range Condition
Vegetation	Desirable and intermediate forage plants[2] have high vigor and become more abundant, cumulatively, than undesirable species.	At least 50% of plant composition in all pastures consists of desirable and intermediate forage species as defined in monitoring plan and agreed upon by range managers	Plant composition
Vegetation	Cool season grasses are common (30% of composition)	1) Cool season grass species make up 30% plant composition by frequency in northern pastures; 2) maintain current species composition in southern pastures	Plant Composition
Soils	Plant cover and litter should be well distributed to protect soil with minimum bare spaces present	1) Minimum of 35% effective ground cover (vegetative plus litter) in soil units 053 and 054	1) Plant and litter ground cover
Soils	Reduced tree canopy in pinyon-juniper cover types	1) Canopy cover of trees near site potential in grassland vegetation types; 2) Increase site productivity and forage production in soil units 53, 181, 182, 186, 187, 504, & 592 without the use of mechanical pushing or chaining that mixes soil layers	Canopy cover by trees
Wildlife	Reduced tree canopy in pinyon-juniper cover types	Cover of tree species resembles Vegetative Structural Stage desired future conditions from Ari-Pine Agreement in the PJ	Canopy cover by trees

[2] A desirable species is one that provides high quality and production for a significant part of the grazing season. Desirable species will typically consist of cool season grasses and legumes but may include other species such as warm season grasses, brassicas, chicory, and others. Intermediate species are those which, while palatable, provide low tonnage or poor quality forage. Examples include: *Bouteloua gracilis* (Blue Grama) and *Agropyron Smithii (*Western Wheat) (desirable) and intermediate species *Eriogonum* spp. Buckwheat and *Aristida* Three-awn.

Table 2 (con't): Carlisle Complex site-specific objectives.

Resource	Desired condition	Site-Specific Objective	Monitoring Parameters
Riparian	Riparian areas in proper functioning condition along entire stream length where possible[3]	Diverse age classes and riparian dependent plant species composition; adequate vegetation cover to protect stream banks from erosion; adequate woody debris[4]	Selected elements of Proper Functioning Condition surveys monitored using the approved technique for that element. For example, greenline method (Winward) for bank stability

A new Allotment Management Plan [AMP] would be prepared for the allotment. The AMP will prescribe any mitigation measures and monitoring requirements necessary to implement management. Existing and new range improvements would be repaired or reconstructed to the degree necessary to achieve management objectives and move the project area toward desired condition.

Vegetation Treatment Plan

The proposed vegetation treatment plan is designed to meet DFCs by converting stand Vegetative Structural Stage [VSS] classification and by maintaining existing openings. It includes the following actions:

- Treat approximately 600-1,000 acres of woodland stands per year over the next decade.

Stands will be selected based on the following priorities: those affected by the RC Fire, those with natural or created openings requiring maintenance, those defined as Wildland-Urban Interface stands, and, of the remainder, those which will move the Complex toward the mix of VSS objectives outlined in the Ari-Pine agreement (See Map 4 and Table 12).

Roads Management Plan

The proposed roads management plan is designed to meet Forest Plan standards by reducing unneeded travel ways. It includes the following actions:

- Open roads (29 percent of current inventory, or about 179 miles) will be reconstructed/maintained to Forest standards (Map 5). Overall density will be reduced to about 1.4 miles per section.

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[3] Proper Functioning Condition (PFC) is a method for assessing the physical functioning of riparian and wetland areas. The term is used to describe both the assessment process and a defined, on-the-ground condition of a riparian area. In either case, PFC describes a minimum, or starting point.

[4] East Cottonwood, Bull Hollow, McCleve Canyon, Water Canyon, Bear Canyon, and Show Low Creek have the proper soil types to establish and maintain cottonwood–willow associations. TES unit 058, which underlies 384 acres on the allotment and is currently in unsatisfactory watershed condition and impaired soil condition, can potentially produce good riparian areas if stream banks and wet areas are protected from livestock grazing. This does not mean every impact, but does mean that active management to keep livestock out of riparian areas must be employed, including herding, salting, and fencing if necessary. Mortenson Wash is within a longleaf cottonwood association and may be restorable

- Closed roads (16 percent of current inventory, or about 99 miles) will not be routinely maintained; any maintenance activity will focus on erosion-prone segments. Overall density will be reduced to about 0.7 miles per section.

Please see chapter 2 for more detail about the Proposed Actions.

Decision Framework

The Lakeside District Ranger is the official responsible for decisions regarding the management of the Carlisle Complex. Based on the results of this analysis, the Ranger will decide whether or not grazing will be authorized. If it is authorized, the Ranger would determine which mitigation measures and monitoring requirements would be prescribed in the AMP, He will also determine the stocking rate, season of use, utilization standards, and method of grazing management and associated management constraints. He will include any structural and/or non-structural range developments necessary to fully implement the grazing system.

The Ranger will decide which vegetative treatments are necessary to improve watershed, range and wildlife habitat.

The Ranger will decide which roads will remain open and which will be closed after the forestwide Travel Management process has reviewed all public input.

Public Involvement

The proposal was listed in the Schedule of Proposed Actions on September 30, 2001. The proposal was provided to the public and other agencies for comment during scoping that began February 27, 2004. In addition to a public notice published in the newspaper of record, the District mailed the Scoping Report to 17 federal, state and local government officials, 18 private citizens or other interested individuals, 82 interested organizations (home-owners' associations, environmental groups, and so on), and twelve tribal governments {Chapter 4}.

Issues

The scoping report included a list of potential issues {Doc. 15}. Using the comments received, the Team developed a list of issues to address. The Team separated these into two groups: key and non-key issues. Key issues were defined as those directly or indirectly caused by implementing the proposed actions.

Non-key issues were identified as those: outside the scope of the proposed action; already decided by law, regulation, Forest Plan, or other higher level decision; irrelevant to the decision to be made; or conjectural and not supported by scientific or factual evidence {40 CFR 1501.7}. A list of non-key issues and reasons regarding their categorization may be found in Document 32a in the project record.

As for key issues, the District Ranger identified five from the list developed by the Team:

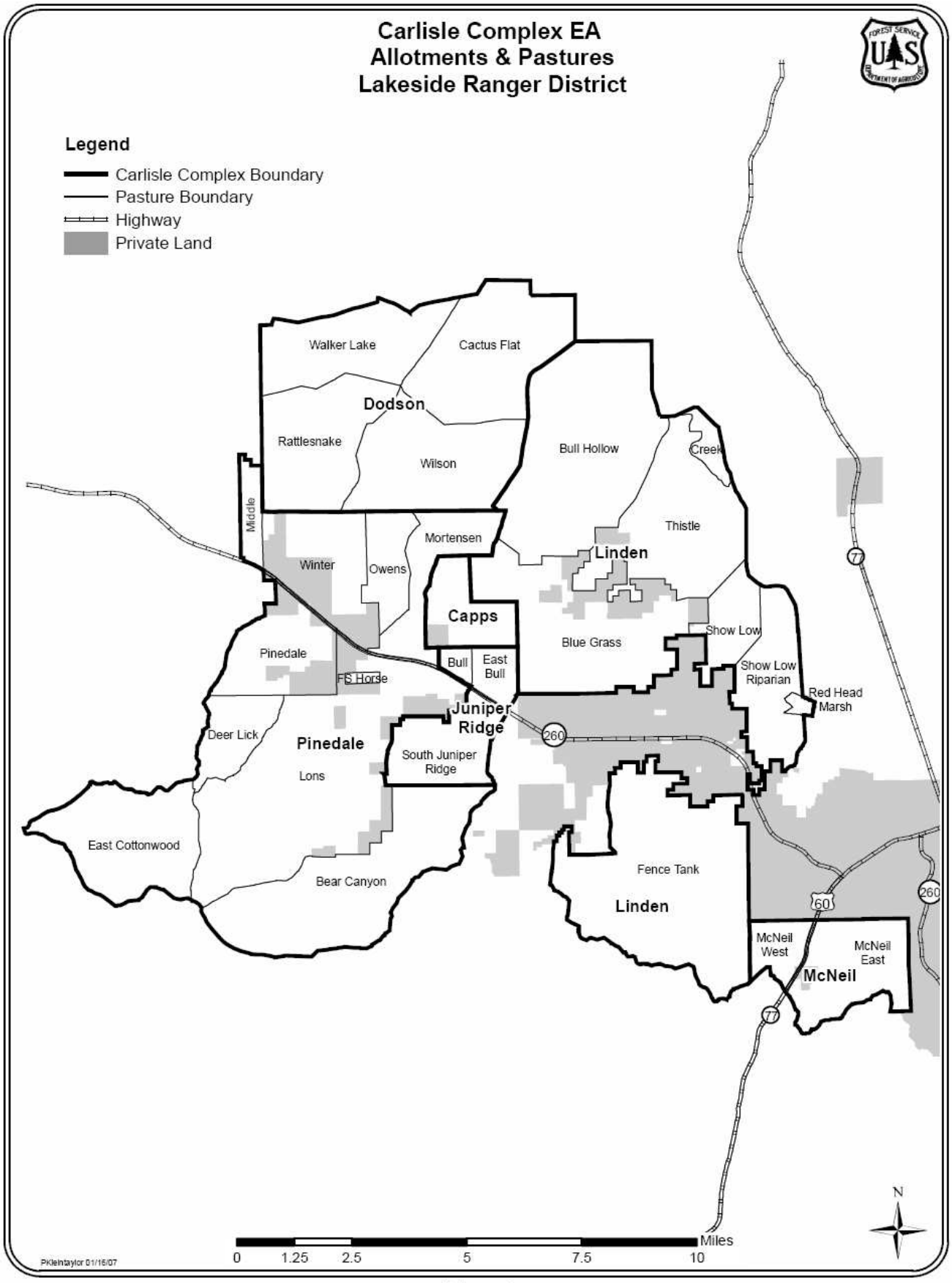
- **Issue 1:** Current range conditions over most of the Complex are Poor, often with a declining trend. Evaluation criterion and measure: *Is stocking within the land's capacity per Forest Plan direction? GIS analysis of grazing capacity based on field studies.*

- **Issue 2:** Range structural developments may not be adequate to properly manage livestock distribution. Evaluation criterion and measure: *What range developments are needed for proper management? GIS analysis.*

- **Issue 3:** Watershed condition is Impaired or Unsatisfactory across most of the Complex. Evaluation criterion and measure: *Within budget constraints, what level of vegetation improvements will best improve watershed condition by increasing litter and perennial grass density and by reducing erosion? GIS analysis and narrative.*

- **Issue 4:** Current open road density exceeds Forest Plan standards. Evaluation criteria and measures: *On a case by case basis, which roads should be classed as Open or as Closed and which should be recommended for obliteration? Map analysis and narrative.*

- **Issue 5:** Different grazing management strategies will have effects on local communities. Evaluation criterion and measure: *What are the anticipated changes in income and employment? Economic analysis and narrative.*


Carlisle Complex EA
Allotments & Pastures
Lakeside Ranger District
Legend
Carlisle Complex Boundary
Pasture Boundary
Highway
Private Land
Walker Lake
Cactus Flat
Dodson
Rattlesnake
Wilson
Bull Hollow
Creek
Middle
Mortensen
Thistle
Linden
Winter
Owens
Capps
Blue Grass
Show Low
Pinedale
Bull
East Bull
FS Horse
Show Low Riparian
Red Head Marsh
Juniper Ridge
Deer Lick
Pinedale
South Juniper Ridge
Lons
East Cottonwood
Bear Canyon
Fence Tank
Linden
McNeil West
McNeil East
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Miles
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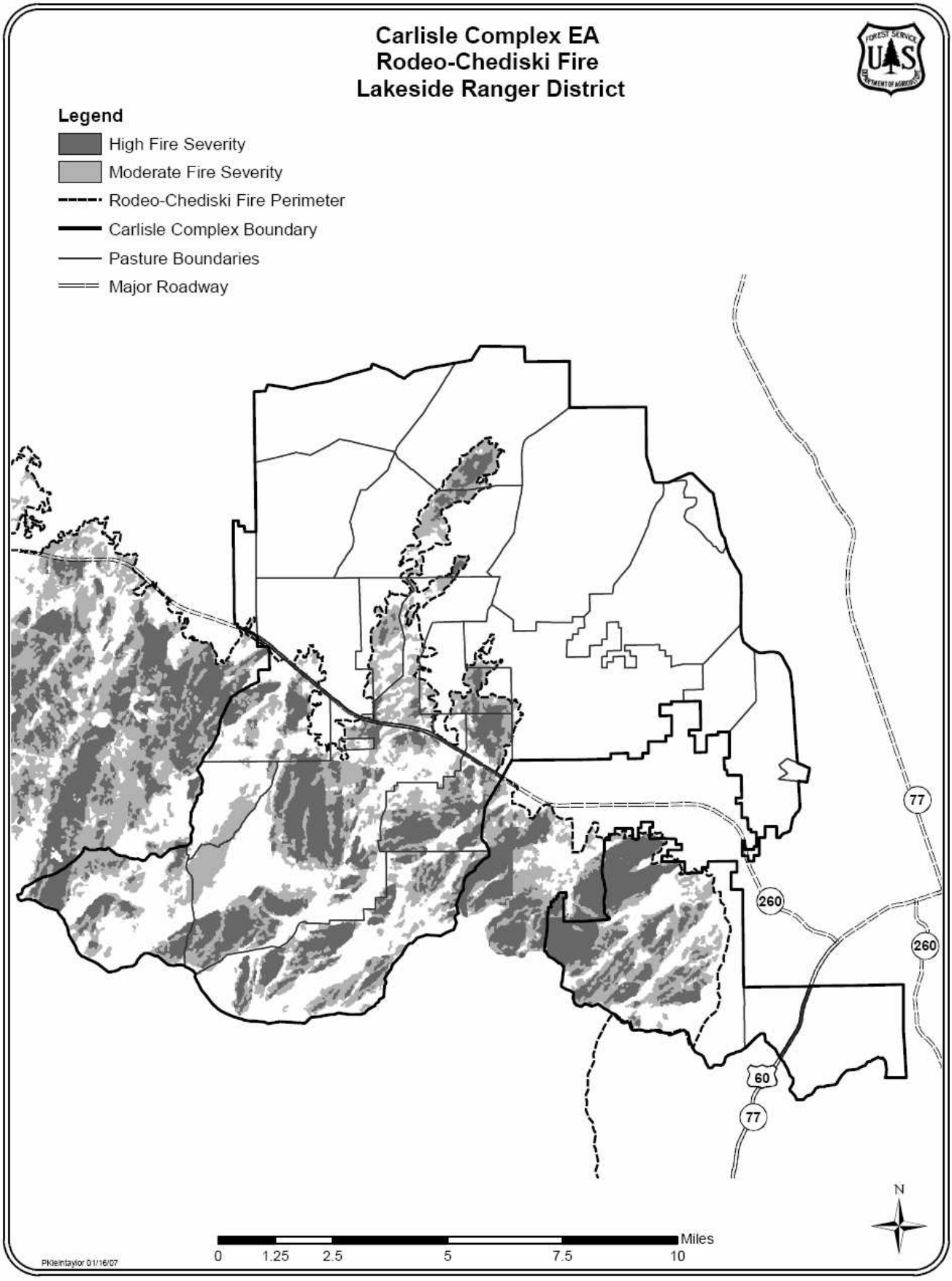
Map 1


Carlisle Complex EA
Rodeo-Chediski Fire
Lakeside Ranger District
Legend
High Fire Severity
Moderate Fire Severity
Rodeo-Chediski Fire Perimeter
Carlisle Complex Boundary
Pasture Boundaries
Major Roadway
77
260
260
60
77
N
Miles
0
1.25
2.5
5
7.5
10
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Map 2

Chapter 2 – Alternatives

This chapter describes and compares the alternatives considered for the Carlisle Complex Allotment Management project. This section presents the alternatives in comparative form, in order to define the differences among alternatives and provide a clear basis for choice among the options for the decision maker and public. Mitigation and monitoring measures incorporated into the alternatives are also described.

As project analysis proceeded, it became clear to the Team that concerns related to, but distinct from grazing, needed to be addressed. Soil, watershed and habitat improvements could be achieved through vegetation treatments and road closures. Rather than undertake separate, essentially redundant efforts, the District Ranger agreed to concurrent analyses which would lead to individual decisions. Accordingly, this chapter contains three major subdivisions, one each for the allotment management plan, the overstory treatment plan, and the roads management plan.

Alternatives Eliminated from Detailed Study

Several alternatives were considered but not fully analyzed. Because the currently permitted stocking level exceeds the estimated capacity of the land, it does not meet either the stated purpose and need or the objectives of improving range condition. Therefore, the currently permitted stocking rate was not addressed as a viable alternative. Current permitted numbers (equivalent to 461 cows/calves yearlong) are 50% above this capacity figure. An alternative that does not meet Forest Plan Standards ("*Balance grazing capacity and permitted use as soon as possible but no later than 1995*." page 77-2) does not require analysis because it was already analyzed and decided by a previous decision (the Forest Plan Record of Decision).

The permittee submitted an alternative for yearlong grazing that requested 300 head yearlong in 2002, not long after the Rodeo-Chediski Fire. At that time, the alternative stocking rate was 67% above the estimated capacity. Due to the recovery since the fire and the increased forage resource {Doc. 64, 66, 76} the Interdisciplinary Team (IDT) reanalyzed capacity and found this alternative just met the new estimated capacity. Therefore, Alternative G3 now reflects the estimated capacity since the recovery of the fire-affected pastures.

Several yearlong alternatives with varying details, mostly in numbers of livestock, were suggested, but none met the stated purpose and needs {Doc. 34A}. The initial Proposed Action, G2, was winter-only grazing. Based on public input during scoping and the recovery of the RC Fire area at a faster rate than anticipated, that alternative, although analyzed in detail, will not be further documented in detail in this Environmental Analysis. It was considered not feasible economically and not needed to provide improved range conditions. With the summer range now mostly recovered, the northern pastures can begin receiving mostly winter use. Only G1, G3, and G4 will be considered in detail.

An alternative to the roads proposed action was suggested. "Instead of closing roads, create better drainage to slow down flow of water with frequent repair. The damage has already been done and nothing short of complete closure will solve the problem." This alternative does not meet Forest Plan Standards and Guidelines for road density. Also, many of the "roads" were not built by the Forest Service, but were "user created" when vehicles used a route over and over. These roads need to be closed or brought up to FS standards, which will need to be determined on a case-by-case basis. Therefore, this alternative was not considered in detail.

Allotment Management Plan Alternatives

Alternative G1 – No Action/No Grazing

Under the No Action alternative, no livestock grazing would occur on the Complex. This alternative does meet most of the objectives of the analysis. A decision not to allow grazing on the allotment would result in cancellation of the existing grazing permit.

Proposals Common to Action Alternatives – Grazing Alternatives G3, G4

The following lists the proposals which are shared by each of the action alternatives.

- The allotments within the Complex will be combined into one allotment, administered under a single ten-year Term Grazing Permit. The new allotment will be renamed the Railroad Allotment.
- Rotation will be scheduled such that no pasture will be used during the same period in consecutive years. Complete rest will be taken after each pasture use.
- The Show Low Riparian Pasture will be used only during the dormant season (November-April).
- Non-use for resource protection was implemented for the pastures affected by the RC Fire until they recovered {Doc. 34}. Grazing resumed on a pasture basis. Some pastures or areas within pastures may be excluded from the rotation schedule in areas that are slower to regain ground cover and desired vegetation composition, and/or to protect tree seedlings.
- Fences and other developments will be in Serviceable condition prior to livestock being allowed to graze the affected pasture(s).
- Where feasible and practical, smaller pastures may be consolidated and larger pastures split so they contain approximately the same amount of forage. This will allow for a more efficient rotation schedule. Due to potential costs, consolidation is more likely than splitting pastures.
- Approximately four miles of new fence and nine miles of fence reconstruction are proposed. At least ten cattleguards will be emplaced to prevent unscheduled livestock movement between pastures due to gates being left open by the public. Up to eleven new livestock waters, two corrals and five miles of pipeline may be constructed (Map 3).
- A monitoring plan will be developed for the selected alternative to help ensure Forest Plan standards are met and the allotment is moving toward desired conditions. The monitoring plan identifies key areas, methods, and timing of monitoring. This plan will also establish threshold criteria for determining if and when grazing intensity, frequency, or duration might be increased or decreased.

Alternative G3 – Yearlong Alternative

Several responses to the scoping report stated that the allotment could support livestock yearlong while improving range condition, and that winter-only grazing would pose an undue economic hardship. Based on the grazing capacity plus allowing full rest in each pasture a minimum of one year in two, the Team proposes the following:

- Issue a new Term Grazing Permit to authorize yearlong use under a deferred-rest rotation grazing system for the entire Complex. The class of livestock will be cow/calf. The proposed action would authorize a maximum 3,852 Animal Months (AMs), equivalent 300 cow-calf pairs plus associated bulls. To reflect the variability in forage conditions regularly experienced on the allotment, yearly adjustments will be made through the administrative process. As improvements are completed and are effective at improving distribution and if monitoring demonstrates movement

towards desired conditions as determined in the monitoring plan, stocking would be allowed to increase within the range defined above.

- Maximum herd size will be 300 cow/calf, with associated bulls, not to exceed the 3,852 Animal Months.
- Grazing utilization is limited to light grazing intensity[5] on Full Capacity range.
- Grazing strategy will be a mix of deferred/rest and rest rotation system. Each pasture will be rested at least twelve months prior to re-entry, but southern pastures may not be rested an entire growing season after use.

Alternative G4 – Modified Yearlong Alternative

This alternative is purposely conservative, developed with the intent of allowing more rest between episodes of livestock entry. The range analysis reports for the Complex {Doc 1B and 1C} recommend at least three full years of rest after each use during the growing season. Based on capacity and allowing full rest for two years after use, the Team proposes the following:

- Issue a new Term Grazing Permit to authorize yearlong grazing use under a deferred-rest rotation grazing system for the entire Complex. The class of livestock will be cow/calf. This alternative would authorize up to 1800 AMs, equivalent to 150 cow-calf pairs. The schedule would be yearlong, with the southern pastures used May-October and the remainder used November-April, with minor exceptions at the beginning or end of these periods.
- Maximum herd size will be 150.
- Grazing utilization is limited to light grazing intensity on Full Capacity range.
- Grazing strategy will be a rest rotation system. Each pasture will be rested at least 22 months prior to re-entry.

Vegetation Treatments Alternatives

Alternative V1 – No Action

Under the No Action alternative, no vegetation treatments would occur.

Alternative V2 – The Proposed Action

The proposed vegetation treatment plan includes the following actions:

- Treat approximately 600-1,000 acres of woodland stands per year over the next decade {Map 4}. See Table 7 for current, desired, and after-treatment mix of VSS. Treatment costs will be paid for by grants, cooperative agreements, sales of fuelwood, or any combination thereof.
- Treatments will vary depending on soil type and amount and size of trees to be removed. As shown in Table 2, those soil types where soil layers should not be mixed will be treated by means that

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[5] Holechek (2004) defined "light" grazing (average 32%) as a degree of utilization of primary forage species (25 studies) that allows palatable species to maximize their herbage producing ability. "Moderate" grazing (average 43%) allows palatable plants to maintain themselves but usually does not permit them to improve their herbage producing ability. These averages are based on pasture-wide utilization averaged over time. The Forest Service monitors utilization based on the use of key forage species in key areas. Key areas are selected to be representative of management effectiveness over the entire pasture. Annual use in key areas will be targeted at about 30%.

Holechek, J.L. 2004. Controlled grazing versus grazing exclusion impacts on rangeland ecosystems: What we have learned. Range Improvement Task Force Report # 1527417. New Mexico State University, Las Cruces, NM.

do not pull the tree roots to the surface. Agri-Axe, which cuts trees off at or just below soil level, or BullHog, which grinds the trees down to soil level on-site, are examples of such methods. One caveat with such methods is that they are best suited for areas with smaller trees, and will be used mostly on old push areas (2,000 acres in seedling stages). Some acres within grassland soil types that show encroachment by junipers are included in the acres shown on Table 7. However, up to another , because they are naturally grassland types, not juniper woodlands.

- In areas with larger trees, commercial fuelwood sales will be used whenever possible to control soil disturbance, lessen amount of time required to treat them, and allow revegetation if necessary. Some areas may be cut under public fuelwood permits. In areas where alligator juniper is present, prescribed burning should take place within the first 4 months after treatment to kill root sprouts, whenever possible. Some areas may be thinned by commercial contracts to remove biomass.
- Treatments will be scheduled in coordination with the grazing schedule. Livestock will not be allowed to graze areas treated by soil disturbing methods (i.e., harvest by commercial contracts, pushing) for at least two years, including two full growing seasons, to allow soil recovery and grass reestablishment.

Roads Management Plan Alternatives

Alternative R1 – No Action

Under the No Action alternative, no formal plan would replace current procedures.

Alternative R2 – The Proposed Action

The proposed roads management plan includes the following recommendations to meet the stated purpose and need:

- Open roads (29 % of current inventory, or about 190 miles) should be reconstructed/ maintained to Forest standards. Overall density should be reduced to about 1.4 miles per section. This proposed system is deemed adequate to support public recreation use throughout the Complex {Map 5}. Some roads will be considered for use as trails during the Forest-wide Travel Management analysis.
- Closed roads (16 % of current inventory, or about 101 miles) will not be routinely maintained. Occasional use of closed roads will be restricted to administrative personnel, such as firefighters or grazing and utility company permittees. Overall density will be reduced to about 0.7 miles per section.
- Once the Travel Management analysis has been completed and a decision made, no use will be allowed on roads decided for obliteration. Given the large number of miles involved (about 340) treatment would be prioritized based on erosion potential or similar considerations. This analysis will determine the effects of obliteration of roads.

Mitigation Measures Common to All Action Alternatives

To mitigate resource impacts, the following measures will be implemented. These measures have been used on previous projects and are considered effective at reducing potential short-term and long-term undesirable environmental effects. These measures are applicable to all of the action alternatives.

Soil, Water and Vegetation – the objective is to mitigate effects of livestock grazing and range facility maintenance through the use of Best Management Practices {FSH 2509.22} and adaptive management. Practices include, but are not limited to the following.

- Utilization of key upland herbaceous forage species in key areas will be limited to light grazing intensity. The objective is to improve plant vigor, provide herbaceous residue for soil protection and to provide residual forage and herbaceous cover for wildlife. By definition, light grazing intensity best moves the plant resources towards these conditions.
- Necessary techniques to achieve proper distribution or lessen the impact on sensitive areas. Practices include herding, salting and controlling access to waters.
- Utilization of annual growth of apical meristems of riparian broadleaf trees less than six feet tall will not exceed 30%. The objective is to provide for growth and recruitment of riparian trees.
- All vegetative treatment areas are to be rested a minimum of two growing seasons after treatment. This will allow understory plants to become established.
- Slash will be left on the ground at least two years after vegetative treatments to discourage use of area by ungulates and vehicles. Slash also helps create microhabitats for seedling establishment. The exception is areas dominated by Alligator Juniper, which will be burned within 4 months of treatment if possible and conditions are right to kill root sprouts {Doc. 72}.
- Best Management Practices {Appendix A} will be followed and tailored to meet site conditions for all vegetation removal and road closures.

Wildlife – the objective is to mitigate impacts to wildlife from livestock grazing and from disturbance associated with maintenance of range facilities, vegetation treatments, and road closures.

- All reconstructed water developments will include wildlife access and escape ramps.
- All fencing repairs will conform to LRMP standards {LRMP, p. 35} to provide for wildlife passage through the fence. At a minimum, this will be a 4-strand fence with smooth bottom wire 16 inches off of the ground and a total height of 42 inches or less.
- The Forest will implement measures designed to minimize the introduction of non-native species (see Appendix A), including washing of vehicles, seeding with certified weed-free sources only, etc., during construction, vegetation treatments, and road treatments.
- Where feasible, all equipment associated with authorized and permitted use will be properly sterilized between aquatic sites, by completely drying or treating with a 10% bleach or 1% Quat 128 solution, in order to reduce the spread of chytrid fungus, which is fatal to leopard frogs. This will occur where there is potential to provide suitable habitat for leopard frogs, in compliance with Biological Opinion on the Forest Plan.

Heritage Resources – the objective is to protect heritage resources (historic and prehistoric sites) from impacts caused by livestock concentration.

- No salting will occur within or adjacent to identified heritage sites.

Monitoring

The objective of monitoring is to verify whether management is being properly implemented and whether the actions are effective at achieving or moving toward desired conditions. Utilization will be measured on key species in key areas[6]. Some key areas have been established and others will need to be identified in cooperation with the permittee(s) and other interested parties, as will a complete monitoring plan for the Complex. Key species will be native perennial grasses that are palatable to

[6] Key areas are selected to be representative of management effectiveness over the entire pasture. Key areas are usually ¼ to 1 mile from water and located on productive soils on level to intermediate slopes. They are 5 acres or more in size. Annual use in key areas will be targeted at about 35%, which should insure pasture-wide average use of 32%.

livestock. These may include, but are not limited to blue grama (*Bouteloua gracilis*), sideoats grama (*B.curtipendula*), black grama (*B.eroipoda*), galleta (*Hilaria jamesii*), muttongrass (*Poa fendleriana*), arizona fescue (*Festuca arizonica*), mountain muhly (*Muhlenbergia montanas*) and three awn (*Aristida sp*). Utilization will be measured after the growing season; however, grazing intensity will be monitored throughout the grazing period in order to practice adaptive management and make management adjustments needed for plant development and recovery.

Implementation monitoring will occur yearly and will include such things as inspection reports, forage utilization measurements in key areas, livestock counts and facilities inspections. Utilization measurements are made following procedures found in the Interagency Technical Reference (BLM 1996) and with consideration of the Principles of Obtaining and Interpreting Utilization Data on Southwest Rangelands (USDA 2004). Utilization will be monitored on key forage species that are listed above, which are native perennial grasses that are palatable to livestock. At a minimum monitoring will include use in key areas, but may include monitoring of other areas considered critical to wildlife, watershed, etc. The Lakeside Operation Team and the permittees will be responsible for monitoring livestock grazing utilization. Over time, changes in resource conditions or management may result in changes in livestock use patterns. As livestock use patterns change, new key areas may be established and existing key areas may be modified or abandoned in cooperation with the permittee(s). Permittees will be encouraged to participate in monitoring activities. Records of livestock numbers, movement dates and shipping records as well as precipitation records will be kept by the permittees and will be provided to the Operation Team Leader annually.

Effectiveness monitoring includes measurements to track upland range and watershed condition and trend (hydrologic function). Monitoring will include, but is not limited to pace transects, Parker 3-step, repeat photography, grazed plant count, or clipping and weighing. Any procedures described in the Interagency Technical Reference (BLM 1996) or the Region 3 Rangeland Analysis and Training Guide (USDA 1997) may be used. These data are interpreted to determine whether management is achieving desired resource conditions, whether changes in resource condition are related to management, and to determine whether modifications in management are necessary. Effectiveness monitoring will occur at a minimum of five-year intervals, or more frequently if deemed necessary.

Adaptive Management

The proposed action is intended to provide sufficient flexibility to adapt management to changing circumstances. If monitoring indicates that desired conditions are not being achieved, management will be modified in cooperation with the permittees. Changes may include administrative decisions such as the specific number of livestock authorized annually, specific dates for grazing, class of animal or modifications in pasture rotations, but such changes will not exceed the limits for timing, intensity, duration and frequency defined for the proposed action and analyzed herein.

If monitoring indicates improved conditions, administrative changes could also increase the specific number of livestock authorized annually. Effectiveness monitoring would be required to use the same methods each session. In order to increase numbers beyond those analyzed, it would be based on a minimum of two years monitoring conducted at least three years apart (monitor year one, then wait three years to monitor the second time). Results must show that significant movement toward objectives has been met across the Complex.

Future Review of the Decision

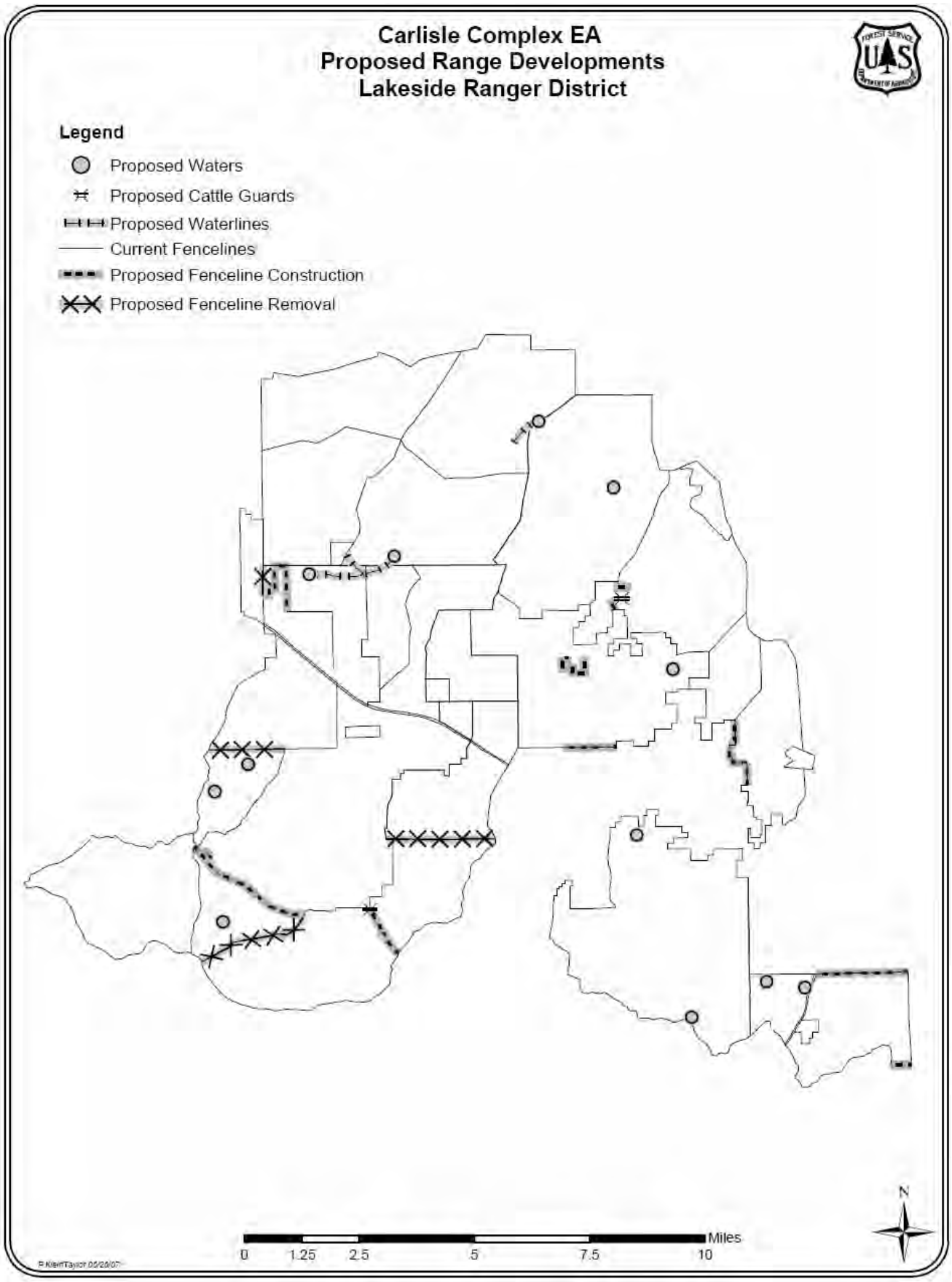
In the case that changing circumstances require physical improvements not disclosed or analyzed herein, further interdisciplinary review would occur. The review will consider the changed

circumstances and site-specific environmental effects of the improvements in the context of the overall project. Based on the results of the interdisciplinary review, the Ranger will determine whether correction, supplementation or revision of the EA is necessary in accordance with Forest Service Handbook direction at FSH 1909.15(18) and FSH 2209.13(96.1).

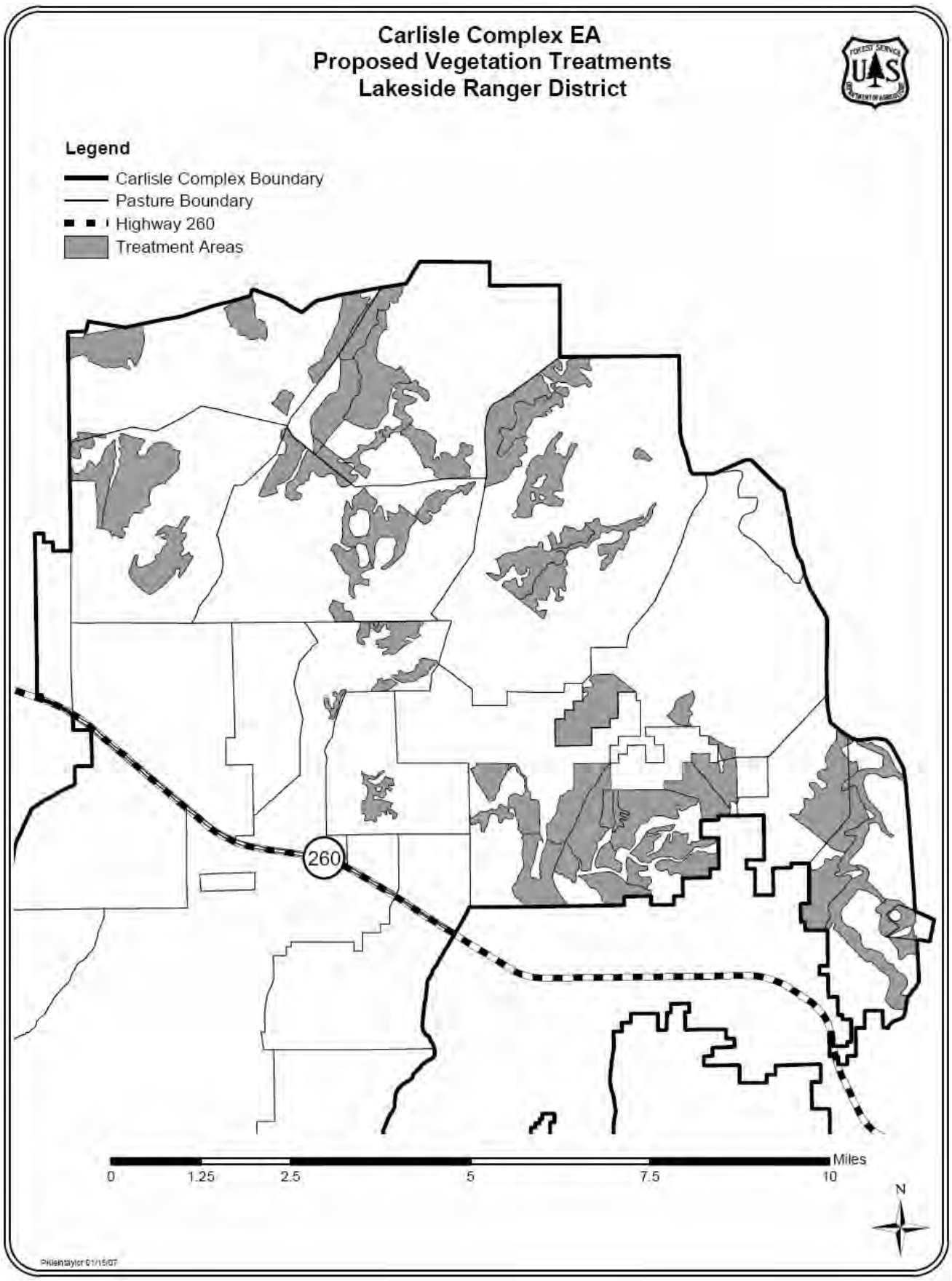
Comparison of Grazing Alternatives

Table 3: Comparative summary of proposed grazing alternatives. Details can be found in the Project Record under the individual specialist's reports.

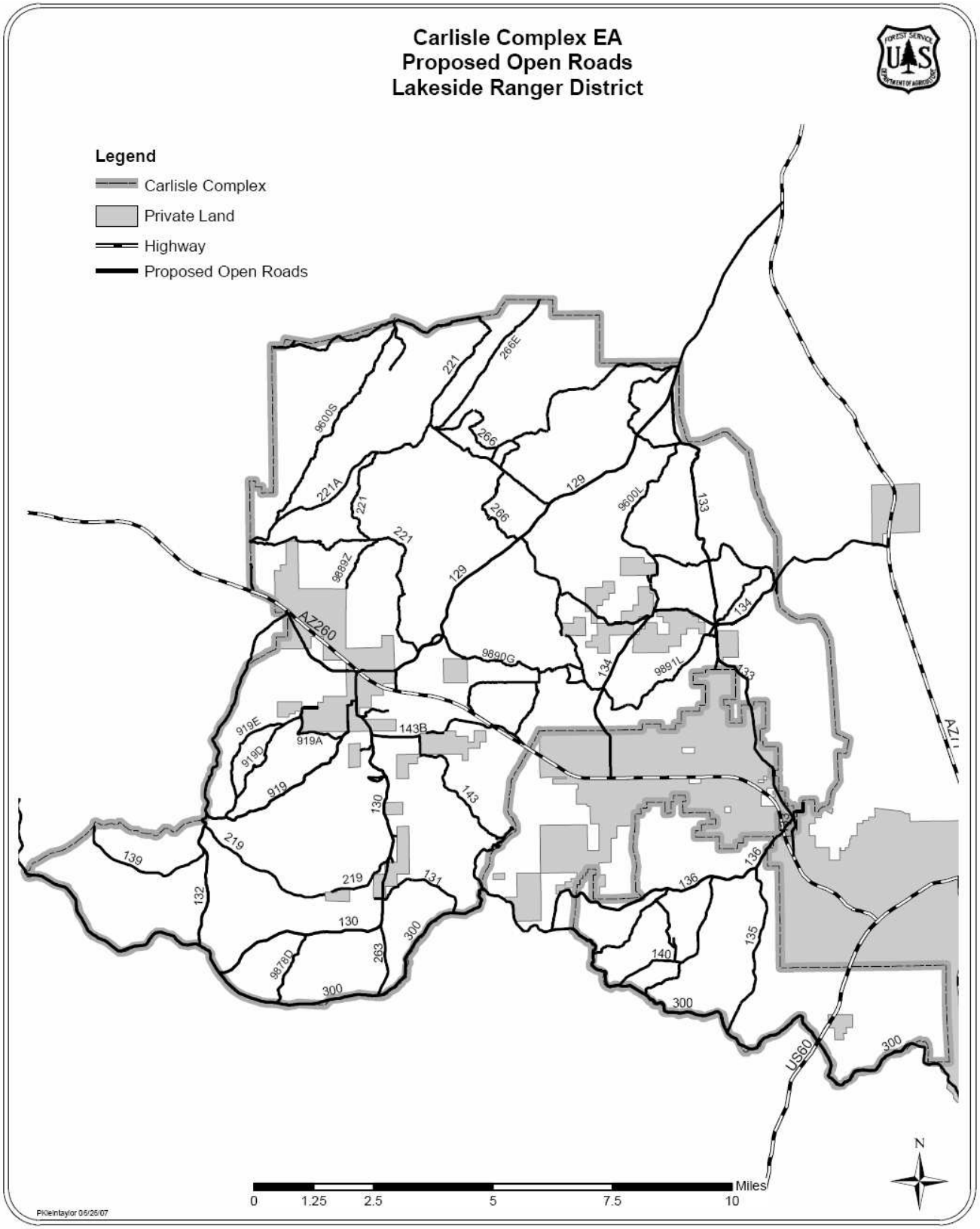
	Alt. G1 No Grazing	**Alt. G3 Yearlong Grazing**	**Alt. G4 Modified Yearlong**
Manage at Current Intensity	No	Yes	Yes
Season of Use	NA	Yearlong	Yearlong
Initial AMs	0	1,800	1,440
Initial Herd Size	0	150	120
Long-term AUMs	0	1,080-3,600	900-1,800
Long-term Herd Size	0	90-300	120
Allowable Use	NA	light	light
Nonuse (rest) Period	NA	12 months minimum	22 months minimum
Range Developments	None	11 roadside tanks 5 mi pipeline 13 mi fence 10 cattleguards 2 corrals	11 roadside tanks 5 mi pipeline 13 mi fence 10 cattleguards 2 corrals


Carlisle Complex EA
Proposed Range Developments
Lakeside Ranger District
Legend
Proposed Waters
Proposed Cattle Guards
Proposed Waterlines
Current Fencelines
Proposed Fenceline Construction
Proposed Fenceline Removal
N
Miles
0
1.25
2.5
5
7.5
10
P.KleinTaylor 05/29/07

Map 3


Carlisle Complex EA
Proposed Vegetation Treatments
Lakeside Ranger District
Legend
Carlisle Complex Boundary
Pasture Boundary
Highway 260
Treatment Areas
260
0
1.25
2.5
5
7.5
10
Miles
N
PKlein\taylor 01/15/07

Map 4


Carlisle Complex EA
Proposed Open Roads
Lakeside Ranger District
Legend
Carlisle Complex
Private Land
Highway
Proposed Open Roads
AZ260
US60
AZ1
9600S
221
266E
266
221A
129
9600L
133
9889Z
9890G
9891L
134
919E
919A
919D
919
143B
143
130
139
219
131
132
136
135
140
263
9878D
300
Miles
0
1.25
2.5
5
7.5
10
N
PKleintaylor 05/25/07

Map 5

Chapter 3 – Environmental Consequences

This chapter summarizes the physical, biological, social and economic environments of the affected project area and the potential changes to those environments due to implementation of the alternatives. It also presents the scientific and analytical basis for the comparison of alternatives presented in the chart above. Basic assumptions of all analyses are that normal climatic conditions will prevail and that no catastrophic events – fires or floods, for example – will occur within the next decade. The affected environment summarizes the area, vegetation type, potential species affected, etc. A Direct Effect happens at the time and place where the action occurs, or immediately afterwards. An indirect effect takes place at a later time or at a distance from the action.

The chapter is divided into several sections, each addressing an environmental component of management concern. Each section begins with a brief description of the affected environment in terms of the topical component. This is followed by an analysis of the direct and indirect effects of each alternative. Direct effects are those which occur as an immediate consequence of a given action. Indirect effects are those which occur at a later time and/or place. This chapter then concludes with an analysis of cumulative effects. Cumulative effects are caused by the aggregate of past, present, and reasonably foreseeable future actions.

Range Condition & Capacity

Affected Environment

The Range specialist report {Doc. 40} in 2000 showed that 66 percent of the Complex was rated as Full Capacity (that which produces more than 100 pounds per acre of herbaceous forage); the remainder was Potential Capacity with small areas (less than 1 %) rated as No Capacity {Map 6}. Current Range Condition is summarized in Table 4, based on data collected from 1999 to the present {Doc 1B, 1C, 46A, 48, 57A, B, 59, 60, 62, 64, 81, 82}. A majority (64%) of the Complex is in Poor condition with a mix of trends. The southern portion of the Complex affected by the Rodeo-Chediski fire has improved to Fair condition within the Moderate to High burn severity classes. In 2007, Condition Class was reevaluated based on paced transects completed between 2005 and 2007 in the RC area.

Table 4: Range Condition by acres and percentage of area (Complex = 88,630 acres) in 1999, 2000, 2005, 2006, and 2007. Numbers have been rounded to nearest 100 acres.

Range Condition in Acres and Percent					
Good	Fair	Poor	Very Poor	No Data	**Total**
1,900	21,700	56,500	2,900	5,300	88,300
2%	25%	64%	3%	6%	100%

The limited forage production in Potential Capacity areas was and is largely due to closed canopy cover in the overstory. To demonstrate this, we conducted an analysis of the RC Fire area in 2005 and 2006. Areas that were potential capacity before the fire were checked to see if they were now producing over 100 lbs per acre {Doc 66}. That analysis showed that some 15,750 acres of Potential Capacity rangeland was burned at moderate-to-high severities. Due to nutrient cycling, grass seeding,

and rest from grazing most of that area is now full capacity range. In 2007, only about 18% of the allotment remains in potential capacity (Map 7). Approximately 47% of the potential capacity acres, mostly in the fire-affected pastures, are producing more grass. Range condition has also improved to Fair in most areas on the south side of Highway 260, although no mapping of range condition has been completed.

Improvement in range condition is a direct reflection of utilization levels, the residual biomass after grazing, plant composition changes, and climate. Several studies show that light to conservative grazing intensities can promote improvement in ecological condition even when accompanied by some drought (Holecheck 2003). Those alternatives that propose appropriate utilization levels, appropriate season of use, and stocking levels that reflect the range, watershed, and soil conditions were found to facilitate range improvement more rapidly and reduce risk of severe overgrazing during drought (Galt et.al. 2000, Holecheck et. al. 2001, Holecheck 2003).

Alternative G1 – No Action/No Grazing

Direct Effects: This alternative would not maintain the current Management Intensity {Apache-Sitgreaves National Forests Plan [Plan], pp. 149}. The Complex would be completely rested, other than grazing by wildlife. Removal of livestock would result in an immediate decrease in forage utilization, followed by an increase in herbaceous plant vigor and litter accumulation. This occurs by permitting grasses the opportunity to build their root system and the reserves of carbohydrates in the root system. This in turn leads to more robust individual plants, increases an individual plant's likelihood for survival, and results in increases in overall forage production. Then, plants produce seeds and ripening takes place, increasing the probability of reproduction of important grass species, including the less common cool season species such as muttongrass and Indian ricegrass. Seedlings are given time to become established, which eventually increases plant density. Organic material accumulates between plants, enriching and building soil.

Rest by itself leads to changes that differ among sites and by the length of time an area is rested (Brady et. al. 1989, Fleischner 1994, Curtin 2002, Valone et.al. 2002). Some studies in arid communities show little effect for one to three decades, while others show more rapid changes to the grass communities. In shrub or tree invaded rangeland, increases in grass density may take longer and sometimes require other management activities such as brush/tree removal in addition to rest (Brady et. al., Galt et. al. 2000). It is expected, that in the absence of these other activities, change due to rest alone will be measurable only after at least a decade has past.

The increases predicted in plant density would be more noticeable on the northern pastures than on the southern ones, because the southern pastures have undergone a huge disturbance factor, are just now being returned to grazing after a 3-5 year rest following RC and received much after-fire management, including seeding and mulching.

Range Betterment funding, one source for implementing non-structural developments, would not be available since there would be no collection of grazing fees. However, other non-federal funding could be available for this purpose, so it is possible that other management activities to improve the vegetation resource would be available.

Indirect Effects: As plant density and litter build up on sites, it reduces both wind and water erosion. As noted above, increased forage production should result even in areas where current plant density is lower than desired, such as flatter areas of most northern pastures. Density of plants is expected to increase most on soils in Impaired or Unsatisfactory condition, particularly in those areas where heavy use has occurred, such as around earthen tanks and along livestock trails. A notable change would likely be an increase in cool season species, especially in the northern pastures,

because they would not be grazed by domestic livestock during their critical growth stages. Several years or intense management may be required to replace the current weed community in some parts of Walker Lake, Bull Hollow, and Cactus Flat pastures with a perennial grass one. Given soil capabilities, the presence of invasive plants and weeds, and woody species now established on most of these sites, this improvement is not expected to be substantial in the near term. Nevertheless, in areas where tree canopy allows, range condition is expected to show an upward trend and improved plant composition within the next 10 years, especially in areas currently classified as Poor or Very Poor, such as the northern portion of Walker Lake pasture, Cactus Flat grasslands, East Bull, Owens, and in flatter portions of Bull Hollow and Thistle pastures.

Upland ranges which were in Fair condition (all of which were fire affected) are expected to maintain vigor, but not show a shift in plant composition during the next 10 years. This initial improvement is expected to be followed by an overall stabilization of Fair range condition by the end of the project term.

With the absence of domestic grazing in the southern pastures, riparian areas will reach their full potential faster than if livestock have access to those areas within the growing season.

Alternative G3 – Yearlong Grazing

Direct Effects: This alternative would balance permitted use with capacity while providing at least 12 months – or one full growing season – of rest for a given pasture after each use. It would increase the current stocking to a potential of 300 cow/calf yearlong. Rest-rotation grazing is distinguished from deferment in that the range receives nonuse for a full year rather than just during the growth period {Hormay and Evanko 1958}. This one year's rest gives the plants a longer period to recover from past grazing influences and provides wildlife with a pasture free of livestock use during the critical dormant period. Rest-rotation was developed for regions with extended periods of drought {Heitschmidt and Stuth 1991) such as the Mogollon Rim country of Arizona. This grazing system has been shown to improve plant vigor, reduce erosion and improve range conditions {Holechek et al. 1989, McCarthy 2003, Heitschmidt and Stuth 1991}. It works in the same way as described under Alternative G1, but allows for multiple use by grazing domestic livestock.

Implementation of Alternative G3 would result in increased rest in most pastures compared to currently. Light forage use should continue through a decrease in livestock numbers from permitted numbers. Spring deferment followed by yearlong rest for most summer pastures (south of Highway 260) is expected to increase the vigor and productivity in all soil sites, resulting in increased cover from litter, and incorporation into the soil once livestock return. Past studies in semi-arid rangelands in Arizona all reported improvement in vigor and density of palatable perennial grasses accompanied light to moderate stocking {Martin and Ward 1976, Martin 1978}. They also concluded that a full year's rest before grazing provides for the accumulation of old herbage that protects early growth from repeated close grazing. Winter-use pastures would also improve plant vigor. In areas where tree density is not too high, areas of Poor and Very Poor condition are expected to change to upward trends over the decade due to increased rest, but not as fast as G1.

Indirect Effects: Range conditions, both vegetation and soils scores, would eventually improve through increased plant vigor, perennial plant density, and increased forage production. Planned rest together with deferment in winter pastures is expected to improve plant composition by eventually increasing the amount of cool season grasses. A more balanced composition of warm and cool season grasses would be expected than is currently found on most of the northern pastures, especially in soil types 53 and 54, which comprise a majority of the northern area. Cool season grasses currently are well below their natural potential percent of composition on these soils.

The most notable change in vegetation conditions is expected to occur in the northern pastures, where Alternative G3 provides a combination of increased rest and moderate stock density that would promote increased plant density and start perennial grass plant regeneration. Increased litter incorporation into the soil for nutrient cycling may occur when livestock return to a pasture after grasses have seeded out. Perennial seedling establishment would be expected within 3-5 years, followed by a positive shift in range condition trend, assuming adequate amounts of moisture are received.

Herbaceous vegetation that has not evolved under large-bodied herbivory use, such as lands in the Southwest, benefits from an extended period of non-use or rest from such use. A brief review of the research is presented here. According to McCarthy (2003), rest-rotation grazing is a forage management system that utilizes livestock grazing to improve forage vigor, reduce erosion and improve range conditions by allowing for the occurrence of the following:

1) Plants that have been grazed are permitted the opportunity to build their root system and the reserves of carbohydrates in the root system. This in turn allows the plant to become more robust, increases individual plant's likelihood for survival, and increases overall forage production.

2) Seed production and ripening takes place increasing the probability of reproduction of important grass species.

3) Seedlings are given time to become established, which reduces erosion and increases forage production on a site.

4) Organic material accumulates between plants enriching and building soil, while reducing both wind and water erosion.

In addition, rest-rotation grazing was designed for regions having extended periods of drought (Heitschmidt and Stuth 1991) such as the Mogollon Rim country of Arizona. As far back as 1965, Johnson (1965) reported an improvement in range condition under rest-rotation versus deferred rotation grazing in a Wyoming study. Several studies (Hormay 1970, Ratliff et al. 1972, Ratliff and Ruppert 1974) found that, in mountainous ranges in California, rest-rotation grazing (compared to continuous) resulted in higher vigor of key forage species. On semi-desert grasslands in southern Arizona, Martin and Ward (1976) and Martin (1978) all reported improvement in vigor and density of palatable perennial grasses. They also concluded that a full year's rest before grazing provides for the accumulation of old herbage that protects early growth from repeated close grazing.

Holechek et al. (1989) also report rest-rotation grazing has a number of multiple-use advantages; such as benefits to wildlife, greater esthetics, and benefits to soils (higher infiltration, reduced bulk densities, and reduced sedimentation when compared to deferred rotation or season-long grazing), and concluded that rest-rotation grazing was a good system for both vegetation and livestock in rugged, mountainous terrain. McCarthy (2003) concluded that one year of grazing should be followed by two years of rest to meet a wide variety of forage and social needs.

Herbaceous understory within dense browse stands would be improved by increasing forage consumption of woody species during the winter months, maintaining open browse stands and keeping noxious weeds from invading. Overall, implementation of this alternative is expected to shift range conditions on those soils and sites that are in deteriorated conditions towards objectives, and improve range conditions on sites and in pastures currently rated Poor or Very Poor in areas where tree canopy is not too dense.

Holechek (1999) concluded in a study from 1992-1999 in three different arid grasslands that "So far the 30% harvest coefficient has proven superior in vegetation productivity, livestock productivity,

and financial returns. After drought in 1994 through 1996, forage production on the conservatively stocked pastures increased 71% (1997 and 1998) compared to 35% on those moderated stocked. Calf crops were more influenced by stocking than calf or cow weights." Galt et. al. 2000, studying Chihuahuan grassland and Colorado mid-grass prairie, found that conservatively stocked pastures and a 25% harvest coefficient produced more forage and required less destocking during drought. There was also substantial improvement in ecological range condition and forage production.

With higher grazing intensity than Alternative G1 and G4, this would reach Desired Future Conditions slower than the other alternatives.

Alternative G4 – Modified Yearlong Grazing

Direct Effects: This alternative would balance permitted use with capacity while improving range resources by providing at least 22 months – or two full growing seasons – of rest for a given pasture. The effects would be similar to those described in Alternative G3, but with about one-half the AMs and herd size, recovery of deteriorated range in the northern pastures should be faster than G3. The draft grazing schedule required some use of the northern pastures in the growing season in order to provide rest every other year in the southern pastures {Doc. 49}. Recently, with the recovery of the Rodeo-Chediski pastures, the productivity has been such that growing season use of those northern pastures would not be required in order to achieve 22 months rest in any pasture. Because of the recovery of the southern pastures, dormant season only use of the northern pastures is now feasible immediately. The combination of increased growing season rest of forage plants would promote increased plant density, perennial grass regeneration, and increased litter accumulation.

Indirect Effects: This alternative would improve range trend and eventually, condition and capacity throughout the Complex, given the expected increase in residual grass and litter. This would be beneficial to both livestock and wildlife, and eventually watershed condition would also improve.

The proposed grazing schedule would result in increased rest of warm season perennial herbaceous plants across the northern pastures through implementation of a 6-month dormant season management schedule. Increasing density of warm season grasses would be expected due to the amount of rest. Cool season grasses would not increase until summer and winter grazing is balanced, which is now possible due to fire recovery and spring deferment of most winter pastures, followed by complete rest for two growing seasons. Animal activity during the dormant season would serve to increase consumption of woody forage, reduce consumption of herbaceous forage, open browse stands for herbaceous understory development, and incorporate standing litter into the soil system. Range condition would begin to improve through increased plant vigor, perennial plant density, and improved plant composition.

The most notable change in vegetation conditions is expected to occur in the southern pastures, where summer use and fall/winter rest each year would be implemented, with the addition of two full growing seasons of rest after each growing season use. Range condition, both vegetation and soils scores, should continue to improve through increased plant vigor, perennial plant density, and improved plant composition. Fewer numbers and longer rest provide easier control of grazing pressure in riparian areas, so they should continue to show low use on riparian vegetation and few impacts to banks. Due to grazing with lower numbers and increasing the amount of rest, this alternative would reach Desired Future Conditions faster than the other grazing alternative.

Alternative V1 – No Action/No Vegetation Treatments

Direct Effects: Selection of this alternative would have no direct effect on range condition or capacity. Lack of ground disturbance, however, could lessen the chance of noxious weeds becoming

established when compared to an action alternative. Current range conditions would persist in the short term throughout areas recommended for treatment.

Indirect Effects: Continued juniper encroachment in both the woodland and browse associations is projected during the next decade, eventually resulting in a declining trend in range condition over the long term, as herbaceous plants decline while woody species increase. Grassland vegetation types would tend to become woodland vegetation types.

Alternative V2 – Proposed Vegetation Treatments

Direct Effects: A description of methods to treat juniper stands was included in the proposed action. Methods such as use of Agri-Axe and BullHogs have little impact on soils. They do not rip up tree roots and mix soil layers. BullHog treatment actually helps soils by leaving the chips on site, which keeps ground cover the same or increases it, depending on how thinly the chips are spread. Generally, Agri-Axe treatments leave the tree skeletons on the ground, which must be burned or crushed later to incorporate some of the nutrients into the soil and prevent a buildup of fuel loadings.

Commercial fuelwood contracts will allow for relatively fast treatment of areas, but will entail increased soil disturbance compared with the methods above. The soil disturbance and its associated compaction is anticipated to be relatively short term, because Best Management practices will be employed and matched to each cutting unit to reduce soil compaction caused by vehicular traffic. Slash would be scattered to increase microhabitats for herbaceous plant establishment and help deter grazing by large wild ungulates. In areas with dense canopy and therefore a small herbaceous seed source, seeding may be required to help establish a grass community faster. Commercial contracts would provide funds for such seeding. Livestock grazing would not be allowed for two years following treatment to allow for grass establishment. This is a BMP that has been shown to be effective in areas to allow the recovery of grass density after soil disturbance.

Public fuelwood permits may be sold in areas that are not quite as dense or have as many large trees. Greater soil disturbance would be expected in these areas because the number of vehicles would be higher than with a contractor, and greater compaction is expected. Treatments to the desired canopy openness will probably take longer than with commercial contracts because as choice trees are removed, the public wants to move to other areas rather than take the remaining trees. This method could also have an impact on the permittee and his grazing schedule because the length of time would be longer to accomplish the goal. Due to higher compaction in at least some areas, reestablishment of grasses might require longer than two years.

Prescribed fire may be used after any of the above treatments, and is recommended as soon as possible after removal of alligator juniper because later burn treatments do not kill as many root sprouts as those burns occurring within about four months of treatment {ERI 2007}. Fire is expected to help in nutrient cycling and seed bed preparation, although it is inevitable that some small areas will be burned hot enough to prevent seed establishment for a number of years.

Indirect Effects: Several researchers have shown that forage production decreases with increasing tree canopy and that the removal or treatment of Pinyon and/or Juniper (PJ) trees has been shown to greatly increase forage production {Kruse 1979, Clary 1987, Vaitkus and Eddleman 1987}. The density of desirable grasses and shrubs also improves with the removal of PJ {Arnold 1964, Kruse 1979}. O'Rourke and Ogden {1969}, indicate that conditions of the site before PJ control is performed will have an effect on vegetative response. One factor is that the lower the PJ overstory (13 to 26%) before removal, the less of a chance for improvement. Where the canopy is between 36% and 44%, the perennial grass cover had a significant increase.

Slash left after treatment results in higher grass production, aids in the establishment of grasses and forbs, protects against runoff and sediment loss and provides higher soil moisture content. The proposed woodland treatments should improve range forage production within two years of implementation, due to total rest after treatments, assuming adequate moisture. Following resumption of grazing, continued improvement is expected due to rest built into all of the alternatives.

Reduction of the P-J canopy cover and leaving a light to moderate slash or burning of slash will improve forage production and range condition and trend of these areas in the long term. In areas that are currently in Poor or Very Poor range condition and Impaired soil condition, vegetation trends may improve in as little as three to five years.

Alternative R1 – No Action/No Roads Management Plan

Direct Effects: Selection of this alternative would have no direct effect on range condition or capacity.

Indirect Effects: Continued unmanaged use will eventually result in declining watershed and soil trends. This would have generally negative effects on range condition and eventually, on capacity.

Alternative R2 – Proposed Roads Management Plan

Direct Effects*:* Selection of this alternative would have no direct effect on range condition or capacity. There will be direct, short term soil disturbance when closing any roads. By use of best management practices, such direct effects are expected to be minimized and short term in nature.

Indirect Effects: Managed use and a substantial reduction of open roads would result in generally improving watershed and soil conditions. This would have generally beneficial effects on range condition and capacity.

Range Developments

Affected Environment

Structural range developments are presently adequate to utilize the northern pastures for livestock management, although some are in need of maintenance. Some fences still need replacement in the RC Fire area. Water is adequate in most pastures. Overall, 92 percent of the Complex is within one mile of water; additional waters would provide for better livestock distribution and management. See Map 3 for proposed location of range developments.

Alternative G1 – No Action/No Grazing

Direct Effects: Most existing developments would not be maintained. Maintenance responsibility for existing allotment and district boundary fences would be shifted to the District (about five miles) or adjacent grazing permittees (about 44 miles). Maintenance of selected water sources for wildlife would become the responsibility of the Arizona Game and Fish Department, if the Department so elected.

Indirect Effects: Deterioration of developments would accelerate through the decade. Large capital investments would be required if and when livestock grazing resumed.

Alternative G3 & G4 – Grazing Action Alternatives

Proposed actions are identical for these alternatives. A total of approximately four miles of new fences and nine miles of fence reconstruction are proposed. Seven miles of burned fenceline are proposed for removal. At least ten cattle guards would be constructed to prevent unscheduled

livestock movement between pastures due to gates being left open by the public. Eleven new roadside waters, two corrals and five miles of pipeline are proposed.

Direct Effects: Ninety-five percent of the Complex would be within one mile of water, as compared to 92 percent currently. This does not meet the Forest Plan standard of onewater per section; however, given that the areas more than a mile from water would consist of a few small pasture corners, the capital investment required to bring the entire Complex within standard is considered uneconomical. The proposed waters, fences and cattleguards would provide for improved livestock distribution and management. There will be direct, short term soil disturbance when installing any of the proposed developments. By use of best management practices, such direct effects are expected to be minimized and short term in nature.

Indirect Effects: With water better distributed in some pastures, better use of some pastures may result. Wildlife and the public would also benefit from the removal of unneeded fences. No other indirect or cumulative effects from these developments are expected.

Alternatives V1 & V2 –Vegetation Treatments

Direct and Indirect Effects: There would be no significant effects on range structural developments.

Alternatives R1 & R2 – Roads Management Plan

Direct and Indirect Effects: There would be no significant effects on range structural developments. Roads to range developments such as waters would be available to the permittee. There is a concern about ATV users having adverse impacts to waters when they enter them or use dams as ramps. Law enforcement and education is the only solution known to stop these types of impacts.

Watershed, Soils, Water Quality & Riparian Areas

Affected Environment

Soil and Watershed Condition: The Complex is located within the Cottonwood-Dodson (40.1% of the 5th code watershed in within the Complex) and Show Low Creek fifth-code watersheds (39.6% of the 5th code watershed falls within the Complex) {Doc. 45}. Both watersheds were rated as being in Unsatisfactory watershed condition in 1985 {USDA 1987}. Prior to the RC Fire, areas within the ponderosa pine forestland were generally in Satisfactory watershed condition; this was primarily due to an accumulation of needle litter, which adds hydraulic roughness to the surface and protects topsoil from runoff and accelerated erosion. Unsatisfactory watershed conditions are associated primarily with the pinyon-juniper woodland and with the transition zone between woodland and forestland or savanna. Woodland areas include all soil types associated with juniper and/or pinyon pine. All of these soil types are rated as impaired or unsatisfactory, regardless of canopy cover {Doc. 44}. Generally, areas with heavy canopy cover within the woodland are Unsatisfactory due to inadequate ground cover conditions.

Soil condition is an evaluation of soil quality based on an interpretation of factors which affect three primary soil functions, soil hydrology, soil stability, and nutrient cycling; these functions are interrelated. Soil condition was evaluated in the field during surveys in 1999. Soil condition is rated generally Impaired in the woodland areas. Hydrologic function is reduced in these areas due primarily to reductions in pore space from raindrop impact and compaction from ungulates. Some of the areas showing compaction from concentration by livestock are: areas in Bull Hollow and Walker Lake pastures, and the entire Bull and East Bull Pastures. Soil loss from sheet and rill erosion is

currently below tolerance levels throughout much of the area; however, evidence of concentrated flows associated with steeper slopes and roads are common.

The upland soils within the woodland area have lost much of their production potential due to loss of topsoil. Erosion pavement is evident in many areas in the woodland. In areas of dense overstory canopy cover, protective litter and vegetation is not distributed evenly across the landscape. Ground cover is limited to needle litter directly under tree or shrub crowns. The area between trees is devoid of adequate vegetative cover and is subject to gully erosion. Areas with dense tree cover will not stabilize without reduction of tree overstory to reduce light and water competition between graminoids (grasses) and trees.

Soil condition was generally rated Satisfactory in areas under ponderosa pine overstory prior to the RC Fire. Effective ground cover consisted mostly of pine needle litter in these areas. There are localized areas of Impaired condition where large ungulates concentrate, such as around tanks and in drainage bottoms.

The RC Fire burned approximately 85,899 acres on all districts within the two watersheds. Within the Carlisle Complex, fire resulted in moderate to high burn severity to the soil over about 16,000 acres. Watershed conditions within the burn are improving. Most of the area with high severity fire was seeded, and much of it was mulched. Seeding results were mixed, especially the first year after the fire. Current soil condition ranges from Satisfactory to Unsatisfactory within the fire area depending on localized burn severity, effectiveness of treatments, and level of natural recovery.

The table below summarizes watershed and soil conditions and soil erosion hazard ratings across the Complex.

Table 5: Watershed condition, soil condition and soil erosion hazard ratings by percentage of combined subwatersheds (94,215 acres; figure includes some private lands).

Watershed Condition Rating	Soil Erosion Hazard	Soil Condition Rating			Total %
		Satisfactory	Impaired	Unsatisfactory	
Satisfactory	Slight	37.5	-	-	37.5
	Moderate	1.0	-	-	1.0
	Severe	14.6	-	-	14.6
Unsatisfactory	Slight	-	26.6	2.1	28.8
	Moderate	-	-	0.2	0.2
	Severe	-	18.0	-	18.0
	Total %	53.1	44.7	2.3	100.0

Biological Soil Crusts: Microphytic crusts "are formed from living organisms and their by-products, creating a crust of soil particles bound together by organic materials" {Belnap et al. 1999}. They appear to play a significant role in nutrient cycling, water infiltration, improved plant diversity, and erosion control. A number of studies have demonstrated that the cyanobacterial component of these crusts fix significant amounts of nitrogen. Herbivores benefit from the improved nutrient status of plants grown in healthy, biologically crusted soils. It has been demonstrated in other studies that presence of these crusts are linked with greater vascular plant biodiversity. Within the desert brush, desert grassland and pinyon-juniper vegetation types, microphytic crusts are very important to help stabilize disturbed soils by providing ground cover in a pioneer species role.

Biological soil crusts have been shown to be susceptible to degradation through a variety of disturbances, such as fire and trampling, and may require lengthy periods in which to recover from

such disturbances. No surveys to document presence/absence of soil crusts have been completed post-fire within the burned pastures. Within the northern portion of the Complex, areas exist where ungulates concentrate and plant and crust density is low. Biological soil crusts would most likely improve in these areas under grazing management that provides protection when soils are very dry or extremely wet. Rotations that maximize periods between disturbances, with maximum animal dispersal (low density) will favor recovery of biological soil crusts {Ladyman, et. al. 1996}. A conservation practice for biological crust would favor salting away from areas where plant and biological crust density is low to areas where rock cover offers protection from hoof impact.

Water Quality: There is a concern that watershed conditions on the Cottonwood Creek and Show Low Creek are contributing sediment and impacting downstream fisheries in Silver Creek. The Arizona Department of Environmental Quality {ADEQ 2006} gave Show Low Creek and Silver Creek an "inconclusive" rating for the designated use as a cold water fishery. While the Complex represents only a portion of the watersheds, there is a concern regarding watershed condition as it relates to water quality. Specifically, the overall concerns center on turbidity, poor stream bank stability, and unsatisfactory riparian and fisheries habitat conditions downstream that can be attributed to impoundments, recreation, forestry practices, roads, ungulate grazing, and natural conditions in the watershed.

Road density within the Complex is high. More than eight miles of road fall within 75 feet of intermittent and perennial streams. Within the analysis area, over 63 miles of road were determined to be in close proximity to all drainages. Roads in close proximity to drainages leave little opportunity for mitigating sediment input into the stream network. Once sediment enters a channel, it will eventually enter live streams, unless intercepted by impoundments of some kind.

Within the Show Low Creek Watershed, two large reservoirs are located in and downstream of the project area, both upstream of the confluence with Silver Creek. The impoundments act as large sediment traps, allowing sediment to settle out of the water before continuing downstream. Downstream of the Cottonwood Wash Watershed, two large sand and gravel mining operations occur within the channel bottom, which clouds the effects of sediment input into the watershed.

Riparian Resources: Riparian areas within the Complex are found along the mainstem and tributaries of Show Low, Mortenson, Dodson and Cottonwood drainages. Proper Functioning Condition [PFC] surveys were completed in 1998 and 1999; areas within the RC burn have not been resurveyed. Flow augmentation (changes in the way water flows through a watershed) from Fool Hollow Lake and dam and the breached Lone Pine Dam has had the most detrimental affect to the riparian areas along Show Low Creek. Other riparian areas north of the RC Fire are generally Functioning at Risk, with no apparent trend, or Non-Functioning. Contributing factors to this Unsatisfactory condition include: 1) unsatisfactory upland watershed conditions (including the effects of wildfire) which results in increased damaging peak flows; 2) poorly placed roads and poor condition of roads (many roads are located within a channel or are restricting channel lateral movement); and, 3) poor representation of riparian vegetation and large woody debris within the channels.

The rate of improvement of riparian areas is directly affected by road location and condition, and/or the effects of water impoundments. Upland soil and watershed conditions also influence the amount and timing of flood flow within a riparian area, which impacts the hydraulic and erosion/deposition function of the channel. With the RC Fire, there will generally be an increase in amount of available woody debris over the next few years as fire-killed trees fall into the drainage system. Riparian areas north of the burned area will benefit from moderated flood response to precipitation events. Improvement in these riparian areas will take many years to overcome past management and the

effects of the fire. The table below summarizes ratings and trends for the riparian reaches within the Complex.

Alternative G1 – No Action/No Grazing

Direct and Indirect Effects: Under this Alternative, soil and watershed condition in uplands would improve at the fastest rate as impacts from domestic cattle would be eliminated. Areas with heavy pinyon-juniper canopy cover would not improve due to the extreme competition for light and

Table 6: Percentage of riparian reaches by functional rating; pre-RC Fire data (miles of reach = 45.5).

Rating		
Proper Functioning Condition	Functioning at Risk	Non-Functional
14%	62%	24%

available moisture would preclude grasses from re-establishing. Improvements in vegetation and litter ground cover will continue to occur in areas burned within the RC area.

Cryptogams will benefit from this alternative as biological soil crusts are least vulnerable to shear and compressional forces when the crust is not dry or protected by snow. Wild ungulates would continue to impact biological crusts, although animals would be widely distributed and generally not concentrated in areas for long periods of time.

Water quality impacts, mainly from turbidity and suspended sediments from upland sites, would gradually diminish. Major sediment sources, such as open roads and OHV use, would continue to produce the majority of sediment within the watersheds. Ground cover within the RC Fire area will continue to improve at its maximum potential recovery rate, further reducing effects to water quality.

Riparian resources would improve at the highest rate of all alternatives.

Alternative G3 – Yearlong Grazing

Direct and Indirect Effects: Soil and watershed conditions would improve under this alternative with moderate grazing intensity. However, areas that currently have heavy canopy cover would not improve due to the inability of understory vegetation to compete with woodland overstory vegetation for water and sunlight. Watershed improvement would be at a reduced rate as compared to Alternative G1. Generally, soil compaction would be higher as grazing would occur during the wettest months, July and August, and warm season grass species, such as blue grama, would be utilized at the most vulnerable time in June and July. However, rest is built into the rotation, and grazing during critical times would not occur in consecutive years, thereby providing for some recovery. Grazing management would result in greater plant litter retention and will have slow but complex results. Surface litter plays a complex role in range soil health. It cycles plant and animal nutrients, reduces raindrop impact, traps mobilized sediment, insulates and moderates soil temperatures, conserves soil moisture, and builds soil structure. The changes expected to occur are: reduced surface crusting, reduced erosion, increased biological activity, increased permeability, increased root mass, increased fertility, increased soil cover, and increased soil moisture. These effects will vary in time, and may take one to more decades before measurable results are obtained.

The proposed stocking rates and rest would also benefit biological crusts if cattle are well distributed. With improvements in soil and watershed conditions, water quality will improve due to reductions of sediment inputs by way of improved ground cover conditions.

Riparian resources would improve at a slower rate than any other alternative. The bulk of riparian areas are found within the burned area. These pastures are used during the summer months. Even at the lowest stocking rates, livestock can and will congregate in riparian areas if allowed. Active herding will be required to keep livestock from congregating in riparian areas. However, riparian areas in the north would improve due to a moderate stocking rate in winter when livestock are less likely to congregate in riparian areas and due to continued pasture rest. Careful monitoring of critical areas can be used to identify any needed adjustments to ensure banks are stable and vegetated.

Alternative G4 – Modified Yearlong Grazing

Direct and Indirect Effects: Soil and watershed condition would also improve under this alternative with the decrease in grazing intensity, although little improvement would occur in areas of heavy woodland canopy cover due to competition for light and water. Generally, improvement would be faster than Alternative G3 as a lower stocking rate and increased rest would be implemented.

Cryptogams will benefit from this alternative as biological soil crusts are least vulnerable to shear and compressional forces when the crust is not dry or protected by snow. The proposed stocking rates and rest would also benefit crusts especially if cattle are well distributed.

With improvements in ground cover and soil and watershed conditions, water quality would improve due to reductions of sediment inputs.

Riparian resources would improve at a slower rate than Alternative G1, but more rapidly than G3. The bulk of riparian areas are found within the RC Fire area. Riparian areas within the northern pastures would still improve due to the lower stocking rate and increased pasture rest. As with Alternative G3, careful monitoring of critical areas will be required to determine if adjustments are need to maintain bank stability and vegetation cover in riparian areas. An eventual improved watershed condition is predicted and an improved hydrologic response to precipitation events is expected. Cattle grazing in riparian areas within the perimeter of the burn must be carefully monitored and minimized.

Alternative V1 – No Action/No Vegetation Treatments

Direct and Indirect Effects: No overstory treatments would be implemented; therefore no improvement to soil and watershed condition would be expected in the areas of dense canopy cover. Canopy cover would continue to increase, further reducing the amount of available water and light to improve vegetative cover in interspaces. Inputs from areas with heavy overstory would continue to supply sediment to stream systems. Poor and Very Poor soil and range conditions would persist in these areas due to that high canopy closure.

Alternative V2 – Proposed Vegetation Treatments

Direct and Indirect Effects: Overstory reduction would be accomplished under this alternative. An increase in sediment and soil loss will occur; however, these are expected to be short term effects. Soil and water conservation practices {Appendix A} will be implemented and monitored to ensure impacts from harvest activities will be mitigated. Long term improvement in soil and watershed conditions are expected with this alternative, primarily due to the improved conditions for grass and forb establishment from reduced competition for soil moisture, nutrients and sunlight.

Slash generated from the treatments would be an immediate benefit to local watershed conditions by providing resistance to overland flow, which allows for reduced soil loss and increased residence time of water, which provides more eventual infiltration. The microhabitat shading and physical protection from the impacts of grazing would improve vegetation establishment. Slash treatments

such as crushing or masticating would be beneficial as it provides positive contact of material into the soil surface horizon and increases the surface area of the slash to improve decomposition of organic material. Treatment areas should be rested from domestic ungulate grazing until vegetation is well established.

Alternative R1 – No Action/No Roads Management Plan

Direct and Indirect Effects: No improvement to watershed and soil conditions would occur as the existing road network would remain. Sediment inputs to drainages within Cottonwood Creek, Show Low Creek and Silver Creek would remain high.

Alternative R2 – Proposed Roads Management Plan

Direct and Indirect Effects: With full implementation of this alternative, approximately 43.8 miles of unneeded road within riparian areas would be closed or obliterated. Minimum buffer width to provide suitable filtering of sediment from forest activities is 75 feet {Appendix A}. Estimates from the model Water Erosion Prediction Project [WEPP] for Roads indicates a conservative rate of potential reduction of 2.2 tons/mile/year of sediment delivered to the drainage network per year. Closure and obliteration of roads would result in an estimated reduction of 2.0 tons/mile/year of sediment. Reductions in sediment to Schoen's reservoir will increase its useful life expectancy. This alternative will be fairly expensive, and alternative funding sources must be developed to complete this work within the planning cycle.

Vegetation Ecology

Affected Environment

The entire Complex is considered affected environment {Doc. 44}. There are three vegetation components that would be affected by the proposals:

- **Forestland:** Forestland consists of ponderosa pine stands (approximately 40% of the allotment). These stands were severely impacted by the RC Fire, resulting in significant change. Prior to the fire, vegetation classes were skewed towards dense pole stands of 9-12 inch diameter trees (67%), but now, 55 percent of the area has reverted to the grass/forb stage due to overstory trees being killed {Doc. 47}. Grasses and forbs are expected to dominate for at least a couple of decades in the moderate to high severity burn areas. Succession will create a more substantial and widespread browse component in shallower soils, which will benefit wildlife more than livestock because most of those areas will be grazed by cattle only in the summer/fall. Current planting projects will hasten regeneration of some pine stands.
- **Woodland Overstory:** Woodland is defined as pinyon and/or juniper dominated areas (48% of the Complex). Pinyon-juniper woodland size classes are skewed toward dense stands. Closed canopies inhibit understory growth in some area of the allotment. Savannah-like conditions, present only 150 years ago, are almost non-existent. Natural and created openings as well as old treatment areas are being invaded by juniper {Doc. 43, 47}.
- **Grasslands and Understory:** Historic photographs and early descriptions of northern Arizona paint a different picture from the present. The pinyon juniper woodlands across the Carlisle complex mostly likely represent PJ savannah, based on recent research, although some areas might be persistent woodlands that were converted to grasslands in the last 60 years {Romme et. al. 2007}. Savannah grasslands generally had canopy closures about 15%-35% of present canopy closure {ERI2007}. In savannahs, the most dramatic changes occurred after Euro-American settlement but specifically around the 1870s decade when railroads brought large numbers of domestic cattle and

sheep to the area. Between that time and when the Forest was created, little control over livestock numbers occurred except drought. Even after the Forest was created, so many settlers and large ranches had claims for domestic livestock grazing that policy decreed most be allowed permits. The result was often heavy overstocking and excessive use. Pinedale District records beginning in 1916 and showing actual use and estimated carry capacities until the 1950s show that the Dodson-Pinedale, Capps, Bear Canyon, and McNeil allotments were overstocked by 30-70%. In 1969, the Pinedale allotment was of great concern to the Forest Supervisor. The only records found for Juniper Ridge show it was slightly understocked (by 7%), and Linden was stocked at about capacity according to the few records available.

Historic overstocking resulted in excessive use by both cattle and sheep in both PJ woodlands and ponderosa pine forests. That excessive use, especially during drought, was a major factor leading to a decrease in fire frequency. Climate also played a role in establishment of pinyon and juniper trees. Together these factors are mostly responsible for current conditions. Current management under the current permittee is not a factor in current conditions, except that the current management has been light and improving conditions are noticeable.

Domestic livestock grazing preferences often result in differing frequency and intensity of grass defoliation. Plants grazed less frequently gain a competitive advantage over the more preferred plants. Many of the preferred species are not very tolerant of grazing, and have become rare within many of the pastures, especially northern pastures. Most of these are cool season mid-grass species such as Junegrass, Squirreltail, Indian ricegrass, muttongrass, and sand dropseed, which are important wildlife habitat components.

The current grass community has shifted from short- to mid-grass towards a short-grass (blue grama) dominated monoculture accompanied by encroaching juniper woodlands {ERI 2007}. How much of the natural resilience of the ecosystem remains is unknown. When one group of plants has been displaced by another, the new assemblage may be long lived and persistent. Some studies predict the ecosystem may continue to be a short-grass dominated site for several decades even if grazing were removed {The Nature Conservancy 2003}. One sign that this threshold has not been reached is the recovery of grama dominated grasslands after the RC Fire. Those pastures north of the highway dominated by blue grama prior to the fire, such as in Capps and Owens pastures, seem to be experiencing an increase in plant vigor, density, and species diversity compared with before the fire.

The Forest Service is committed to bringing the Complex rangelands into satisfactory condition, defined as Fair or better range condition with stable to upward trends. Even though the current permittee and his management is not responsible for the prevailing conditions across the northern pastures, if these pastures are to be restored to a more diverse and productive grassland, the current permit is the one which will bear the brunt of new management strategies and reduced stocking rates compared with historic levels. The rate of improvement will vary among the alternatives based on herd size, utilization standards, and amount of rest.

Alternative G1 – No Action/No Grazing

Direct Effects: The cessation of domestic livestock use of vegetation would result in increases in plant vigor almost immediately is precipitation is near normal. Forage production and new plant recruitment could take considerably longer, depending on climate. Ground cover would eventually improve, and riparian areas would become less impacted from trampling.

Indirect Effects: This alternative would eventually result in shifting competitive advantage back to less grazing-resistant (decreaser) grass species. Changes in species composition are expected because the rarer but more preferred plants will be able to grow and reproduce. Vertical structure of the

grasses will improve as more mid-height and tall grasses mature and reproduce. Cool season species should also increase in vigor, basal area, and reproduction. Eventually, a more diverse mix of warm and cool season grasses would result. These changes should occur more rapidly under this alternative than any of the action alternatives, although in the more northern pastures, recovery may be quite slow, and could take as long as several decades {TNC 2003}.

Alternative G3: Yearlong grazing

Direct and Indirect Effects*:* This alternative would allow yearlong grazing at a stocking rate that allows each pasture to be given complete rest after use. Each pasture will receive at least 12 months of rest after use, and use will be deferred to a different time of the year each year in summer pastures.

The Complex is currently in a low successional condition. Rest is essential to recover plant vigor, growth, reproduction, and increased accumulations of litter. This alternative gives all pastures some nonuse each year, and rests them completely after they are grazed. Utilization levels are set to light intensity. Recovery to a higher ecological state will begin, but at a somewhat slower pace than under Alternative G1.

Increases in forage production are expected under this alternative. Stocking that allows the amount of rest proposed is a tactic that generally enhances herbaceous recovery and lessens potential for adverse effects during poor production years. This alternative will enhance the understory vegetation but not as much as Alternatives G1 and G4. Although G4 allows higher intensity grazing in the winter, Alternative G3 allows summer use in the northern pastures, which would not allow for as fast a recovery to a higher ecological condition.

One effect that is assumed in both Alternatives G3 and G4 is that, as the herbaceous vegetation improves, livestock capacity will also increase, leading to fairly rapid increases in numbers of livestock authorized. Increased forage production should not be immediately followed by increased stocking because in many cases, it is not biologically possible to continually maximize plant growth and also maximize harvest efficiencies (animal production per unit area) {Heitschmidt and Stuth 1991, Galt et. al. 2000, Holecheck 2003}. Existing conditions show a need for improving the ecological health of the northern portion of the Complex, which is generally not achieved quickly. This is especially true in areas such as the Mogollon Rim with highly variable climate. However, the range of stocking presented should allow for steady range improvement and should ensure ecosystem recovery.

Alternative G4: Modified Yearlong Grazing

Direct and Indirect Effects: This alternative would allow yearlong grazing and also allows two complete growing seasons of rest for each pasture after being grazed. Northern pastures would only be used during the dormant season and southern pastures only during the growing season. This alternative will provide twice the rest as Alternative G3, so recovery of plant vigor, growth, reproduction, as well as increases in litter would be faster compared to that alternative, given suitable climatic conditions.

Herd size is reduced compared with Alternative G3 (Table 3), and was based on the pre-fire capacity plus the desire to rest each pasture two full growing seasons until the range meets all Forest Plan standards, including being in Fair or better condition with stable trends in all pastures. The northernmost pastures would be used every other year in the winter. The winter pastures would be rotated to allow early spring deferment in most pastures each year. This should increase recovery rates and improve herbaceous plant cover somewhat faster than alternative 3.

Utilization rates were set at 30 percent on Fair range, which includes most of the southern pastures, based on the Range Management Handbook, which is higher than the rates allowed under the other alternatives. However, even with the higher utilization rates, the herd size is such that higher trampling damage to riparian areas is not expected. Additionally, the longer rest period will double the chance of a pasture being rested during a time of ample rainfall when the benefits to herbaceous vegetation can be maximized. Based on the above, this alternative is likely to benefit herbaceous vegetation faster than the other yearlong alternative. However, given that restoration is likely to be long term regardless of the Alternative chosen, other factors such as social or economics may be of more importance in choosing an alternative.

Alternative V1: No Action/No Vegetation Treatments

Direct and Indirect Effects

The encroachment of junipers into savannah and the increasingly crowded woodland stands has reduced the ground cover to almost zero in some stands. Some areas, such as much of the Clay Springs, Winter, and Rattlesnake pastures, may contain persistent pinyon-juniper woodlands, which have also increased in density in the last 50 years. Lack of ground cover has resulted in PJ woodlands that are very fire resistant, except under extreme conditions. In addition, the lack of ground cover within the PJ has created erosion-prone areas across portions of the northern portion of the Complex. Not treating the dense woodland stands would continue to exacerbate the erosion potential, and soil loss would continue to exceed soil deposition. The end result will likely be a catastrophic wind-driven fire due to lightning or humans, such as the Cerro Grande Fire of 2000. Because the only soil cover in these PJ stands is the woody canopy cover, losing the woody vegetation over a large area at once could permanently degrade soils in the area due to massive erosion.

Alternative V2: Proposed Vegetation Treatments

Direct and Indirect Effects: The proposed woodland treatments concentrate on maintaining current openings and reducing canopy cover in other areas to conditions that promote the growth of ground cover. Removal of junipers by a variety of means has been effective in increasing grass growth, but care must be taken when treating areas to minimize soil disturbance and provide a good seed bed for grass establishment. Scattering slash and reseeding with native cool season grasses when funding is available is recommended. A reduction of overstory canopies by vegetation treatments would lead to increased herbaceous cover beginning at about the third growing season. Increased ground cover helps improve water infiltration as well as slow runoff, which in turn leads to improved watershed condition.

In the 1950s through 1970s, opening up stands by chaining or pushing trees was a preferred method to open the woodlands. It is now recognized that pushing in some soil types can permanently reduce the soil productivity of the area, so current methods to restore areas are less soil-disturbing, include rest from livestock to allow ground cover to establish, and are followed with prescribed fire after a few seasons. The mitigation measure of two years of rest after treatment was proposed to allow grass species to achieve maximum chance for establishment of new grasses after soil disturbance. Monitoring these areas will determine if this mitigation is effective and sufficient. Close coordination with the permittee is essential to complete treatments just as the season(s) of rest begin.

The planned result of treatments is shown in Table 7. The vegetative structural stages will be altered more towards the open conditions of the past. The treatments are designed to move the area closer to the desired future conditions recommended for the Ari-Pine Resource Area {Doc 2A}. Occasional burning will aid in preventing woody reproduction from becoming invasive.

Table 7: Vegetative Structural Stage distributions within the Pinyon-Juniper woodlands (MA 2), by percent. Desired Conditions come from the Ari-Pine Resource Area (Doc. 2A). Area = 36,321 acres. Canopy Classes break out at <15% open, 16-40% medium, and >40% dense canopy. Old woodland stands contain a mix of older and younger trees.

VSS Class	Current	Desired	Treated Acres	Proposed
1 – Grass/forb stage	5	10	-	10
2A – Seedling/Sapling open canopy	12	10	2,084	8
2B – Seedling/Sapling medium canopy	3	5	-	3
2C – Seedling/Sapling dense canopy	0	0	-	0
3A – young woodland open canopy	7	10	-	12
3B – Young woodland, medium canopy	7	5	-	8
3C – young woodland dense canopy	10	0	4,000	1
4A – Mature woodland open canopy	0	20	-	6
4B – Mature woodland medium canopy	8	10	-	8
4C – Mature woodland dense canopy	19	10	3,036	12
5A –Old woodland open canopy	0	10	-	7
5B – Old woodland medium canopy	2	0	1,014	0
5C – Old woodland dense canopy	6	10	-	6

Alternative R1: No Action/No Roads Management Plan

Direct and Indirect Effects: Current road density exceeds Forest Plan Standards, diminishes herbaceous ground cover, and provides paths for introduction of noxious weeds. Not closing these roads, many of which were created by forest visitors driving cross-country, will continue to decrease vegetation recovery potential and allow excess erosion.

Alternative R2: Roads Management Plan

Direct and Indirect Effects: The proposed road closures will bring the open and closed road densities to within Forest Plan standards. Short term soil disturbance may lead to increases in erosion in some areas, although road crews will work to reduce potential impacts by following BMPs and placing erosion-control structures where necessary. As the roads are obliterated, herbaceous vegetation will begin to grow in the ripped roadbeds within about two to three years. The end result should be increased ground cover and reduced erosion in the northern pastures, where some roads are currently showing active erosion. Grasslands will be less fragmented across the northern end of the Complex. More miles of roads will be obliterated in the southern pastures because that is where many old, closed logging roads were made visible after the RC Fire. Off road vehicles have, in some cases, re-opened them.

Wildlife

Affected Environment

The Complex provides a diverse variety of habitats for wildlife. For regulatory and analytic purposes,

species are grouped in a number of ways. Only those species of project-specific interest or concern are discussed below, but all required species were initially considered {Doc. 42}. See Appendix B for lists of all species considered.

TEP: Under the Endangered Species Act, some species are listed as Threatened, Endangered, or Proposed for Listing by the US Fish & Wildlife Service [USFWS]. A list of all Federally listed species is in Appendix B. Regulations require the Forest to consult with USFWS on any actions that may affect these species. The Forest is required to promote recovery of listed species. The species of interest here are the Little Colorado spinedace and the Chiricahua leopard frog. Neither species has been confirmed present on the Complex, but are or have been found within the 5th Code watershed. Habitat for the Chiricahua leopard frog may be directly and indirectly impacted by livestock grazing on the Complex. There is potential spinedace habitat within the Complex and there is a concern that activities may have indirect, downstream effects to Silver Creek, which provides habitat for spinedace.

Sensitive: The Regional Forester has designated TEP and additional species as Sensitive to management activities. A list of all Sensitive Species considered in this analysis is found in Appendix B. The National Forest Management Act and other direction require the Forest to maintain viable populations of these species. Thirteen Sensitive species, not otherwise listed or proposed for federal listing, occur or may occur on the Complex. These species (among others) were analyzed in a programmatic Biological Assessment and Evaluation which determined that continued grazing of livestock could impact them all to some degree {Myers 1995}. The Sensitive species of interest here are the roundtail chub, the northern leopard frog, and the northern goshawk. Neither the roundtail nor the northern leopard frog has been confirmed present on the Complex. There is potential chub habitat within the Complex and a concern that activities may have indirect, downstream effects. Habitat for the northern leopard frog may be directly or indirectly impacted by livestock grazing on the Complex. Goshawks are present, and populations are relatively stable considering the effects of the RC Fire.

MIS: The Forest Plan lists Management Indicator Species for each habitat type on the Forest. The National Forest Management Act and other direction require the Forest to maintain viable populations of MIS species. A list of all MIS species considered for this analysis is found in Appendix B. The MIS species of interest here are the Lincoln sparrow, and aquatic invertebrates. An additional species of interest is elk, because of the desired forage allocation between elk and cattle in the Ari-Pine Area.

BCC: Birds of Conservation Concern are migratory species considered by USFWS to be priorities for conservation action. The Migratory Bird Treaty Act and other direction require the Forest to consider potential impacts when planning activities. The Arizona Partners in Flight technical report was used to determine which migratory species would be considered. Those are listed in Appendix B.

Wildlife: The existing mosaic of vegetative habitat types within the Complex is not meeting the potential diversity level to provide for the greatest diversity of wildlife species. Overstory density and size classes of trees are unevenly distributed. Key habitat components for most species – such as snags, cover, and forage – are poorly distributed. The demand for herbaceous forage by grazing ungulates (wildlife and livestock) as currently permitted may exceed the available supply. Herbaceous vegetation density and diversity is generally in poor condition in the pinyon-juniper and grassland vegetation types.

All wildlife species rely either directly or indirectly on grasses, forbs, and shrubs to meet their biological needs. Each plant life/growth stage has its own series of dependent wildlife. For instance, growth of cool season plants provides key forage for many birds and mammals. Other species rely on

the insects that are tied to this spring growth; turkey and quail poults, for example, are dependent on the protein that insects provide. Smaller animals are prey for predator species.

The removal of herbaceous cover by grazing may affect ground-nesting and denning wildlife and may fragment habitat for species that depend on taller plants for hiding or for moving from one area to another. The reduction of cover ultimately results in lower populations of all wildlife directly or indirectly dependent upon healthy grass and forb communities. Sufficient hiding cover can be especially important for the survival of young during fawning (mule deer, antelope, and elk) and brood rearing (turkey and quail). Several species of birds and small mammals require grass/forb cover for nesting and denning. These species also serve as prey for other wildlife.

Reduced perennial grass cover often results in lower prey abundance and increased prey vulnerability. Whether or not this is beneficial for predators depends on the prey species and type of habitat. Many prey species cease to exist in heavily grazed areas due to lack of food and increased predation, thus reducing prey availability. Several prey species, such as gophers, voles and mice, currently occur in less than desired numbers because cover in meadows, openings, and along riparian corridors is low or less than adequate.

When livestock have access to riparian habitats, direct and indirect effects to aquatic organisms may occur. Consumption of streamside herbaceous and woody species reduces the number, age classes, and diversity of riparian plants. Trampling of aquatic species such as invertebrates, fish, reptiles, and amphibians (including their eggs) can harm individuals. Indirect effects may result by reducing the number of nesting or egg laying sites. Grazing and trampling can also alter soils adjacent to riparian areas and impact upland vegetation and soils in the surrounding watershed, resulting in increased sedimentation. These impacts, in turn, alter the quantity and quality of habitats on which aquatic species depend. Alteration of various habitat parameters may result in declines in the diversity, abundance, and species composition of aquatic invertebrates, reptiles and amphibians.

One of the main conflicts between the needs of domestic livestock and wildlife is that most livestock grazing schedules, particularly under yearlong permits, do not provide for long-term undisturbed habitat. Especially affected are ground nesting birds. Because of behavioral characteristics such as nest-site fidelity, this problem is applicable even if a pasture is occasionally rested.

Increases in available forage would result in higher densities of insects, small mammals, song birds, game animals and other wildlife. More abundant food enhances the physiological condition of animals, which would provide an opportunity for higher birth or clutch rates and better survival of young. Increases in populations of prey species would have beneficial effects on many TEP, Sensitive, MIS and other species that use the Complex.

Alternative G1 – No Action/No Grazing

Direct and Indirect Effects*:* The removal of livestock would reduce current rates of utilization of herbaceous and browse plants, and would eventually provide more forage and cover for all wildlife species considered. Such benefits would be especially evident in areas where past livestock use has reduced the vigor and density of herbaceous plants, such as the Dodson allotment. The opportunity for reproduction and survival would be higher with the implementation of this alternative compared to any of the other alternatives.

The implementation of this alternative would increase the amount of cover faster than any of the other alternatives. Amphibians, reptiles, insects, small mammals, and birds that rely on herbaceous ground cover would become more abundant as cover increases in amount and density. This could, in turn, increase predator populations as well.

Range conditions would improve over time as historic disturbance factors are re-established. Herbaceous plant vigor, density and litter would increase as the return of a more natural fire regime may eventually occur. Increasing fine fuels density allows for more continuity of carrier fuels, which could lead to an increase in fire frequency. This would eventually reduce canopy cover of the woodland type without continuous thinning of invading trees. Increased fire frequency may also slow and eventually reverse the current encroachment of woody plants into grasslands and savannahs. Competition would then favor increased development and diversity of herbaceous species.

Because healthy and abundant riparian vegetation slows water flow, promotes lower water temperatures, and reduces sediments in the water, the habitat for aquatic species would be improved. This alternative would have the greatest potential for restoration of the greatest number of riparian areas. It would best meet the needs of all aquatic species by removing impediments to watershed, soil, and riparian recovery.

Under this alternative, new range developments would not be constructed and maintenance on existing developments would generally be eliminated. Unmaintained fences would be a hazard to deer, elk, and antelope. Unmaintained water developments may become defunct; however, water is often not limiting for far-ranging wildlife species. Indeed, artificial waters may create artificially high population levels of some species. Ephemeral waters would normally provide adequate water for wildlife.

The implementation of this alternative would provide the greatest opportunity for meeting the delisting or downlisting objectives established for spinedace, Mexican spotted owl, and Chiricahua leopard frog. It provides the greatest potential for preventing the need for federal listing of species. This would provide the greatest opportunity for maintaining viable populations of Springerville pocket mouse, northern goshawk, and all riparian dependent species (see Appendix B) that occur within the Complex. This would provide the best forage opportunities for grassland dependent bird species such as Swainson's Hawks and gray vireos which might nest in the grasslands of the northern portion of the Complex.

The primary benefit of this alternative is that improvement of range, soils, watershed and riparian conditions would occur, and would occur more rapidly than with any other alternative. Substantial habitat improvement across the Complex is expected, although measurable changes are unlikely within 10 years. The time-frame would more likely be measured in decades. There would not be any expected direct, indirect or additional cumulative adverse effects to wildlife and plant populations because livestock are not permitted. Directly and/or indirectly, almost every wildlife species present on the Complex would benefit the most by the selection of this alternative because of expected improvements in their habitat and with a return to a more naturally occurring habitat. With improved ecosystem functions, many historical conditions may eventually reappear (but not likely within 10 years).

Alternative G3 – Yearlong Grazing

Direct and Indirect Effects: Under this alternative, the conditions for perennial grasses and litter will likely remain stable or improve slightly due to reduced grazing intensity. It is expected that riparian vegetation communities would not show any measurable recovery in any part of the Complex, at least in the short term, but perhaps even within the first 10 years. Southern pasture should show continued growth of new riparian species.

TEP – Habitat capability for the Chiricahua leopard frog and particularly spinedace is currently less than desirable. The implementation of this alternative would maintain at risk riparian habitat conditions through trampling of ephemeral stream banks and through inhibited growth of forage and

riparian regeneration due to summer grazing in the majority of riparian areas, located south of Highway 260. This alternative has the potential to continue to degrade upland watershed condition even if erosion rates remain static, because soil would still be lost each year. Combined with direct riparian impacts, this would result in adverse effects to Chiricahua leopard frog and spinedace habitats due to overland flow of sediments which eventually reaches perennial streams. This alternative would also not provide an opportunity for meeting the delisting objectives established for the spinedace, such as enhancing and restoring habitat.

Sensitive – Under this alternative livestock would still have access to at least some portions of Show Low Creek; however, access to the Show Low Creek Riparian Pasture will be restricted to the dormant season. Indirect impacts may occur to aquatic species, but are not expected to lead to a trend toward federal listing.

MIS and BCC – Because this alternative would result in stable conditions or marginal improvements in perennial grass cover, elk, antelope, and aquatic macroinvertebrates could continue to be impacted. Current habitat capability does not appear to be resulting in loss of population viability at the Forest level. The use of Show Low pasture only during the dormant season reduces impacts to aquatic species. No significant additional impacts should result from implementation. It is possible some localized negative effects to small mammal species could occur, which in turn could indirectly impact Swainson's hawk and burrowing owls.

With moderate grazing intensity, plant vigor, density, and composition may improve, but that may be minimal in the short term due to continued growing season use in the more degraded portions of the Complex (northern pastures). Because of the current conditions in the northern pastures, plant composition changes are not likely to be measurable within a few years. Even though all pastures will be rested at least 12 months after each grazing period, a pasture that is grazed in May one year could be grazed beginning in June or July the next, and only given complete growing season rest one year in four. Therefore, range condition changes are likely to be slower than changes in Alternative G1 or G4 and may not be measurable within a few years.

Alternative G4 – Modified Yearlong Grazing

Direct and Indirect Effects: With light grazing intensity, dormant season use only, and longer rest periods, the northern pasture habitats should begin to recover their former vigor, density, and plant composition. Recovery should occur more rapidly than under Alternative G3, but there is still concern as to whether or not those changes will be measurable within 10 years. The southern pastures, with alternate year growing season rest, are anticipated to reach and maintain the DFCs faster than G3 but not as rapidly as G1.

TEP – Given the expected slow improvements to range, watershed, and soil conditions, habitat conditions would likely slowly improve for Chiricahua leopard frog and spinedace. Indirect and cumulative effects would still continue to adversely affect the spinedace for many years.

Sensitive – The vast majority of suitable nesting and foraging habitat for the northern goshawk is within the southern pastures. Some indirect effects to nesting goshawks, such as disturbance from herding, could occur but would not contribute to a trend toward federal listing or the loss of population viability. Implementation of this alternative may impact the northern leopard frog and roundtail chub, but is not likely to contribute to a trend toward federal listing or loss of viability.

MIS and BCC – This alternative will not lead to loss of population viability or downward habitat capability trends for any of the species considered (see Appendix B). This Alternative would likely contribute to improving current habitat conditions and population numbers of elk, mule deer, northern goshawk, and Merriam's turkey that occur in the southern pastures. Other MIS such as Abert

Squirrel, woodpeckers, and nuthatches are not affected by the action alternatives. The use of Show Low pasture only during the dormant season reduces impacts to aquatic species.

Small mammals and herbivores would benefit more under Alternative G4 (as compared to Alternative G3) from increased cover, habitat cohesiveness, and improved foraging habitat capability. Allowing 22 months rest compared with 12 months should result in moderate improvement in wildlife habitat conditions. Habitat improvement across the Complex is expected, although measurable changes are unlikely within 10 years. This alternative would likely meet most of the resource objectives identified for the Complex.

Alternative V1 – No Action/No Vegetation Treatments

Direct and Indirect Effects: Although all of the grazing alternatives will at least minimally improve grass densities, encroaching junipers can only be controlled by mechanical methods or by burning. Therefore, unless control occurs, the junipers will continue to prevent grass establishment via water uptake, competition for soil nutrients, and chemical influences. The current lack of ground cover will allow and even exacerbate soil erosion. Wildlife habitat conditions will decline as biomass production shifts from herbaceous to woody vegetation.

Alternative V2 – Proposed Vegetation Treatments

Direct and Indirect Effects: Overstory treatments will be concentrated in the dense stands, returning them to a more open canopy, which should help increase herbaceous ground cover. Short term impacts to soils will be mitigated by Best Management Practices and rest after treatment. Increased herbaceous cover and reinvigoration of browse species sources may improve habitats for both winter and summer range for wild ungulates like Springerville pocket mouse, elk, mule deer and antelope. These species would also benefit from the reduced competition for forage along with improvements in cover for fawning, thermal regulation, and escape.

Swainson's hawks, burrowing owl, and northern goshawk would benefit indirectly by having a larger prey base. Gray Vireo, Pinyon jay, and juniper titmouse should benefit by more open woodlands. Lewis' woodpecker may be negatively impacted by loss of nest trees (not very likely), while Black-throated gray warblers prefer dense woodlands and may avoid more open areas.

Alternative R1 – No Action/No Roads Management Plan

Direct and Indirect Effects: Current road densities are well above forest standards. The standards were conceived based on scientific studies that show high densities of roads directly adversely affect wildlife by increasing the chances for disturbance. Animals such as game species become more susceptible to predation and hunters. Small mammals become more susceptible to both predation and to being killed by automobiles. In addition, roads fragment habitat for many species, especially birds. The simplest definition of habitat fragmentation is when a particular habitat is broken into pieces. Roads create an edge, or opening in woodland and pine stands. With increasing density of roads, what were once large, contiguous expanses of wildlife habitat become smaller and more isolated. Habitat is lost to the road surfaces, altered by the creation of more edge, and fragmented as patches become smaller. Many bird species need areas of undisturbed habitat in the middle of a stand in order to avoid nest predation. This alternative allows the fragmentation and greater disturbance to all wildlife species.

Another direct effect of roads comes from increased erosion due to increased surface with no ground cover. Stream crossings directly affect both sediment loads and the hydrology of the streams. Wet meadows can be permanently dried up by improper road placement. Also, increased pollutants from such sources as road salts or oils can directly and indirectly poison both plants and animals. All of the

above effects increase as road densities increase. Forest Plan standards were set to be below the known threshold for significant effects to wildlife and the vegetation. By allowing the current density, wildlife habitat is impacted.

Alternative R2 – Proposed Roads Management Plan

Direct and Indirect Effects: The proposal will benefit almost every wildlife species by reducing disturbance and habitat fragmentation. In addition, as roads are obliterated and eventually become covered with herbaceous and/or woody plants, the amount of wildlife habitat will increase. Again, BMPs will be required to minimize short term impacts to soil and vegetation resources.

Heritage Resources

Affected Environment

The effects of grazing on heritage resources are of concern to a variety of agencies, tribes, and individuals. Location of heritage sites is influenced by soil type, slope, aspect, elevation, access to water and arable land. The majority of identified sites are located on gentle slopes near water and arable land. Throughout the District, prehistoric sites are concentrated within the forest-woodland ecotone while historic sites appear to be more directly tied to perennial waters. About 68 percent of the Complex has been inventoried with 832 sites identified. Few sites post-date the late Ancestral Puebloan period ending in the late 14th century. None of the known sites are standing ruins or cliff dwellings, site types recognized as more susceptible to grazing impacts.

Grazing Alternatives G1, G3 and G4

Direct and Indirect Effects: Heritage resources may be directly affected by livestock trampling, and may be indirectly affected by natural processes, primarily sheet- or gully-erosion subsequent to loss of vegetative cover. Expected effects can be ranked on the basis of grazing intensity and frequency with G1 rated the best, followed in order by G4, then G3.

Maintenance, replacement or reconstruction of existing facilities are usually not deemed undertakings and do not require additional consideration (if previously unidentified sites are noted, it is expected that the District will be notified, followed by timely and appropriate action). Of main concern is the construction of proposed developments. Potential impacts to sites are easily negated through project redesign once proper inventories are completed. All proposed developments shall be inventoried once they are identified on the ground. If sites are present, they shall be avoided as a standard mitigation measure {Appendix A}.

Alternative V1 – No Action/No Vegetation Treatments

Direct Effects: There would be no direct effects under this alternative.

Indirect Effects: Expected increases in bare ground due to increased canopy cover would likely lead to increased soil erosion. Sites located on slopes, and especially on the more fragile soils, may be expected to be degraded over the long term.

Alternative V2 – Proposed Vegetation Treatments

Direct Effects: Sites are potentially threatened by equipment operation. This shall be negated through use of appropriate inventory and, if sites are present, avoidance as a standard mitigation measure.

Indirect Effects: Reducing canopy cover would lead to an overall decrease in erosion-related impacts to sites.

Alternative R1 – No Action/No Roads Management Plan

Direct and Indirect Effects: Continued unmanaged use poses a potential threat to sites from vehicle intrusion, especially in areas close to private lands.

Alternative R2 – Proposed Roads Management Plan

Direct Effects: Sites are potentially threatened by equipment operation as roads are formally obliterated (mechanically ripped and seeded). This threat shall be negated through use of appropriate inventory and, if sites are present, strict avoidance as a standard mitigation measure.

Indirect Effects: Reducing erosion sources should lead to improvement in soil and watershed conditions, generally lessening on-site erosion potential.

Social & Economic Environment

Affected Environment

In the earlier part of this century, the economic base for most communities close to the Forest was timber harvesting and forest products processing. Ranching was important throughout the county. Recreation uses, primarily related to summer homes and autumn hunting, supplemented the area's economy. This pattern has changed.

In recent years, there has been an absolute decrease in ranching and timber harvesting. Improvement of the transportation infrastructure, development of water-based and other recreation opportunities on federal, state, county and tribal lands, and the opening of the White Mountain Apache Tribe's ski resort in the early 1970s and casino in the 1990s have all served to transform the area into a year-round recreation destination. Changes in the economics of ranching coupled with an increased demand for land for vacation and retirement homes have resulted in a marked decrease in the number of ranching operations.

Alternatives G1 – G4

Grazing on the Apache-Sitgreaves NFs was analyzed relative to the local economies surrounding the Forests in 2005 {USDA 2005}. The analysis showed the Forest contributed about 142 jobs (6.6%) to the Agriculture industry, and contributed about $2,320,600 or 12% of the agriculture income to the local area {USDA 2005}. Apache-Sitgreaves NFs-related grazing contributed about 27 jobs and about $225,800 annually to the local economies. Grazing made up less than one percent of the Forest's contribution to the local economies {USDA 2005}{Doc 90A}.

Primary economic effects are measured by proposed changes in the livestock operation's gross annual income derived from use of Forest lands. The best available proxy of this is the level of grazing as reflected by the number of permitted Animal Months (AMs) and monetary value those AMs could bring to the permittee. The table below compares grazing levels under the proposed alternatives with actual use averaged over the past decade and the current permitted numbers. Income levels can be determined by multiplying the number of calves (based on 95% calf crop) times an average weight and the price per pound, based on current prices.

Table 8 above does not include costs, only potential income. At the proposed maximum stocking rates, grazing income would be cut in half by Alternative G4 compared with Alternative G3. Given that many costs would remain the same, profit would be less than one-half if Alternative G4 is

selected. It should be noted that stocking rate of Alt. G3 is about 70% of the current permitted numbers, but that the current permittee has not stocked more than 200 head since acquiring the permit. The analysis shown here relates only to the permittee directly. Indirect costs to the local economy cannot be determined directly, but are a small portion of the local economy in terms of jobs and income generated, as shown under the cumulative effects section.

Table 8: Comparison of gross income levels*, as measured by maximum cow/calf Animal Months, as numbers and as percentage of annual actual use averaged over the past twelve years.

Current Permitted Use	Average Actual Use**	Alt. G1	Alt. G3	Alt. G4
5,532	3,600	0	3,852	1,800
154%	100%	0%	107%	50%
$240,900	$158,175	0.00	$158,175	$79,088

* Based on assumption of 95% calf crop, no losses, all calves sold at an average of 500 pounds at June 17, 2007 prices (average of about $11.00 per hundred weight). Costs are not included, so this is a maximum potential gross income only. ** 1995-2006

Whether, or at what level, the permittee's operation could sustain changes in AMs is a business decision. Factors which would enter into the permittee's decision include fixed, variable, and one-time costs. An example of a fixed-cost item is fence maintenance: the number of fenceline miles needing inspection remains constant whether 50 or 250 head are being grazed. Other costs will vary more-or-less directly with the herd size: grazing fees or veterinarian supplies are typical instances.

The prospects for long term economic stability in combination with ecological health were an additional consideration. The functional aspects of grazed ecosystems remain constant – in other words, the way plants react to grazing does not change. However, as grazing intensities increase or decrease, the ecosystem can affect the long term economics of a ranching enterprise. Studies show that, over time, the production potential of more heavily stocked ranges will decline as range condition declines. Galt et. al {2000} found that conservatively stocked ranges using 30% harvest coefficient produced more forage in drought years and required less destocking than ranges stocked with a 40% harvest coefficient. The more conservatively stocked range also showed, over time, substantial improvement in ecological range condition and forage production.

Forest direction is to ensure that range condition is stable or in an upward trend; a corollary would be to maintain a stable long-term herd size. More conservatively stocked ranges can be more economically stable because plant production remains higher, and production per cow tends to be higher – e.g., more and heavier calves. Additionally, more conservative stocking will result in less annual variation in allowable grazing intensity due to adverse climate {Heitschmidt and Stuth 1991}.

Another economic factor is that a system that attempts to maximize numbers can lead to lower yield of calf crops, and highly variable production, leading to variable numbers on a yearly basis, and, unless monitored very closely, potentially degraded range conditions. Under more conservative numbers, improved forage can maximize calf crops. The result may be that the ranch is more sustainable in the long run compared with having to sell or buy new livestock each year.

All of the proposed action alternatives propose structural developments, notably waters and pipeline; construction of these represent one-time costs. No attempt has been made to estimate such costs because the improvements were deemed necessary to improve management of the herd. Plus, the costs remain the same regardless of which action alternative may be selected. Thus, cost consideration of the proposed improvements is beyond the scope of the present analysis.

There are costs to the agency which would result from implementation of alternatives G3 or G4, but these are routine, generally invariant expenses (range monitoring or permit administration, for example). While such costs do not pertain to Alternative G1, new maintenance costs would be incurred by adjacent permittees and the District for some 44 and 5 miles of fence, respectively. Under Alternative G1, there would be no maintenance of waters; if the Arizona Game and Fish Department were to decide that some of these were required for wildlife, maintenance costs would fall to that agency.

Grazing fees – currently set at $1.35 per AUM – would vary directly with authorized AMs. Half of the grazing revenue remains with the Treasury, and one-fourth is paid to Navajo County. The remainder is returned to the Forest Service's Regional Office for the Range Betterment Fund to be used for structural and non-structural developments.

Alternative V1 – No Action/No Vegetation Treatments

Direct Effects: There would be no direct social or economic effects.

Indirect Effects: Over the long term, implementing no overstory treatments would slow potential improvement in range capacity. This would impede possible increases in herd size for both livestock and wild ungulates, affecting the permittee's potential gross income as well as potential revenue for the Arizona Game and Fish Department.

Alternative V2 – Proposed Vegetation Treatments

Direct and Indirect Effects: The proposed vegetation treatments have administrative and implementation costs, but they would also generate revenue from fuelwood permit sales: up to 65 percent of these funds would be returned to the Forest, with the remainder going to the US Treasury. Such revenues are not likely to offset the costs.

Quantified values cannot be established for all benefits. Nevertheless, there is an intuitively obvious "value" for resource components such as watershed improvement, range capacity, and wildlife. As there are no local or regional studies to provide baseline information, no attempt was made to quantify these benefit values in dollar terms. There are, nevertheless, obvious benefits associated with the proposed action which should be recognized.

Alternative R1 – No Action/No Roads Management Plan

Direct and Indirect Effects: There would be no direct social or economic effects.

Alternative R2 – Proposed Roads Management Plan

Direct and Indirect Effects: Costs for full implementation would far exceed foreseeable funding levels. Adoption of this alternative, however, would provide a starting point for fiscally responsible management levels by, for example, prioritizing Open roads for maintenance or identifying those road segments recommended for obliteration which have the highest erosion risk. Benefits, while not readily quantifiable, would be realized over the long term.

Air Quality

Air quality within the region is currently impacted by industries established in the area such as the paper mill outside of Snowflake, and several coal-fired power plants located substantial distances away (Holbrook, St. Johns, and Springerville). Of these sources, only the pulp mill, when a northeast wind is present, affects the analysis area. The type of pollution from the mill is mostly non-particulate. The project area is approximately 50 miles west of the Mount Baldy Class 1 airshed. The

short pulses of dust or smoke from this activity area are not expected to significantly alter air quality of the Class 1 airshed. The Complex is not within a recognized area of non-attainment for certain particulates, therefore no analysis is necessary to determine conformity with the State Implementation Plan for Air Quality.

Smoke from the prescribed burning under Alternative V2 will comply with Arizona Department of Environmental Quality requirements for reporting and accomplishment. Smoke emissions modeling will be completed as part of the permitting process. Fuel removed from the project to reduce fuel loading will not be disposed of off-site, unless hauled to a permitted solid waste disposal site.

Air quality impacts other than smoke are limited to the generation of dust generated by vegetative treatments and grazing activities. These effects are expected to stay within the analysis area as dust from roads settles out relatively quickly. The expected overall impacts are negligible.

Environmental Justice

The Forest Service must examine the action to determine if it will have disproportionate impacts to minority groups or socio-economic groups such as low or high income. Areas adjacent to rural communities will be treated in similar manners regardless of demographics or income of the inhabitants. Therefore, there does not appear to be a disparate effect to any particular population.

Cumulative Effects

Cumulative effects are caused by the aggregate of past, present, and reasonably foreseeable future actions. The present analysis is conducted at two scales. The first is that of the Complex itself; this focuses on a variety of activity types. The second is that of the Ari-Pine Resource Area, which is concerned with the allocation of forage between cattle and livestock and with reaching certain defined goals for VSS distributions across forestland and woodland overstory communities. The analysis showed there will not be a significant cumulative impact from any of the Alternatives either individually or in concert with other related actions, past, present, or in the foreseeable future

The Carlisle Complex

Cumulative effects were assessed using overlay mapping and GIS analysis. Mapping most types of projects, with the exception of mechanical treatments (primarily juniper pushes), went back 10-15 years; most pushes were accomplished in the 1960s through 1970s. Various combinations of grazing methods, vegetation treatments (logging in pine forests, fuelwood cutting in woodlands, pushes in woodlands and savannah), associated road building and slash treatments, and unmanaged motorized recreation have taken place over virtually the entire Complex at some time during the past (Table 9). All have played a role in negatively affecting the productivity, composition, and stability of the plant communities through changes in plant reproduction, recruitment, and mortality.

These effects have exacerbated long term trends beginning in the late 1800s. Species composition changes have generally tended to replace higher successional species with lower successional ones (lower successional species are usually short-grass species). Less ground cover and shorter grasses interrupted the natural fire regime, which in turn has lead to crowded canopies in the forest and woodland and to juniper encroachment on once open savannah areas.

The RC Fire was the most recent major disturbance to the southern portion of the Complex. The natural ecosystem will eventually recover, and in some areas, improve compared to conditions present immediately prior to the fire. Recent observations show that the herbaceous vegetation component is much improved across most of the burn, although the introduction and spread of noxious weeds is of concern and is being monitored.

Table 9: Projects considered in the cumulative effects analysis for the Complex (figures are acres unless indicated otherwise). Grazing includes the entire Ari-Pine area.

Projects	Past	Present	Foreseeable
Grazing - acres	88,815	50,570*	88,815
Grazing - AUMs	14,435	10,056	5,499-9,769
Mechanical treatments	6,940	0	6,084
Fuelwood	7,314	50,750	4,050
Commercial logging	10,930	0	0
Salvage logging	5,450	245	0
Thinning	12,370	1,000	0
Tree planting – acres/year	580	200	245
Prescribed fire	7,500	5,500	1,300
Wildfire	1440	38,108	unknown
Fire rehab. treatments	200	8,890	0
Roads/Travelways - miles	617	617	291 Open + Closed
Roads maintenance - miles	NA	NA	190 Open
OHV use - miles	Entire Complex	Entire Complex	62 miles

* Due to deferment after Rodeo-Chediski Fire

Given the current status of the herbaceous layer throughout the Complex, it is evident that a loss of biological variability has occurred over the long term. Reduced variability and stability lead to a loss of resilience in the ecosystem. As a system loses its resilience, it becomes increasingly sensitive to changes in management and outside forces such as climate. Given the potentially long time spans for natural recovery to desired conditions, more conservative management strategies are more likely sustainable and have more predictable results over the long term. With the exception of the pushes (which were done under different legal constraints), the actions considered here were developed in accordance with the Forest Plan, and should therefore reflect "conservative" management strategies – or at least more conservative than prior managerial actions.

The short-term and long-term effects to range, wildlife, vegetation, and watershed from any of the proposed grazing alternatives are predicted to be mostly positive in varying degrees. None of the grazing alternatives will lead to significant negative cumulative effects. Adoption of proposed vegetative treatments and/or the proposed roads management plan will have beneficial cumulative effects, hastening the movement toward desired conditions for all natural environmental components.

There is another factor which impacts the social, economic and natural environment, one which is essentially beyond the control of the District. Development on private lands adjacent to the Complex has been accelerating over the past decade or so. This destroys wildlife habitat, disrupting population dynamics. Development has also lead to increased negative effects on vegetation, range and watershed conditions from allowed uses such as recreation, hunting, and fuelwood cutting. When combined with illegal use – fuelwood theft, poaching, and trash dumping are examples – the effects simply mount.

The Ari-Pine Resource Area

The Ari-Pine Resource Area (Front Cover) comprises 14 grazing allotments {Doc 2A}. The Carlisle Complex (totaling six allotments) is the last of these to have an updated AMP developed. "The Ari-Pine Resource Coalition was formed to encourage open communication between the various users of the National Forest….. The original plan called for analyzing an area covered by one of the

Arizona Game and Fish Department's [AGF] elk herd units, the Aripine-Pinedale Unit. An elk herd unit was selected to start addressing local elk-livestock relationships now and in the future. The objective was to address vegetative and watershed conditions, riparian areas, and wildlife and livestock forage needs" {ASNF 1993, p. 2}. More than two dozen individuals participated in meetings, representing, in addition to the Forest Service, grazing interests, environmental concerns, AGF and other agencies.

Cattle & Elk: The situation in 1993 was described as follows: "Current forage use commitments in the resource area include an estimated 14,956 animal months [AMs] of livestock use and approximately 3,708 AMs of elk use (based on 618 adult elk in the elk herd unit). Current deer and antelope use of the forage is insignificant. Therefore, the current resource allocation approximates 80% livestock and 20% wildlife. …. The combined livestock and elk forage commitments (18,664 AMs) currently exceed the existing capacity of the Area (17,023 AMs) by 10%. This means the perennial grass forage resource does not meet current demand" {ASNF 1993, p. 4}{Doc 2A}.

Table 10 displays the changes in permitted livestock use for Ari-Pine. "Initial" refers to 1993, prior to the updating of any AMPs in the area (note that the number in the table differs from that quoted above; the former is considered more accurate). "Current plus Proposed" combines the sum of permitted AMs established since 1993 plus those proposed here {Doc. 46}.

Table 10: Comparison of Ari-Pine permitted livestock levels, as numbers and as percentage of Initial levels.

	Ari-Pine Current AMs plus Complex Proposed AMs		
Initial	Alt. G1	Alt. G3	Alt. G4
14,629	5,014	8,614	5,914
100%	34%	59%	40%

Across the Ari-Pine Resource Area grazing AUMs will have been reduced by 49-64 percent, depending on which grazing alternative is selected for the Complex. These reductions, together with improvements in livestock management such as better rotation schedules and distribution of stock waters, are beginning to show results in improved plant vigor and basal area. Range condition and capacity should improve slowly over the entire area.

AGF gathers big game data by Game Management Unit [GMU]. About 84 percent of Ari-Pine is contained within GMU 3C, the remainder being divided among three other units. Current estimates of the elk population within Ari-Pine/3C are 560 {Doc. 46}. Estimated use is 2,323 AUMs {Doc. 52}. The conversion rationale for elk AUMs in the Ari-Pine document is unknown; the method used here would equate 618 elk with 2,562 AUMs {Doc. 38}. One of the desired conditions is that, under proper management guidelines, the ratio of forage use by cattle and elk approximate 70:30. Table 11 displays use levels and allocation ratios for the Ari-Pine/3C subdivision.

Vegetation: Cumulative effects for Ari-Pine woodlands are displayed in the Table 12. (Effects from the RC Fire are not considered here; given the woodland acreage involved there would likely be very little overall change.) Two estimates of existing distributions are provided, one from the Ari-Pine document and the other compiled from the individual grazing environmental assessments [EAs]; the latter is considered more accurate. The proposed treatments will move the existing distribution very close to desired conditions. It is anticipated that this situation will be reached within the next decade, provided that there is sufficient funding for preparation and implementation costs.

Table 11. Comparison of Ari-Pine/3C forage use, expressed as AUMs and allocation ratios, for livestock and elk.

		Ari-Pine Current Plus Complex Proposed		
	Initial	Alt. G1	Alt. G3	Alt. G4
Livestock	8,267	3,621	5,721	4,492
Elk AUMs	2,562	2,323	2,323	2,323
Livestock : Elk	76 : 24	61 : 39	71:29	66 : 34

Effects from the RC Fire to the forestland overstory component were most dramatic, with more than 96 percent of the Resource Area affected by fire; of this, some 62 percent was burned severely enough to kill most trees. Table 13 displays VSS distributions for size classes only (complete data for canopy closure classes were not available). Two estimates of pre-fire distributions are provided, one from the Ari-Pine document and the other generated for the post-fire salvage environmental impact statement {ASNF 2004} together with the GIS analysis; the latter is considered more accurate.

Table 12: Woodland Vegetative Structural Stage class distributions, by percent, for the Ari-Pine Resource Area (112,115 acres per EAs).

Woodland VSS Classes	Existing Distribution from Ari-Pine Appendix 4	Existing Distribution from Project EAs	Proposed Distribution from Project EAs	Desired Distribution from Ari-Pine Appendix 4
VSS 1	29	26	14	10
VSS 2a	-	3	10	10
VSS 2b	5	-	4	5
VSS 2c	-	-	-	-
VSS 3a	-	2	11	10
VSS 3b	4	4	6	5
VSS 3c	-	2	1	-
VSS 4a	-	3	16	20
VSS 4b	15	10	9	10
VSS 4c	25	14	9	10
VSS 5a	-	-	10	10
VSS 5b	-	1	-	-
VSS 5c	22	36	11	10

The fire has skewed VSS toward the grass/forb stage, and decades will pass before a commercial forest is restored. Otherwise, there are some positive effects anticipated. Herbaceous forage production should increase substantially in the short term, once soils become stabilized. How long the flush of nutrients and seeded grasses will persist is unknown. Similar gains in the browse component should be realized within a somewhat longer time frame.

Social & Economic Environment: AUMs are used as the best available proxy variable representing that portion of average annual gross income for the involved permittees derived from on-Forest operations. Table 10 above displays the different current AUM levels and percentages compared to the situation in 1993. The key to interpreting these figures is remembering that these apply to on-Forest grazing *only*: the effects are not distributed evenly across the different livestock operations since some depend entirely on Forest lands while others derive just a small portion of gross income from these lands. While overall reductions of one-third to one-half may appear drastic, the trade-off is in proper management of the rangeland resource, and recovery of degraded rangeland resources. The result is less year-to-year variability in actual use and, over the long term, a more sustainable and stable operation whose economic returns are more predictable.

Table 13: Forestland Vegetative Structural Stage size-class percentage distributions for the Ari-Pine Resource Area (72,413 acres per EIS).

Forestland VSS Size Class	Pre-Fire Distribution from Ari-Pine Appendix 5	Pre-Fire Distribution from EIS/GIS Analysis	Post-Fire Distribution from EIS/GIS Analysis	Desired Distribution from Ari-Pine Appendix 5
VSS 1	1	2	60	10
VSS 2	3	8	4	10
VSS 3	40	67	28	20
VSS 4	49	14	6	20
VSS 5	7	7	2	20
VSS 6	-	2	1	20

Cumulative changes in sector-specific direct employment and in grazing fee-specific payments to the county would both change by the same percentages. In absolute terms, however, the changes are quite small. At 1.14 jobs per 100 animal years (a figure provided by the Forest Service Regional Office), the employment factor is 0.00095 job/AUM; the "Initial" figure is thus equivalent to fewer than 8.5 jobs. Any jobs created by the other proposed actions would be short-term. Current grazing fees are $1.35 per AUM; with one-quarter of the fees being returned to the county, the factor is $0.34/AUM. The "Initial" figure represents some $3,699 in county payments; in 2002, to provide a context, Navajo County received $717,428 from all Forest-related activities. Thus, grazing income to the Navajo County from the Forest respresents less Payments resulting from fuelwood sales would also be relatively small.

Analysis Summary

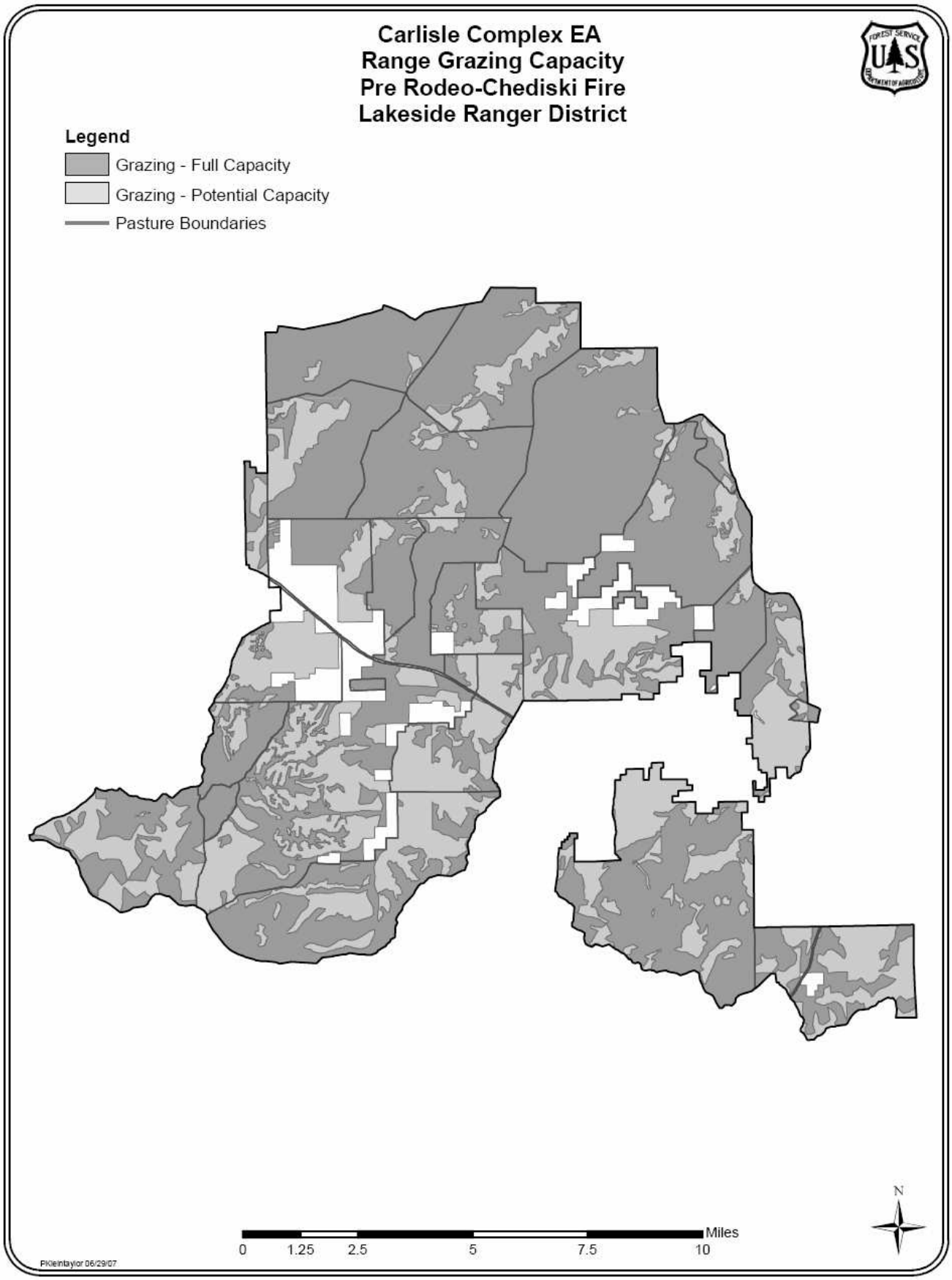
Table 14 below summarizes the above analyses. Summary effect evaluations for the different grazing alternatives were ranked from "1" (fastest recovery) to "4" (slowest recovery) for different measures. Team members noted that rankings would not present an accurate assessment unless the Complex was divided into the northern and southern pastures. The exception to the ranking system was for meeting Forest Plan direction to manage at current grazing intensity; only Alternative G1 fails to meet this measure. It should also be noted that the ranking for Economics does not fully display the actual situation; as mentioned above, Alternative G2 and the initial phase of Alternative G4 propose winter-only grazing, a restriction that the permittee finds burdensome.

Table 14: Comparative summary of environmental effects by alternative for grazing alternatives.

Identified Need	Alt. G1	Alt. G3	Alt. G4
Range			
Manage at current intensity	No	Yes	Yes
Improve range condition	Faster	Slower	Intermediate
Watershed			
Improve herbaceous cover (north)	1	3	2
Improve herbaceous cover (south)	1	3	2
Improve riparian condition (north)	1	3	2

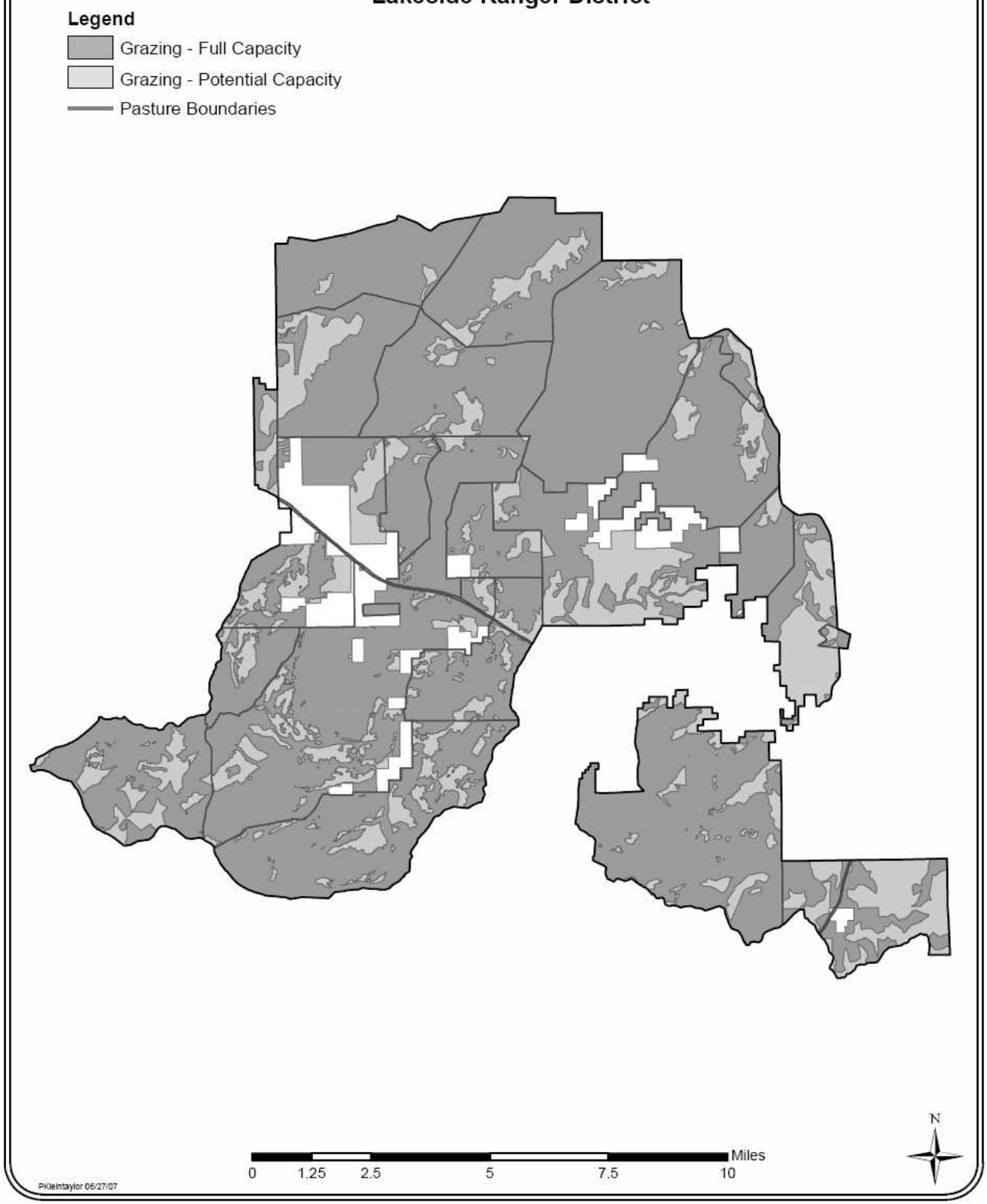
Table 14 (con't): Comparative summary of environmental effects by alternative for grazing alternatives.

Identified Need	Alt. G1	Alt. G3	Alt. G4
Watershed			
Improve riparian condition (south)	1	3	2
Improve watershed condition (north)	1	3	2
Improve watershed condition (south)	1	3	2
Wildlife			
Improve wildlife habitat (north)	1	3	2
Improve wildlife habitat (south)	1	3	2
Improve TEP habitat (north)	1	3	2
Improve TEP habitat (south)	1	3	2
Economics			
Gross income from grazing FS lands	3	1	2


Carlisle Complex EA
Range Grazing Capacity
Pre Rodeo-Chediski Fire
Lakeside Ranger District
Legend
Grazing - Full Capacity
Grazing - Potential Capacity
Pasture Boundaries
N
Miles
0
1.25
2.5
5
7.5
10
Pkleintaylor 06/29/07

Map 6

Carlisle Complex EA
Range Grazing Capacity
Post Rodeo-Chediski Fire
Lakeside Ranger District



Map 7

Chapter 4 - Consultation and Coordination

INTERDISCIPLINARY TEAM MEMBERS:

Genice F. Froehlich – Team Leader

Randall Chavez – Range

Robert T. Csargo – Wildlife habitat

Bruce R. Donaldson – Heritage resources, roads plan, socio-economic analysis

Joseph A. Hamrick – Silviculture

Pamela Klein-Taylor – Geographic information systems

Chris A. Nelson – Watershed, soils, riparian areas, water and air quality

David Reisner – Fire and fuels management

Sharon Wallace – Recreation

COOPERATING AGENCY MEMBERS:

Sharen L. Adams (Arizona Game and Fish Department) – Wildlife

David Dorum (AGFD) – Wildlife [replaced Adams in October, 2004]

FEDERAL, STATE, AND LOCAL AGENCIES:

Arizona Department of Environmental Quality

Arizona Department of Water Resources

Arizona Game and Fish Department

City of Show Low

Fool Hollow Recreation Area, Arizona State Parks

Fort Apache Agency, Bureau of Indian Affairs

Navajo County Board of Supervisors

U.S. Fish and Wildlife Service

U.S. Natural Resources Conservation Service

Clay Springs-Pinedale Fire Department

Linden Fire Department

Show Low Fire Department

TRIBES:

Fort McDowell Yavapai Nation

Hopi Tribe

Navajo Nation

Pueblo of Zuni

Ramah Navajo Chapter

San Carlos Apache Tribe

Tonto Apache Tribe

White Mountain Apache Tribe

Yavapai-Apache Nation

Yavapai-Prescott Tribe

OTHERS:

Arizona Wildlife Foundation

Center for Biological Diversity

Forest Guardians

People of the West!

Rocky Mountain Elk Foundation

Sonoran Biodiversity

Southwest Forest Alliance

The Nature Conservancy

Torreon Summit Development

TRACKS

White Mountain Audubon Society

White Mountain Conservation League

White Mountain Open Trails

Wildlife Damage Review

Cheney Ranch Property Owners Assn

Fairway Park Property Owners Assn

Juniper Ridge Resort Property Owners Assn

Pinedale Estates Property Owners Assn

Summer Pines Homes Property Owners Assn

Torreon Property Owners Assn

Members of Arizona delegation, U.S. Congress

All District grazing permittees

Other individuals {Doc. 15}

APPENDICES

A. Standard Mitigation Measures & Best Management Practices

All allotments under analysis share the following proposed mitigation measures. Mitigation measures pertain to actions recommended to reduce or resolve any effects incidental to the proposed project activities. The measures shown below would be followed for all action alternatives. Most have been used on many previous projects and are considered to be very effective in reducing environmental impacts.

Mitigation Measure	Purpose	Effectiveness
Heritage resource clearance will be obtained prior to ground-disturbing activities	Protection of heritage resources	Almost always effective
Slash generated from grassland and woodland projects will be treated in accordance with best management practices (see below)	Create habitat for small animals (prey species) and hiding-cover for large ungulates	Usually effective
Fences will be built in conformance with Forest standards: the bottom wire will be smooth and a minimum of 16" from the ground; the top wire will not exceed 42" from the ground; and wooden stays will be used.	Increase the longevity of the fence, and accommodate the movement of elk, deer and pronghorn antelope	Mostly effective
Soil and water best management practices will be followed (see below)	Reduce erosion and sedimentation	Almost always reduces impacts
Retention of all existing snags and recruitment of potential snags in treatment areas	Enhance wildlife habitat	Mostly effective

Best Management Practices

A Best Management Practices [BMP] is a practice or combination of practices that are determined (by a state or designated area-wide planning agency) through problem assessment, examination of alternative practices, and appropriate public participation to be the most effective, practicable (including technological, economic, and institutional considerations) means of preventing or reducing the amount of pollution generated by nonpoint sources to a level compatible with water quality goals.

In 1972, the Federal Water Pollution Control Act [FWPCA] amendments became law. The Clean Water Act [CWA] amended the original act, with further modifications occurring with the Reauthorization Act of 1987. Together, these laws provide the authority to manage water quality on Forest lands with the objective to restore and maintain the chemical, physical and biological integrity of the nation's waters.

Section 319 of the amended CWA provides authority for each state to prepare a nonpoint source [NPS] water quality management program that includes cooperation with federal agencies. As part of that cooperation the states have recognized the Forest Service as a designated management agency for NPS water quality management. They have recognized our Integrated Resource Management [IRM] process for developing BMPs to control NPS water pollution on Forest lands.

Connectivity to stream segments identified in the 1998 Arizona Water Quality Assessment shall be established. Allotments with grazing activities that affect stream segments that are considered non-attaining of water quality standards for designated uses by the State should be considered a high priority for completion.

A draft handbook was prepared to assist the owner/operator of a Rangeland Livestock Grazing Activity with the selection of BMPs for voluntary compliance with A.R.S. 49-202.01. This draft publication was developed by the NPS Technical Advisory Committee Group on Livestock Grazing Activities. The following are excerpts from this handbook that relate directly to the allotment management plans developed on the Forest.

- The goal of maintaining or improving the quality of water should be included in management plans for livestock grazing activities. While the goal of the Clean Water Act is to improve water quality, some waters have acceptable quality which should be maintained.

- The location, timing and intensity of livestock grazing activities should be controlled with objectives of achieving soil cover to prevent accelerated erosion and to protect water quality.

- Structural range developments, such as fences, water development, trails and corrals, should be planned, constructed and utilized in a manner to enhance or maintain water quality.

- Land treatments to manage vegetation or practices to reduce erosion should be planned, implemented and maintained to minimize adverse impacts on water quality.

- Livestock management activities, such as parasite control, feeding and salting, should be done in a manner to protect water quality.

Specific activities to maintain or improve water quality for the allotments include:

- Brush or woodland management treatments, if implemented to improve soil quality, should retain at least 5 tons/acre of treatment-generated large woody debris (3-inch and larger) dispersed evenly across the site. Ground cover within two years of treatment should be at or above the tolerance ground cover needed to protect soil productivity and hydrologic function. TES map units 51, 53 and 54 require 40 percent effective ground cover to maintain hydrologic function of the soil. Grazing management should be applied to enhance the success of the treatment. This will involve two growing seasons of rest to let herbaceous cover become established. Use of temporary fencing or modified rotation of livestock may be required. Utilize BMP implementation form for mechanical treatment to evaluate land treatments with regard to potential water quality impacts.

- Prescribed fire treatments should be applied only under conditions where the intensity and rate of spread of the fire are controlled. To protect soil productivity, fire intensity should be low to moderate to prevent loss of soil nutrients, organic matter and the alteration of soil physical properties, such as structure and pores that would reduce infiltration of water into the soil. Utilize BMP implementation and effectiveness form for prescribed fire to evaluate the treatment with regards to potential water quality impacts.

- Seeding projects using native seeds should be implemented in areas where native seed is scarce, or in areas where eroding upland and riparian areas are contributing directly to sedimentation in stream channels, especially in areas used as filter strips to mitigate other management practices. Provide a period of protection from grazing to promote establishment of herbaceous plants.

- Planned grazing systems should be implemented to a) maintain or improve plant cover for the purpose of properly using the available forage, b) increase efficiency by uniformly using all suitable parts of each grazing unit, c) reduce erosion and improved water quality, d) ensure a supply of forage

throughout the grazing season, e) increase production with improved quality of forage, f) enhance wildlife habitat, g) promote flexibility in the grazing program, and h) buffer the adverse effects of drought. Proper stocking and improved distribution of cattle should be major considerations for evaluating effects of implementing a system.

- Grazing intensity should maintain enough cover to protect the soil or improve the quantity and quality of desirable vegetation. Allowable use should be adjusted by range condition class on fully and potentially capable land. Key grazing areas should be monitored to determine when cattle should be moved to prevent overuse.

- Salt should be used to improve livestock distribution. Salt at least ¼ mile away from water or natural congregating areas such as roads, trails, and saddles in hills, but avoid key areas. Move salt when distribution objectives are not being met or to correct localized overuse problems.

- Access roads for the maintenance of grazing developments should be engineered to facilitate reasonable control and disposal of water, to control erosion, and to make the best possible use of topographical features. Access roads should not be placed along or parallel to the stream channel within the streamside management zone. Crossing should be perpendicular to the stream and the number of crossings should be minimized. Road gradients should not exceed 10 percent except for short lengths where more acceptable design criteria are prevented. All cuts and fills should be stabilized. Drainage structures should be engineered to provide adequate surface drainage to meet site specific criteria and runoff conditions. Culverts, bridges or grade dips should be provided at all natural drainage ways. Roadside ditches should be engineered to provide surface drainage for the roadway and deep enough to serve as outlets for subsurface drainage. Drainage channels should be sited on stable grades or protected with structures or linings for stability. Rolling dips or water bars should be incorporated into design criteria to control surface runoff; these should be maintained periodically to ensure proper function. Structures should be placed on all water bar or rolling dip outlets to trap sediment and slow erosive force of water. Lead-out ditches should not be placed directly into water courses. Water quality should be protected during and after construction by erosion control facilities and maintenance. Filter strips, sediment and water control basins, as well as other accepted conservation practices should be used and maintained as needed.

Monitoring the condition of land, water, vegetation or compliance with management plans for a project should meet the intent of the water quality certification rules. The following are examples of monitoring (I = Implementation, E = Effectiveness) currently used on National Forests in Arizona:

Production/utilization studies (I, E)	Range improvement construction and inspections (I, E)
Permittee compliance, adhering to annual operating instruction requirements (I)	Contingencies for drought established and implemented (I)
Road maintenance inspections (I, E)	Stream channel surveys (for example, T-WALK, GAWS, Region 1 methodology) (E)
Parker 3-step monitoring (E)	Daubenmire transects (E)
Paced transects (E)	Ocular ground cover estimates (E)
Soil condition evaluation (E)	Proper Functioning Condition evaluations at specified intervals (E)

B. Wildlife Species Considered in the Analysis

The following species are either present or have/had the potential to be present on the Carlisle Complex Allotments due to suitable habitats, current or historic documentations, and/or are within the known range of the species. Also included are species that either once were documented on the action area or those that are not likely to be present, but which may be impacted by actions on the Complex, such as sedimentation occurring downstream.

The last column displays the effects determinations for all federally listed species that were considered in the Biological Assessment and Evaluation (Doc. 61). The determinations listed are based on the grazing alternatives. Unless otherwise described, the effects of roads management (R2), and proposed vegetation treatments (V2) were generally viewed as having no effect or beneficial effect for the various species. See Doc. 61 for details.

Table 1. Federally protected species expected occurrence and effects from alternatives. Alternatives V1 and R1 (no action) are assumed as the baseline and predicted to have no effect over the next 10-15 years.

Common Name	Occurrence Information			
	Habitat Present	**Population Present**	**Pastures Present (summer/winter)**	**Effects of Alts.**
Eagle, Bald	Show Low Creek; Lakes and ponds; Dense canopied canyons	Winter use	Occasional winter foraging may occur in all pastures	G1 = beneficial effects. G 3,G4 = MANLAA V1, V2, R1, R2 = NE
Owl, Mexican Spotted	Restricted habitat in some locations in summer pastures	No; Nearest known PAC = 16 miles west	Potential foraging may occur in southern pastures	G1 = beneficial effects. G3, G4 = MANLAA V1, V2, R1, R2 = NE
Spinedace	Silver Creek Show Low Creek	Known occupied habitat downstream in Silver Creek; may occur in Show Low Creek	Possibly Show Low Riparian	G1 = beneficial effects. G3, G4 = MALAA V1, V2, R1, R2 = NE
Wolf, Mexican Gray	Throughout allotments	May occur as transients	May occur throughout allotment	All Alts. = not likely to jeopardize the continued existence of the species.
Jaguar	Throughout all pastures	None known; Occasional transients may occur, but not likely	None likely	All Alts. = NE
Southwestern willow flycatcher	No current suitable habitat	No	None	All Alts = NE
Black-footed ferret	Grasslands, savannah in northern pastures	No (prairie dog towns not large enough)	None	All Alts. = NE
Frog, Chiricahua Leopard	Show Low Creek Redhead Marsh Stock tanks and other wet areas	None known	May occur where ever there is perennial or nearly perennial water	G1 = beneficial effects. G3, G4 = MANLAA V1, V2, R1, R2 = NE
Western Yellow-billed Cuckoo	None	None	None	All Alts. = NE

In Table 2, the last column displays the impact determinations for all Region 3 sensitive species considered in the Wildlife Specialist Report (Doc.57). The determinations are based on the grazing alternatives. Unless otherwise described, the effects of the alternatives concerning roads management and proposed vegetation

treatments were generally viewed as having no effect or beneficial effects for the various species. See Doc 57 for details.

Table 2. Sensitive Species Expected Occurrence – all R3 sensitive species were considered. Only those below have potential to be present on the allotment complex.

Species	Habitat Present	Occurrence on Allotment	Impacts of alternatives
Springerville Pocket Mouse	Yes; P/J woodlands	Likely to occur	All G, R, V alts may impact individuals or habitat, but no alt. would affect viability or lead to a trend toward federal listing (**MI**) G1 most improves herbaceous cover and diversity. G3 and G4 improves herbaceous cover and diversity less than G1
New Mexican jumping mouse	Yes; lotic waters	May occur near perennial water	All alternatives MI. G1 most reduces current impacts to riparian. G3 and G4 would reduce impacts. Alt. 4 best among action alts
Northern Goshawk	Yes; Ponderosa pine	Nesting occurs in southern pastures; foraging may occur throughout the allotment	All alternatives MI. G1 most reduces current impacts to riparian. G3 and G4 would reduce impacts. Alt. 4 best among action alts
American peregrine falcon	Yes; riparian	May occur near Show Low creek; other areas	All alternatives MI. G1 most improves habitat/cover for some prey species G3 and G4 improves habitat for some prey species.
Mexican garter snake	Yes; riparian	May occur near Show Low creek and other wetted areas containing fish	All alternatives MI. G1 most reduces current impacts to riparian. G3 and G4 would reduce impacts. G4 best among action alts
Southwestern toad	Yes; riparian	Not likely	All alternatives MI. G1 most reduces current impacts to riparian. G3 and G4 would reduce impacts. G4 best among action alts
Northern leopard frog	Yes; riparian	May occur near Show Low creek; other areas	All alternatives MI. G1 most reduces current impacts to riparian. G3 and G4 would reduce impacts. G4 best among action alts.
Little Colorado sucker	Yes: perennial water	Not likely; occurs downstream in Silver Creek	All alternatives MI. G1 most reduces current impacts to riparian. G3 and G4 would reduce impacts. G4 best among action alts. R2 results in reduced sedimentation.
Roundtail chub	Yes: perennial water	Not likely; however, may occur in Show Low Creek and/or downstream in Silver Creek	Determination same as and impacts similar to Little Colorado sucker
California floater	Yes; perennial water with fish	Historic and possible current occupation in wetted portions of Show Low Creek	Determination same as fish (Roundtail chub). Impacts similar.
Maricopa Tiger beetle	Yes; riparian	May occur in Show Low Creek, Redhead Marsh; other perennial waters	Determination same as fish. Impacts similar.

Species	Habitat Present	Occurrence on Allotment	Impacts of alternatives
Arizona copper	Yes; riparian	Likely to occur	Determination same as fish. Impacts similar.
Spotted skipperling	Yes; streamside-meadow habitats	May occur	Determination same as fish. Impacts similar.
Mountain silverspot butterfly	Yes; riparian	May occur; seen near Brown Creek in 1999	Determination same as fish. Impacts similar.
Blumer's dock	Yes; riparian	May occur in wetted areas	Determination same as Roundtail chub. Impacts similar.

In general, little change in habitat capability or populations of Management Indicator Species (MIS) is expected from the improvements to the area during the life of this project. Generally, Alternative G1 would most benefit MIS species that depend on herbaceous vegetation and/or cover. Given the anticipated slow rate of improvement in ecological condition based on implementation of any of the action alternatives and the size of the project area compared to the Forest as a whole, there would likely be little change in most MIS species populations, except for perhaps in small, localized areas. Alternative V2 would benefit some species, but may negatively impact others that rely on juniper trees and snags for nesting. See Management Indicator Species analysis (Doc. 51) for details.

Table 3. Management Indicator Species and expected change in habitat and population trend due to the Alternatives.

Species	Projected Potential Habitat Indicator (FLMP-EIS)	Management Area Association (FLMP)	Habitat Associations defined by the RO3WILD model and described in the "Wildlife Coefficients Technical Report" as amended in 1985.	Impacts of Alts.
Elk	Early Succession	MA-1, MA-2, MA-4[5]	Wide variety of vegetation types reflecting summer/winter & forage/cover needs.	G1 most improves herbaceous cover and diversity. G3 and G4 improves herbaceous cover and diversity less than G1. V2 and R2 improve habitat quality.
Mule deer	Early Succession	MA-1[2], MA-2[3]	Wide variety of vegetation types reflecting summer/winter & forage/cover needs.	Similar to elk
Abert's squirrel	Early Succession	MA-1	Ponderosa pine, especially more dense mature and pole stands. Gambel oak for feeding.	Alts would result in no significant change in pop numbers or habitat trends
Merriam's turkey	Late Succession	MA-1	Wide variety of vegetation types, but especially aspen, Gambel oak, Ponderosa pine, juniper.	Alts would result in no significant change in pop numbers or habitat trends
Pygmy nuthatch	Late Succession	MA-1	Moderately dense to dense mature and old-growth Ponderosa pine.	G1 would result in no significant change in habitat or pop. trend. V2 may improve habitat and result in localized increases in pop. numbers.
Northern goshawk	Late Succession	MA-1	Moderately dense to dense stands of mature and old-growth spruce-fir, mixed conifer, and ponderosa pine.	See Table 2 above
Mexican spotted owl	Late Succession	MA-1	Dense stands of mature and old-growth mixed conifer and Ponderosa pine.	Nesting habitat does not occur in project area. No change in

Species	Projected Potential Habitat Indicator (FLMP-EIS)	Management Area Association (FLMP)	Habitat Associations defined by the RO3WILD model and described in the "Wildlife Coefficients Technical Report" as amended in 1985.	Impacts of Alts.
				pop. numbers or habitat trends.
Red squirrel	Late Succession	MA-1	Moderately dense to dense stands of mature spruce-fir and mixed conifer, and old-growth stands of spruce-fir and mixed conifer	N/A, species does not occur in project area
Red-naped sapsucker	Snags (Aspen)	MA-1	Mature and old-growth stands of aspen (also high elevation riparian, and cottonwood riparian habitats). Live/dead trees used for nest cavities.	N/A, species does not occur in project area
Hairy woodpecker	Snags	MA-1	Mature and old-growth stands of spruce-fir, mixed conifer, and ponderosa pine; also, mature and old-growth aspen stands to a lesser degree.	No significant change in habitat or pop. trend.
Plain (juniper) titmouse	Snags	MA-2	Primarily mature and old-growth pinyon-juniper woodlands; snags within those woodlands.	G1. G3, G4 would result in no significant or pop. trend. V2 would improve habitat and consequently increase in pop. numbers.
Pronghorn antelope	Early Succession	MA-2, MA-4	Grasslands and early seral stage of juniper-grasslands.	Similar to elk and deer.
Lincoln's sparrow	High Elevation Riparian	MA-3[4]	Mature, high elevation, woody riparian communities.	No significant change in habitat or pop. Trend (all alts).
Aquatic macro-invertebrates	Not in FLMP EIS	MA-3	Not modeled.	G1 and R2 may result in improved habitat and increased numbers. All other Alts no significant change in current pop. or habitat trend
Cinnamon teal	Wetlands	MA-11[6]	Not modeled.	No significant change in habitat or pop. Trend (all alts).

[1] Previously "Yellow-bellied sapsucker"

[2] Management Area 1: "Forested Land" including ponderosa pine, mixed conifer, spruce-fir, and aspen.

[3] Management Area 2: "Woodland" including pinyon-juniper.

[4] Management Area 3: "Riparian" including aquatic and riparian ecosystems.

[5] Management Area 4: "Grasslands" including mountain grasslands, and desert and prairie grasslands occurring as inclusions in the "Woodland" type.

[6] Management Area 11: "Water" including lakes, ponds, wetlands, and marshlands; May duplicate with MA-3.

Migratory birds considered for this analysis were selected from the Arizona Partners in Flight Bird Conservation Plan {Latta et. al. 1999}.Given the anticipated slow rate of improvement in ecological condition based on implementation of any of the grazing action alternatives, little or no improvement in nesting habitat (ground nesting species) or prey species abundance is expected. Of the action alternatives, G4 would benefit most species to the greatest degree, because of the attributes built into this alternative, primarily increased rest between pasture movements, lower livestock numbers, and no livestock use during the growing season in the northern (winter) pastures.

Alternative V2 in juniper woodlands and grasslands invaded by juniper would benefit many of the species. The proposed roads management plan would have little discernible impact to any of the species. See the Wildlife specialist Report (Doc. 57) for details.

Table 4. List of all Migratory bird species considered in the analysis

Species	Residency / Abundance	Habitat	Determination of impact for all alternatives
Buteo swainsoni Swainson's Hawk	Summer / Rare	Grassland	G3, G4 may negatively impact habitats for some prey species on a local level. G1, V2 would improve the prey base for this species. R2 would have little effect.
Buteo regalis Ferruginous Hawk	Winter / Rare	Grassland	G3, G4 may negatively impact habitats for some prey species on a local level. G1, V2 would improve the prey base for this species. R2 would have little effect.
Speotyto cunicularia Burrowing Owl	Summer / Rare	Grassland	G3, G4 may negatively impact habitats for some prey species on a local level. G1, V2 would improve the prey base for this species. R2 would have little effect.
Melanerpes lewis Lewis's Woodpecker	Permanent / Fairly Common	Dry open woods	G1, G3, G4, R1, R2, V1 No impacts. V2 May Impact due to possible nest tree removal
Sphyrapicus thyroideus Williammson's Sapsucker	Summer/Uncommon Winter / Rare	Ponderosa pine	No impacts to this species
Vireo atricapillus Gray Vireo	Migratory / Rare	Sparse Woodlands	G1, G3, G4, R1, R2, V1 No impacts. V2 May Impact beneficially
Gymnorhinus cyanocephalus Pinyon Jay	Permanent / Common	Open Woodlands	G1, G3, G4, R1, R2, V1 No impacts. V2 May Impact beneficially
Vireo vicinior Gray Vireo	Summer / Uncommon	Pinyon-Juniper Woodlands/Chaparral	G1, G3, G4, R1, R2, V1 No impacts. V2 May Impact beneficially
Dendroica nigrescens Black-throated Gray Warbler	Summer / Uncommon	Pinyon-Juniper and Oak Woodlands	G1, G3, G4, R1, R2, V1 No impacts. V2 May Impact negatively
Baeolophus ridgwayi Juniper Titmouse	Summer / Fairly Common	Pinyon-Juniper Woodlands	G1, G3, G4, R1, R2, V1 No impacts. V2 May Impact beneficially
Accipiter gentilis Northern Goshawk	Permanent / Rare	Pine, Mixed conifer	G1, G3, G4, R1, R2, V1 No impacts. V2 May Impact beneficially
Contopus cooperi Olive-sided Flycatcher	Summer / Rare	Pine, Mixed conifer	G1, G3, G4, R1, R2, V1, V2 No impacts.

Species	Residency / Abundance	Habitat	Determination of impact for all alternatives
Empidonax occidentalis Cordilleran Flycatcher	Summer / Uncommon	Pine, Mixed conifer	G1, G3, G4, R1, R2, V1, V2 No impacts.
Progne subis Purple Martin	Summer / Uncommon	Ponderosa Pine, habitats near open water	G1, G3, G4, R1, R2, V1, V2 No impacts.

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D. Monitoring

The objective of monitoring is to determine whether management is being properly implemented and whether the actions are effective at achieving or moving toward desired conditions. Utilization will be measured on key species in key areas[7]. Some key areas have been established and others will need to be identified in cooperation with the permittee(s). Key species will be native perennial grasses that are palatable to livestock. These may include, but are not limited to, sideoats grama (*Bouteloua curtipendula*), black grama (*B. eroipoda*), blue grama (*B. gracilis*), galleta (*Hilaria jamesii*), muttongrass (*Poa fendleriana*), arizona fescue (*Festuca arizonica*), mountain muhly (*Muhlenbergia montanas*) and three awn (*Aristida sp*). Utilization will be measured after the growing season; however, grazing intensity will be monitored throughout the grazing period in order to practice adaptive management and make management adjustments needed for plant development and recovery. Utilization is a useful tool in range management decision making, but utilization guidelines should not be used as management objectives[8].

Implementation monitoring will occur yearly and will include such things as inspection reports, forage utilization measurements in key areas, livestock counts and facilities inspections. Utilization measurements are made following procedures found in the Interagency Technical Reference[9] and with consideration of the Principles of Obtaining and Interpreting Utilization Data on Southwest Rangelands. Utilization will be monitored on key forage species that are listed above, which are native perennial grasses that are palatable to livestock. At a minimum monitoring will include use in key areas, but may include monitoring outside of key areas. The Lakeside Operation Team and the permittees will be responsible for monitoring livestock grazing utilization. Over time, changes in resource conditions or management may result in changes in livestock use patterns. As livestock use patterns change, new key areas may be established and existing key areas may be modified or abandoned in cooperation with the permittee(s). Permittees will be encouraged to participate in monitoring activities. Records of livestock numbers, movement dates and shipping records will be kept by the permittees and will be provided to the Operation Team Leader annually.

Effectiveness monitoring includes measurements to track upland range condition and watershed condition (hydrologic function). Monitoring will include, but is not limited to pace transects, Parker 3-step, repeat photography, grazed plant count, and clipping and weighing. Any procedures described in the interagency technical reference[10] and the Region 3 Rangeland Analysis and Training

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[7] A key area is a portion of rangeland selected because of its location, use or grazing value as a monitoring location for grazing use, range condition and trend. Key areas are usually ¼ to 1 mile from water, located on productive soils on level to intermediate slopes where prescribed use will occur first. They are 5 acres or more in size. Properly selected key areas will reflect the overall acceptability of current management.

[8] Principles of Obtaining and Interpreting Utilization Data on Southwest Rangelands. 2005. U of A Cooperative Extension Service

[9] Utilization Studies and Residual Measurements. Interagency Technical Reference. 1996. Cooperative Extension Service, USDA Forest Service and Natural Resources Conservation Service, and USDI Bureau of Land Management. Revised 1999. 13 Environmental Assessment Range Allotment Analysis

[10] Sampling Vegetation Attributes, Interagency Technical Reference. 1996. Cooperative Extension Service, USDA Forest Service and Natural Resources Conservation Service, and USDI Bureau of Land Management.

Guide may also be used[11]. These data are interpreted to determine whether management is achieving desired resource conditions, whether changes in resource condition are related to management, and to determine whether modifications in management are necessary. Effectiveness monitoring will occur at a minimum of five-year intervals, or more frequently if deemed necessary.

Adaptive Management

The proposed action is intended to provide sufficient flexibility to adapt management to changing circumstances. If monitoring indicates that desired conditions are not being achieved or significant progress has been made, management will be modified in cooperation with the permittees. Changes may include administrative decisions such as the specific number of livestock authorized annually, specific dates for grazing, class of animal or modifications in pasture rotations, but such changes will not exceed the limits for timing, intensity, duration and frequency defined for the proposed action and analyzed herein.

In the case that changing circumstances require physical improvements not disclosed or analyzed herein, further interdisciplinary review would occur. The review will consider the changed circumstances and site-specific environmental effects of the improvements in the context of the overall project. Based on the results of the interdisciplinary review, the Ranger will determine whether correction, supplementation or revision of the EA is necessary in accordance with Forest Service Handbook direction at FSH 1909.15(18) and FSH 2209.13(96.1).

[11] Rangeland Analysis and Management Training Guide. 1997. USDA Forest Service, Southwestern Region.

E. Forest Plan Standards and Guidelines Specific To This Analysis

Management Direction: Forest-wide (pg. 15)

- Riparian: Improve vegetation condition in riparian areas. This is an emphasis area for the plan. Improvement will be accomplished by reducing or, in some cases, eliminating adverse impacts from grazing, vehicles, and over-sue by man.
- Range: Provide a program of range management that emphasizes high quality range forage and improvements. Benefits are improved watershed conditions, improved range forage production, improved wildlife habitat, and enhanced visual quality.
- Soil, Water, and air Quality: Maintain, or where needed, enhance soil productivity and watershed condition. Put all areas in a satisfactory watershed condition by 2020.
- Overstory Control: This practice is the reduction of pinyon-juniper overstory regrowth of residual and new trees to maintain seral grassland on previously treated areas. Retreatment will be accomplished within areas of 0-15 percent slope and on soils with a moderate or high rating for forage production. Treated areas are maintained in a savannah type with pinyon-juniper overstory crown of less than 20%.

Management Standards and Guidelines – Forest-wide (pg. 72)

- Develop one permanent water source to service every 2,000 acres
- Reseed wildfire areas that are not expected to stabilize within 2 years with a mixture of grass forbs and browse species appropriate for the site. Manage livestock to ensure establishment.
- Full capacity rangeland in unsatisfactory range condition will be treated through continued development of improved allotment management plans as well as structural and non-structural improvements and pasture stocking adjustments.
- To improve rangeland condition and resolve conflicts with other resource objectives, improved allotment management plans will be developed using the Integrated Resource Management process. Improved allotment management plans will give equal consideration of innovative practices and techniques, structural and nonstructural range improvements, and stocking rate adjustments to achieve integrated resource objectives.
- Allotment management plans will recognize that domestic livestock may compete with big game animals for available forage on some rangelands.
- Water lots are left open to wildlife for free access except when controlling livestock distribution through water accessibility.
- Forage use by grazing ungulates will be maintained at or above a condition which assures recovery and continued existence of threatened and endangered species.
- Basic allotment analysis will evaluate grazing capability.
- Balance grazing capacity and permitted use as soon as possible but no later than 1995.
- Utilize the Forest's Geographic Information System and Terrestrial Ecosystem Survey information as one tool to evaluate grazing capability based on watershed condition, vegetation, and other appropriate factors.

Management Area 1 S&Gs (pg 129)

- General: Allotments with AMP's that need revision to comply with Forest Plan S&G's and multiple-use resource objectives (Pg 77)
- General: Balance grazing capacity and permitted use (Pg 77-1).
- Manage allotments at the current level of Management Intensity. Upgrade to the D level of management intensity on more productive sites.
- On an allotment basis, develop the management plan constrained by the investment and allocation to accomplish the objectives in each management area.
- Full capacity lands are assigned a grazing capacity. Potential capacity lands may be assigned a capacity at a later date as improvements are made.

Management Area 2 S&Gs (pg 149-150)

- General: Allotments with AMP's that need revision to comply with Forest Plan S&G's and multiple-use resource objectives (Pg 77)
- General: Balance grazing capacity and permitted use (Pg 77-1).
- General:Emphasize fuelwood production, wildlife habitat, watershed condition, and livestock grazing.
- Manage allotments at the current level of Management Intensity. Upgrade to the D level of management intensity on more productive sites.
- Where seral grasslands are maintained in the pinyon-juniper woodlands, eliminate invading vegetation through mechanical, chemical, or planned fire treatments on a maintenance schedule averaging once approximately every 25 years. Stabilize gullies, scarify the soil, and seed disturbed soils with a mix tailored for the site. Seed suitable areas in all range conditions.
- Manage pinyon-juniper to produce forage and ground cover.

Management Area 3 & 11 S&Gs (pg 160)

- General: Allotments with AMP's that need revision to comply with Forest Plan S&G's and multiple-use resource objectives (Pg 77)
- General: Balance grazing capacity and permitted use (Pg 77-1).
- Grazing systems will consider various seasons of use, levels of utilization and exclusions, and classes of livestock.
- Determine grazing capability for livestock in each riparian area. The objective for each riparian area should include livestock use when consistent with other resource objectives and riparian recovery goals.
- In areas of unsatisfactory riparian condition where grazing has been determined to significant causative factor revised allotment management plans will: a) Implement intensive management systems which limit grazing and provide adequate rest for riparian areas. b) reduce stocking to a level that will allow degraded areas to recover, or c) use site specific exclusion fencing.

Management Area 4 S&Gs (pg 167)

- General: Allotments with AMP's that need revision to comply with Forest Plan S&G's and multiple-use resource objectives (Pg 77)
- General: Balance grazing capacity and permitted use (Pg 77-1).
- Manage allotments at the current level of Management Intensity. Upgrade to the D level of management intensity on more productive sites.
- Control grazing by management and fencing to allow adequate regeneration of grasses and forbs.
- Increase forage production by attaining a composition of cool and warm season forage species.
- A seral grassland or savanna woodland state is maintained. On pinyon-juniper lands where overstory modification have occurred in the past (apprx. 50,219 acres on the A-S), a retreatment schedule of approximately 25 years is initiated. Retreatments are accomplished through one or all of the following methods: a) individual tree removal, b) chemical treatments, c) prescribed burning.

Appendix F. Responses to the Draft Environmental Assessment

Or What we heard from you.

Names of responders to the request for comments:

1. Kay Perkins, Perkins Family Trust, Permittee
2. Quinn Smith, Ranch Manager for Perkins Family Trust
3. Clay Springs/Pinedale Volunteer Fire Dept.
4. Beverly Garcia, TRACKS
5. J. R. Despain, Navajo County Supervisor
6. David Tenney, Navajo County Supervisor
7. Linden Fire Department
8. Jon Cooley, Region 1 Supervisor, Arizona Game and Fish Dept.
9. Paul Greer, Wildlife Manager, Arizona Game and Fish Dept.
10. Jack Carlisle
11. Andy Ribeiro
12. Steve Brophy, Page Land and Cattle Co.
13. Gaylon and Donna Flake
14. Mark Carlisle
15. Wade Carlisle

Responses were grouped because several of the responses were repeated by more than one responder. The numbers after the comments identify the responder. The Forest response to the comment then follows.

Comments:

1. *We note that there have been some changes as a result of our previous comments; however, we requested explanations and data in our last comments that we have not received (1).* The permittee was given a preview of the Environmental Assessment prior to its release to the public and provided comments {Doc 85 in the project record}. The Forest carefully considered each comment and amended the EA as appropriate {Doc 91}. The data requested has been made available to the permittee through meetings, records, site visits, and offers to show and explain data on several occasions {Doc 67} and these comments make reference to that data. The Forest then released the amended EA to the public. Comments on Environmental Assessments are part of the project record, but individual responses are not common practice.

2. *We disagree that the allotment is overstocked at the current permitted numbers and the Forest has not provided any collaborating evidence to support this claim to date (1,2,10,11,14,15,). The Forest has essentially refused to analyze current permitted numbers as requested by Perkins Ranch. The Forest has refused based on a claim that since those numbers allegedly exceed their guess of the Complex capacity they do not have to analyze those numbers (1).* Grazing capacity figures are based on a number of factors which are used to calculate the amount of available forage across the complex {Doc. 38, Holechek 1998, Holechek and Pieper 1992}. This method has met a court challenge and been found to be valid. The EA was changed on page 5 to add the following: To start this analysis, Range condition surveys, also known as Parker 3-Step Cluster analyses, were completed for the entire allotment in 1999 and 2000 {Doc 1B, 1C}. Range condition surveys showed the allotments

were not moving towards Forest Plan standards and objectives (See Appendix E in the Draft Environment Assessment (EA)) {Doc 92}.

The next step, beginning those same years, was to estimate forage production, completed by a team of watershed and range professionals {Doc 38, 48, 64, 66, 75, 76}. First, the team clipped grass samples at several different areas on the Carlisle Complex and other allotments and determined forage production based on standard methods. The team members then went to several new areas to estimate forage production, which was then confirmed by more clipping studies. Finally, after all members of the team had calibrated their eye for different 100 pound forage production classes on the Carlisle Complex, they visited each grass, woodland, and forest stand as laid out on aerial photographs and maps and estimated forage across the entire allotment. The results of this extensive effort were then transferred stand by stand to a Geographic Information System (GIS) that calculated total gross forage across the entire Complex {Doc 48}. Field checks by the original team members who estimated forage production were made in 2003 and again in 2007 {Doc 12, 82}. The original grass clippings were not saved and are not available.

After forage production was calculated across the Complex, reductions in forage availability to livestock were made in a few areas based on slope and distance to water {Holechek 1988, Doc 38}. Allowable use was calculated at several levels, with the final calculation at 32% , the average based on Holechek's studies (2004). Allowable use was multiplied by gross forage to give available forage. The available forage was then multiplied by .70 to provide 70% of the available forage to livestock and 30% to wildlife, based on the Ari-pine Agreement as agreed to by the District Ranger {Doc. 2A}. Finally, available forage for livestock was divided by 7,911 lbs., an average amount of consumption of forage used by a 900 lb. cow/calf pair in one year {Doc 48}. The resulting figure is the estimated capacity of the Complex for livestock. All capacity figures assume that all available forage throughout the entire complex will be used.

The total estimated capacity for the complex is 321 cow/calf pairs, or 3,852 AM. The final version of Alternative G3 is based on a 300 head herd, which is the permittee suggested alternative {Doc. 7}. Current permitted numbers, which have never been stocked by the current permittee, are 144% of the estimated capacity. The Forest Plan directs the districts to: Balance grazing capacity and permitted use as soon as possible but no later than 1995 (page 72). While actual use since 2001 has been within the capacity, the permit still reflects the permitted numbers of 461 because when the permit was waived, the current terms and conditions were applied as per the Rescission Act. The EA was changed to include the above explanation on pages 4 and 5. It should be noted that the range capacity is an estimate. There are no known methods that would precisely calculate the exact capacity, which is why monitoring of grazing effects is required.

3. *The statement "stocking on some allotments exceeds what is "considered" sustainable" is an opinion (1)*. The EA, page 2, has been changed to read "Permitted use on the combined allotments exceeds estimated capacity."

4. *The Forest has not adequately described what range or water conditions are in need of improvement or how livestock numbers are related to this goal. We request that the forest provide information that specifically describes what range and watershed conditions are in need of improvement and how this is specifically related to livestock numbers (1).* See page 4, "Current Condition", page 5, "Desired Future Conditions" and Table 2, page 6. The three main factors needing improvement are range condition and trend, watershed conditions, and riparian {Doc 2, 2A, 4, 5, 13A}. Stocking rate was not the only consideration in the Desired Future Condition statements; grazing duration, intensity, and season of use were also considered in defining these objectives. Other actions may be required to meet a condition in combination with or besides grazing

management, such as thinning of tree canopies and roads management {Doc 4, 6, 10}. However, "Selection of the correct stocking rate is the most important range management decision" and "it is recognized that various rotation grazing systems cannot overcome the rangeland degradation associated with chronic overstocking" {Holechek et. al. 1999, page 8}. The methods used for estimating stocking were based on Holechek's work {Doc 38, Holechek 1998, Holechek and Pieper 1992}. Overstocking is defined here as stocking over the estimated capacity for livestock. Numbers were determined based on the methods described in comment 2. The EA was changed on Page 6 to explain the considerations in developing DFCs.

5. *According to document 44 the bulk of watershed issues are related to roads and woodland canopy and not livestock grazing (1).* This is the reason why road management and thinning treatments are also proposed within the area in this EA. See pages 7 and 8. No change is needed to the EA.

6. *We fail to see how being blue grama dominated constitutes a need to do anything (1).* This is a factual statement under "Location and Setting," not a DFC. No change is required in the EA.

7. *We would like to see the documents that support the overstocking of the Carlisle Complex. Why are they not part of the project file (1)?* The historic documents are large portfolio books that have been shown to and are available for the permittee and the public to read. The thin paper and large size makes these documents extremely difficult to copy, but the District is in the process of scanning and printing them for the Project File. No change to the EA is needed.

8. *We request the Forest to stop using the condition classes to characterize the Complex. The lay public will be mislead into thinking they are something other than a general index of change over time (1).* The EA was edited to include a statement about condition classes on Page 4 under Current Condition. These classes are standard range nomenclature describing the value of the land for livestock grazing. The EA was changed.

9. *The use of the northern pastures has nothing to do with a contrived condition class. There are lands adjacent to the Forest used yearlong. It is merely a function of geography and climate (1).* Page 4 says that winter grazing is mostly due to topography and snow cover on the southern pastures. However, dormant season use and growing season rest can influence range condition (see response 2). No change is needed in the EA.

10. *The claim that there is greater vigor, litter, and species due to light use is unsupported because forest has not collected data to show this (1).* Page 4, Current condition was changed to read "By 2007, greater vigor, more litter, and a greater variety of species are present in the southern pastures {Doc 46A, 57A, 57B, 59, 60}. No condition monitoring data has been collected or presented to the Forest in the northern pastures to confirm similar observations."

11. *The data collected in 2007 on four Parker Clusters also does not support this claim [that light use leads to greater vigor, litter and species]. Parker clusters vary by climate, not livestock presence or absence.* The data mentioned have been asked for several times since March 2007, but no data have been made available to the Forest. No supporting data or research references accompanied this comment, so it is interpreted as personal opinion. Several studies show that changes in plant composition can take several years to decades (Brady et. al. 1989, Fleischner 1994, Valone et.al. 2002, Curtin 2002), and that long-term conservative grazing results in high ecological condition (Holechek et. al. 1999, Galt et. al. 2000) even under the influence of climate. During the drought, especially in 2001-2003, many grass plants died, and it would not be surprising if plant density has not improved in the intervening years. The data alluded to would tend to support predictions of slow rates of change. No change is needed in the EA.

12. *We disagree that rest by itself will result in any significant changes on the Complex. The rest proposed is excessive. We do not accept the idea that the northern pastures should be used solely for dormant season use or that this would promote the maximum potential in these pastures (1).* No data, references, or other information is presented to refute the concept that rest or dormant season

use will result in improved rangeland condition. The EA references research on page 23 that concluded a combination of factors influence improved rangeland condition, including amount of rest. The following paragraph was added under Range Condition and Capacity, Alt. G1, page 24: Rest by itself leads to changes that differ among sites and by the length of time an area is rested (Brady et. al. 1989, Fleischner 1994, Curtin 2002, Valone et.al. 2002). Some studies in arid communities show little effect for one to three decades, while others show more rapid changes to the grass communities. In shrub or tree invaded rangeland, increases in grass density may take longer and sometimes require other management activities such as brush/tree removal in addition to rest (Brady et. al., Galt et. al. 2000).

The following paragraph was added under Range Condition and Capacity, Alt. G3, page 26: Herbaceous vegetation that has not evolved under large-bodied herbivory use, such as lands in the Southwest, benefits from an extended period of non-use or rest from such use. A brief review of the research is presented here. According to McCarthy (2003), rest-rotation grazing is a forage management system that utilizes livestock grazing to improve forage vigor, reduce erosion and improve range conditions by allowing for the occurrence of the following:

1) Plants that have been grazed are permitted the opportunity to build their root system and the reserves of carbohydrates in the root system. This in turn allows the plant to become more robust, increases individual plant's likelihood for survival, and increases overall forage production.

2) Seed production and ripening takes place increasing the probability of reproduction of important grass species.

3) Seedlings are given time to become established, which reduces erosion and increases forage production on a site.

4) Organic material accumulates between plants enriching and building soil, while reducing both wind and water erosion.

In addition, rest-rotation grazing was designed for regions having extended periods of drought (Heitschmidt and Stuth 1991) such as the Mogollon Rim country of Arizona. As far back as 1965, Johnson (1965) reported an improvement in range condition under rest-rotation versus deferred rotation grazing in a Wyoming study. Several studies (Hormay 1970, Ratliff et al. 1972, Ratliff and Ruppert 1974) found that, in mountainous ranges in California, rest-rotation grazing (compared to continuous) resulted in higher vigor of key forage species. On semi-desert grasslands in southern Arizona, Martin and Ward (1976) and Martin (1978) all reported improvement in vigor and density of palatable perennial grasses. They also concluded that a full year's rest before grazing provides for the accumulation of old herbage that protects early growth from repeated close grazing.

Holechek et al. (1989) also report rest-rotation grazing has a number of multiple-use advantages; such as benefits to wildlife, greater esthetics, and benefits to soils (higher infiltration, reduced bulk densities, and reduced sedimentation when compared to deferred rotation or season-long grazing), and concluded that rest-rotation grazing was a good system for both vegetation and livestock in rugged, mountainous terrain. McCarthy (2003) concluded that one year of grazing should be followed by two years of rest to meet a wide variety of forage and social needs.

Concerning dormant season rest for the northern pastures, the EA, page 5, says that the northern pastures would be used, *whenever possible*, during the dormant season (emphasis added).

13. *The northern pastures rate Poor and Very Poor due to general Parker cluster rating scorecards that are not specific to the ecological sites or soils found on the Carlisle Complex. They do not properly provide an adequate picture of the complex. Parker condition scoring is not*

appropriate because it was never adjusted to reflect actual conditions on the ground following publication of the Apache-Sitgreaves TES (1). The Scorecards used are specific for the area – Scorecard #003 was used, Above the Mogollon Rim – Pine and Associated Grasslands (AR-B) and Pinyon/Juniper Woodlands and Associated Grasslands {Doc 1B, 1C}. No change to the EA is needed, but a sentence was added on page 4, Current Conditions, that explains what the Condition Ratings represent. The scorecards were adjusted in 1987 to reflect the species composition as taken from the TES. However, there is NO direct correlation between the TES and the Parker 3-Step methods. They were developed independently. The Parker 3-Step method is a standard range management technique as outlined in handbook 2209.11 and has been used successfully for several decades. No change is needed in the EA.

14. *We request an explanation of why the Forest did not use the frequency-cover method to monitor the Carlisle Complex so that direct comparisons to the TES potential vegetative communities could be made (1).* The frequency-cover method was first used on this Forest in 2004, and only very recently was recommended to become the Forest standard for monitoring {Doc 58} to be used in future analyses. The same document states that the Parker 3-Step has been and will continue to be used for determining long-term trend data. Rather than start a whole new analysis, NEPA directs us to use the best information available. The monitoring program will likely suggest using the frequency-cover method to help determine whether the Complex is moving towards DFCs. Both methods are standards techniques. No change is needed in the EA.

15. *We believe the Carlisle complex has been meeting the goals of the Apache-Sitgreaves…Forest Plan on* [sic] *only desires to combine the permits into a single AMP (1).* This is a personal opinion. The EA and data summarized within it show a need for change from the old permit (pages 2, 4-6). The current permit is not meeting or moving towards Forest Plan standards of having satisfactory range condition, and long-term trends in the northern portions of the allotment are stable to down {Doc 1B}. Also, the current permit does not balance capacity with permitted use. The permittee had the clusters, at least in the northern portion, reread in March of this year, but despite repeated requests for the information has not made any of the data or results available to the Forest to show these objectives are being met or moved towards. No change is needed.

16. *Perkins Ranch will not accept a management plan that relies on relative utilization as the basis for pasture moves. Current management has sufficient experience to properly determine pastures moves.* Pastures moves are determined by a number of factors, including utilization and relative utilization. Chapter 90, Page 16 says that Annual Operating Instructions should set forth allowable use or other standards to be applied and followed by the permittee to properly manage livestock. Page 17 of Chapter 90 states "Not exceeding allowable use is a responsibility permittees assume when they accept a grazing permit." The Forest is happy to work with the permittee to discuss current season monitoring other than relative utilization if the permittee has a standard methodology in mind. No change to the EA is needed.

17. *The objective of all pastures in Fair or better condition under the current scorecard is not reasonable or achievable (1).* 54% of the vegetative score is based on species composition. Another 36% is based on grass density and 10% on vigor. The relationship of invader to increaser to decreaser grass species thus has the most influence on long-term trend. Because past surveys recorded Fair condition in McNeil, Fence Tank, Linden, and Capps allotments, the objective of moving towards (i.e. upward trend) or meeting Fair range condition is not unreasonable. No change in the EA is needed.

18. *If the Forest is going to use the frequency-cover method for monitoring why is that not included here (page 6, monitoring parameters (1)?* Because the statement says, "and other methods", it is implied. Both Range Condition, to record long-term trend, and frequency-cover may be used to monitor the parameters. Final determination of methods will be done collaboratively with all interested parties. The EA was changed on page 17 to include collaboration in the monitoring plan.

19. *Vegetation – most of the complex already meets these criteria (1).* Personal opinion because no evidence, information, or data accompanied this comment. No change needed in the EA.
20. *Vegetation (2) – this is not achievable given dormant season use which includes use during the initial growth period of cool season grasses. Also, goal of 25% is not consistent with Parker scorecards that used 30% to adjust score (1).* EA (pg 7) was changed to 30% to match the Scorecards. Only one northern pasture each year would be grazed during the early spring initial growth period of cool season grasses, giving the other 12-13 pastures opportunity to allow establishment of cool season grasses. However, there may be times when the ranch manager and Range Conservationist agree to use the southern pastures during the winter, and perhaps use a northern pasture for the summer. These are expected to be exceptions to the normal grazing Annual Operating Instructions, and must be agreed upon in advance. Page 3 states the reason why they are considered winter pastures, and page 5 says winter only grazing will occur whenever possible. No change is required in the EA.
21. *Soils – the complex meets this DFC in most places according to existing data (1).* If this is new data collected by the permittee, the forest has not seen it. Soil Units 053 and 054, which comprise just over 40% of the allotment, both were rated with unsatisfactory watershed condition and impaired soils {Doc 44, page 28 of the EA}. No change is required in the EA.
22. *Soils – we look forward to your analysis of the increased production and its effects on stocking for livestock (1, 15).* Increased production will be measured after the treatment(s) and rest to establish grasses. Seeding may be required in some places. The forest cannot predict the amount of future forage, given the lack of knowledge about future funding to accomplish the treatments, precipitation, workforce, etc. That is the reason there is a range of between 600 to 1000 acres per year. Some years, reduction may need to be accomplished by public fuelwood sales, which may have mixed results in terms of canopy reduction and soil disturbance (see page 28). As shown on page 18, if significant results are verified by monitoring, numbers may be increased. The EA was not changed.
23. *Riparian – PFC is an improper Desired Condition. PFC is an assessment tool, not an objective. It is not an ecological analysis tool as described in Doc 44 (1).* Proper Functioning Condition (PFC) is a method for assessing the physical functioning of riparian and wetland areas {Doc 110}. The term is used to describe both the assessment process and a defined, on-the-ground condition of a riparian area. In either case, PFC describes a minimum, or starting point {Doc 110}. No alternate Desired Future Condition was suggested for Riparian. Riparian issues such as lack of bank stability, diversity of riparian woody species age-classes, and an insufficient floodplain or channel configuration to allow normal flooding to build banks are recorded during a PFC survey and then the specific attributes that need improvement are monitored. Riparian monitoring will be discussed during the Monitoring Plan collaboration. The EA was changed on page 8. A short description of the Riparian issues in the Complex was added to the project file {Doc 110}.
24. *Light intensity use will be unacceptable. The Forest has not provided any rationale for light use and is making claims that are not supported by the literature (1).* The following paragraph was added to page 26-27. "Holechek (1999) concluded in a study from 1992-1999 in three different arid grasslands that "So far the 30% harvest coefficient has proven superior in vegetation productivity, livestock productivity, and financial returns. After drought in 1994 through 1996, forage production on the conservatively stocked pastures increased 71% (1997 and 1998) compared to 35% on those moderated stocked. Calf crops were more influenced by stocking than calf or cow weights." Galt et. al. 2000, studying Chihuahuan grassland and Colorado mid-grass prairie, found that conservatively stocked pastures and a 25% harvest coefficient produced more forage and required less destocking during drought. There was also substantial improvement in ecological range condition and forage production." The Forest has provided rationale on pages 24-28, 28-31, 33-36, and 38-41 of the EA. See references on pages 66-68 that also support the rationale.

25. *We believe Issue 1 is a non-issue that the Forest either does not understand or is using to remove livestock from the Forest (1).* Range condition, regardless of which classification system being used, has been recognized as an issue on the Forest since before the original Forest Plan was developed. Range condition, both in agreement with and not in agreement with the range assessment, was brought up by the public during scoping of this analysis. No change to the EA is needed.
26. *Issue 3 is also a non-issue (1).* The Forest Plan directs the District to put all areas in satisfactory watershed condition by 2020 (page 15). Because the watershed condition is rated as unsatisfactory over large portions of the Complex, the ranger decided it needed to be addressed in this analysis. The EA was not changed.
27. *We find the Forest is relying too heavily on the use of GIS analysis at the expense of collecting quantifiable field data (1, 2, 14, 15).* GIS is a mapping tool to aid in analyzing field data, not a replacement to collecting field data. It enables cumbersome calculations based on acres and distance to points fast and easy. It is not used to invent data – it only allows input such as that described in Comment 2 to be calculated quickly and easily. Forage production, water sources, fence lines, etc., are all based on field collected data. The maps documenting field collected forage production and ground truthing of the Vegetative Structural Stages were offered to the permittee and his consultant at the June 6, 2007 meeting, but they did not look at them. Also, the present and past permittees were present during at least one day of ground truthing of Vegetative Structural Stages for the V2 Proposed Action, on April 3, 2002 {Doc 4}. The permittee, past and present, or his representative was invited along on almost all trips when data were collected {Doc 1B, 1C}. The EA does not need changing.
28. *We request the Forest analyze the Carlisle allotment at the current permitted numbers, making an honest and objective examination of the Parker cluster data itself, not the scoring system. The Forest has essentially refused to analyze current permitted numbers as requested by Perkins Ranch. The Forest has refused based on a claim that since those numbers allegedly exceed their guess of the Complex capacity they do not have to analyze those numbers (1).* The scoring system is a summary condition statement. The analysis of the actual data and the interpretation of that data were completed by range professionals {Doc 1B, 1C}. The forage production was done by a Forest-wide Team that included both District and non-District personnel (See comment 2 also). These data have been analyzed, the sites visited at least once each year since that time by various team members, and data have been updated {Doc. 3, 4, 10, 12, 46A, 57A,B, 59, 60, 64, 66, 81, 82} as new information becomes available. This constitutes an honest and objective examination of all data available to the Interdisciplinary Team, which is made up a variety of resource professionals. They used the best science and data available to analyze the allotment, not just for livestock numbers, but also grazing management options and other actions that can help move the allotment towards better rangeland conditions. The current permitted numbers are 47% above the capacity of the allotment, and the Forest Plan directs that permitted numbers be balanced with capacity. NEPA policy and procedures (Revised 1992, Fed. Reg. Vol. 57, No. 182, pg. 43198) state that "ensure the range of alternatives does not prematurely foreclose options that might protect, restore, and enhance the environment…Alternatives must meet the purpose and need." The suggested alternative does not meet the purpose and need. The EA states on page 18 that administrative changes in numbers, both up and down, can occur based on adaptive management principles and monitoring. No change to the EA was made.
29. *We find the attitude projected in the last sentence (page 12, paragraph 1 under Alternatives Eliminated from Detailed Study) to be defensive and belligerent on the part of the government (1).* The sentence read "We are not required to analyze an Alternative that does not meet Forest Plan standards." The sentence, now on page 13, was changed to read "An alternative that does not meet Forest Plan Standards does not require analysis because it was already decided by a previous decision (the Forest Plan Record of Decision)."

30. *Monitoring Plan – if the Forest is going to set thresholds for grazing intensity they should be presented here for comment (1).* The Forest has stated many times in the EA that grazing intensity will be "light", as defined in the footnote on page 14. Any mid-season monitoring methods for pastures moves will be done collaboratively as stated in response 16. The EA was not changed.
31. *There is no need for a range of numbers; Forest can reduce numbers when needed (1, 2).* After reviewing this comment and other similar ones (See Comment 71) the Forest decided that, because numbers can be lowered based on Regional drought guidelines and for resource protection, that only a maximum number is needed. The EA was changed on pages 14-15 to have the maximum of 300 head cow/calf with associated bulls, with no range of numbers.
32. *Initial stocking level does not belong in EA document – it is administrative (1, 2).* The Forest also removed any initial stocking rates, originally shown on page 14, from the EA.
33. *The ranch wants a deferred/rest rotation grazing system, not a rest rotation system (1, 2).* The initial change in wording was a mistake – the system being implemented would be a combination of a rest/rotation and deferred/rest rotation system. The northern pastures would be managed on a rest rotation system, and the southern pastures on a deferred/rest rotation system. The wording on page 14 was changed.
34. *We would remind the Forest that it does not have direction to provide maximum forage, only high quality forage. Nor is there direction for maximum potential of vegetative communities (1).* The Forest is proposing actions to achieve high quality forage. No change to the EA is needed.
35. *We fail to understand why livestock need to be removed after vegetative treatments. If the area is burned or seeded, we would not disagree with the additional rest (1).* The State of Arizona works with the Forest Service to develop Best Management Practices, which the Forest then implements. This BMP has been shown to be highly effective in ensuring successful reestablishment of grasses after soil disturbance. The Forest will seed whenever possible. When Agri-Axe or Bull-Hogs are used, no such BMP is needed. The EA was not changed.
36. *We think that mixing soil layers is being taken too literally. We challenge the Forest to show detrimental effects from past treatments (1).* This recommendation is taken directly from TES in soil units 053 and 054. No change is needed.
37. *Monitoring rarely "determines" anything. At best it estimates based on sampling techniques (1).* The Forest agrees that monitoring is sampling and estimating – even techniques such as frequency-cover and TES are based on sampling techniques and so are estimates of existing conditions, as are Parker 3-step clusters and forage production mapping. The word on page 17 was changed to "verify."
38. *We will not accept monitoring for other values unless there is a demonstrated link to livestock grazing effects (1).* The Complex has Multiple Use values, such as watershed and wildlife that may or may not be directly linked to livestock grazing. If the permittee is not responsible for these "other values" monitoring, why would they object to it? As stated earlier, the monitoring plan for the grazing permit will be done collaboratively. No change is needed in the EA.
39. *Why is the frequency-cover method not listed in the monitoring section (1)?* Any monitoring methods within the Range Analysis and Training Guide can be used. Any other peer reviewed methods will be considered. The "other methods" include the frequency-cover methods as well. No change is needed.
40. *We disagree that the proposed action is sufficiently flexible. The last sentence removes the flexibility (1).* The sentence states that the permittee must stay within the analyzed parameters of duration, timing, intensity, and frequency. The commenter calls this a monitor and stock approach rather than a stock and monitor. Because the Complex has been stocked at 120-180 head for the last 5 years, *increasing* the stocking to up to 300 head and then monitoring the results is what the proposed action is analyzing {Doc 7, 72077. The EA does not need changing.

41. *Condition classes provide no information about the complex. How similar to potential is the present community? What factors are influencing these differences (1)?* See the response to Comments 2, 13, 14, 17 and 117. Range Parker 3-step clusters are an established accepted standard method for analyzing the allotment in relation to its ability to provide forage for domestic livestock. No change is required in the EA.
42. *The last paragraph under Range Condition on page 23 misinterprets the research by Holechek (1).* No alternate interpretation was suggested nor was different research presented to refute the interpretation presented here. The research was re-examined by the IDT to see if there were obvious errors, and other professionals consulted for the same, and none were found. Without suggestions for other interpretations or alternate research, the Forest is unable to respond. The EA was not changed.
43. *The scenario described here (in absence of grazing, Alt. G1) will not happen on Carlisle allotment (1).* It is recognized that the scenario would be a long term one, not a one year or even perhaps 10 year result. The EA was modified to better explain the effects and include research we are aware of that shows results of 1) reduced diversity, 2) increased diversity, and 3) increased diversity only after long time periods. Research has been done in similar grassland types but none specifically on the Forest that we are aware of. The EA was changed on page 24.
44. *Effects of grazing are not shown, only results of extreme rest (1).* Effects of grazing are displayed in Chapter 3.
45. *Alternative V1 does not describe direct effects (1).* Alternative V1 is a No Action alternative – there are no direct effects to or from livestock grazing related to it. The EA was not changed.
46. *No effects described in the Watershed section under V2 (1).* The effects are described in the section. See page 26 – for example: little impact on soil; improve soils through leaving chips on site; increased soil disturbance, slash scattered to provide microhabitats for grass establishment, etc. Some modification to further explain effects was added on page 32.
47. *Extensive compaction from livestock grazing in high canopy cover areas should not occur if little herbaceous vegetation is present because livestock would not be attracted to area. Also, if steep slopes not used by livestock, as assumed in capacity model, then livestock not responsible for concentrated flows on steeper slopes. Therefore, roads are issue, not livestock grazing, but analysis implies livestock to blame (1).* Cattle are not physically restricted from grazing steep areas or areas with heavy tree canopies. Capacity is not awarded to those areas, as they are not preferred; however, there is no assumption that cattle would not use these areas. The conclusion that cattle have no effect on soil condition or erosion cannot be implied based on assumptions made in a model to predict forage capacity (Chris Nelson, Watershed Staff, personal communication). Roads are one of the issues mentioned and were analyzed in Chapter 3. The EA does not require changing.
48. *How was compaction in the pastures mentioned (open areas of Bull Hollow, Walker Lake, East and West Bull pastures) measured (1)?* Only one small study was done in 1994 comparing infiltration rates and bulk density on the original East Pasture of the Dodson Allotment. It showed nearly twice the infiltration rate inside the exclosure to outside. This information is considered anecdotal as the exclosure was small and no replications could be made. Bulk density was also slightly lower inside verses outside. Inferences to bulk density were made based on literature citations and personal observation since analysis on the Dodson Allotment began in the early 1990s (Chris Nelson, Watershed Staff, pers. comm.). See Comment 52 also.
49. *Because effects of livestock on water quality have not been measured, they are unknown. Roads, not livestock grazing, are the issue (1).* Roads are a large contributor of sediment to the watershed {Doc 44}. However, it is the professional opinion of the watershed staff that sheet erosion and pedastalled plants due to a lack of ground cover in open, almost flat areas across portions of the Dodson and Linden allotments are mostly attributable to livestock grazing impacts {See Doc 1B}. No change is needed in the EA.

50. *Riparian issues are roads and dams (1).* Page 30 states that unsatisfactory conditions on the uplands are a primary factor in riparian degradation. Livestock grazing contributes to these upland conditions. No change is needed in the EA.
51. *Impacts from livestock grazing have not been described – improvement is assumed under no grazing (1).* See comment 12 for the underlying assumptions and the references on which the conclusions are based. The EA is a summary document that usually does not include extensive explanations and references, but the EA was modified on pages 46-48 to further explain the research behind the prediction effects.
52. *Livestock compaction only occurs near watering, salting, and bedding areas. Because these are small compared to pasture size, compaction is not a livestock issue (1).* Soil compaction limits the ability of plants to obtain nutrients and thus limits their growth. In highly compacted areas such as near waters, few plants can grow. That is why they are called "sacrifice areas." Livestock can exert up to 1000 PSI and so can compact soils when left in pastures for lengthy time periods. According to the Minnesota Extension Service, the freeze-thaw cycle does not have any impact on soil deeper than 2-5 inches in that climate. Compaction due to livestock is generally heaviest where livestock congregate: watering areas which generally include most riparian and low lying areas, as well as salting and bedding areas. The low lying areas are the most critical, as these form the last defense or filter for sediment before it enters a channel. Once sediment enters a channel of any type, the sediment is in the system and will be transported. No change is needed in the EA.
53. *How can you say blue gram is vulnerable to grazing (1)?* All plants are vulnerable to grazing at certain growth stages and during extremely wet conditions, not just blue grama. All vegetation is vulnerable to over use. Blue grama is by far the most abundant grass species, and is considered to be the best species to "recover" areas that lack cover. Blue grama spreads vegetatively and by seed. A way to improve the overall health and reproductive potential of blue grama is to provide rest or low levels of use in the boot stage. "When plants are grazed during the boot stage, apical and intercalary meristems responsible for plant growth are removed and regrowth must occur from axillary buds at the base of the plant, a slow process that requires moisture and nutrients at a time when those resources are dwindling. Conversely, grazing during the boot stage in wetter regions stimulates tillering from axillary buds in grasses and forbs, resulting in the production of nutritious forage" (Briske and Richards 1995). The Southwest and Carlisle Complex of allotments are not considered a "wetter region". No change is required in the EA.
54. *Riparian issues are distribution, not numbers issues (1).* Livestock effects to riparian areas can be caused from poor distribution, improper season of use, and excessive numbers, depending on the location. If physical control of cattle is not practical, other means of preventing over utilization of riparian areas cannot be guaranteed. Use of supplements, salt and herding is an effective way of reducing impacts to riparian areas, and should be used in the management of this allotment. However, without demonstrated intensive cattle management, reduced overall livestock density or time of use within a pasture is a legitimate way to reduce grazing and trampling effects to riparian areas. No change is needed in the EA.
55. *HRM trial was not excessive use and monitoring showed static conditions on the range (1).* This paragraph on page 36 was altered to reflect recently received information {Doc 109}.
56. *Forest says it is committed to bring Complex into satisfactory condition. Better use of time would be to change monitoring techniques because satisfactory is not achievable unless Forest has strong evidence what they are claiming can work at the expense of a legitimate livestock operation (1).* Re-evaluating monitoring methodology is beyond the District's control or direction. It is also outside the scope of this analysis. The methods used in this analysis are standard methods in the Range Handbook and the data collected are the best available information and provide a good picture of plant density, composition, and vigor, which are the objectives noted on Page 6 of the EA as priorities for improvement. The best evidence that the objectives are achievable are past data and the

resulting scores which, on the Linden, Capps, and McNeil allotments rated as Fair condition. Therefore, the Forest thinks moving towards those conditions again is achievable, especially in light of the additional non-structural improvements such as vegetation management and roads management to be taken concurrently with the grazing management actions. The EA does not need to be changed.

57. *The Wildlife section is not specific to the Carlisle Complex and could apply anywhere. It does not meet the requirements for being site specific (1).* For complete details of effects to species, see Documents 51, 57, 61, 86 and Appendix B. Because most of the species present have home ranges or movement patterns both within and outside the Complex, wildlife species must be examined on a landscape or population scale and not individual animals within a specific pasture. The Biological Opinion issued concerning several species demonstrates that another agency, the Fish and Wildlife Services considered this an analysis of the Complex {Doc 86}. The EA does not need to be changed.

58. *The statement that whether or not the permittee's operation can sustain a reduction is breath-taking in its lack of business knowledge. Who can sustain a loss of half their income (1)?* The current permittee acquired the grazing permit with an initial stocking rate of 200 head, and was aware of the analysis and likely resulting numbers when he received the current permit {Doc 7, 8, 11, 12}. To suggest the permittee's income is being cut in half is not revealing the actual situation, but is misrepresenting the facts. This analysis, if Alternative G3 is selected, would result in a potential increase from 200 to 300 cow/calf yearlong. In addition, the permittee's alternative was to run 300 head {Doc 7}. The EA was changed on page 47 to reflect average use over the past decade, current permitted numbers, and proposed actions.

59. *We strongly disagree that logging and juniper treatment had an overall negative impact on the Complex. The effects of the RC fire are also contradictory to this statement (1).* The overall effects of logging and livestock grazing, combined with too conservative thinning and too long between thinnings in many areas led to an increase in tree density and lack of herbaceous understory prior to the Rodeo-Chediski Fire {Doc 112}. While the Rodeo-Chediski Fire increased grass production for the livestock permittee and changed the seral stage towards the grass/forb stage in many areas, there were other serious negative impacts to soils, riparian, recreational, wildlife, and social values. The EA does not need to be changed.

60. *We disagree with paragraph 4 under The Carlisle Complex – it is irresponsible of the Forest Service to put this out to the public. Provide the data to support the claim that a loss of variability and a loss of stability have occurred (1).* The data collected during the range analysis and forage production surveys, as well as the TES data shows the present and potential plant communities. In soil types 053 and 054, on the northern pastures: The range data shows the absence (or loss) of several grass species when comparing the 1964 and 1982 data with the 2000 data {Doc 1B, 1C}. The older clusters were rescored with the updated scorecards, and then compared in detail for species composition and ground cover. The summary of trends from 1982 to 2000, in vegetation scores based on the same scorecards: scores were within 5 points in 6 clusters and down more than 5 points on 2 clusters. Soil scores were down, based mostly on increases in bare ground and decreases in plant density on 6 clusters and within 5 points on 2 clusters. In more southerly soil types, the vegetation scores were up more than 5 points on three clusters, but soil scores were down more than 5 points on all 3 {Doc 1B, 1C} but more recent information shows dramatic changes in the south as a result of the R-C Fire {Doc 46A, 57A, B, 59, 60}. More detailed comparison in the north showed forage production ranged from 8 to 33% of current potential, species composition showed more subshrubs and fewer grass species, and sheet erosion was evident on almost all transects. This led to the conclusion that a loss of variability and stability had occurred over the last several decades. No data or anecdotal information was presented to refute the point. The EA does not need changing.

61. *The proposed actions are ultra conservative and unmerited. The Forest has done nothing to substantiate its claims and has not done the proper field work (1).* To summarize: Approximately 67% of the allotment is in Poor or Very Poor range condition; watershed condition is unsatisfactory

over most of the allotment; 86% of riparian reaches were rated as functional at risk or non-functioning; 47% of the complex has a soil condition rating of impaired or unsatisfactory; cool season grasses are well below their potential on a majority of the northern portion of the allotment. The data supports these claims {Doc 1B, C, 44}. The actions are proposed to reverse the downward trends and move the allotment towards satisfactory range conditions. No change is needed in the EA.

62. *The social and economic section is an effort to shrug off the effects of the loss of income to the county and the community. This is an illogical argument. This is also counter to the purposes for which the Forests were established. The Supreme Court made it clear in 1978 in United States v. New Mexico that the Forests were established for economic purposes, they are not parks or refuges (1).* The economic consequences of any of the proposed action alternatives are small when looked at on countywide basis, as shown on pages 46-47. The Forest recognizes that to the permittee, changes can be substantial. Also see Comment 80. The EA does not need to be changed.

63. *The Forest is proposing to reduce permitted numbers and restrict management flexibility on the Complex with little substantiated quantitative information.* Pages 2-4, 200-22, 28-31, 33-34, 37, 44-45, and 45-51 present quantitative information about the Carlisle Complex. No change is needed in the EA.

64. *Perkins Ranch has made several requests for information from the District concerning data that would support the District's claims (1).* The Range analyses were made available to the permittee as far back as 2002 {Doc 8, 11, 12}. The entire project file was offered in May 2007 and most was copied by the permittee's representative, with the exception of the GIS Notebook {Doc 48 (cover page), 67}. Maps showing the forage production estimates were offered in June, 2007. The only information or data the District is aware of that has not been made available to everyone interested in the project is the data collected by the permittee's consultant in March 2007.

65. *The Forest has made changes to the proposed alternatives without consultation with Perkins Ranch (1).* The Forest has had more than 25 meetings, field trips and discussions with the permittee and/or his representatives {See Doc 67}. The Alternatives changed as new information became available. No change to the EA is required.

66. *The Forest is making unsubstantiated claims concerning future performance of vegetation on the Complex that are misleading to the public (1).* Effects analyses are based on site-specific data, knowledge of the Complex, research and professional judgment {Doc 13A, 40, 41, 43, 46-51, 57, 61, 66, 84, 87}. All effects analyses are somewhat speculative, given such variables as climate, fire, etc., that cannot be predicted. The EA does not need to be changed.

67. *We request the Forest make no decision that alters the current allotment management plan until it can substantiate its claims and conduct the proper quantitative field work (1).* There is no current allotment management plan. There has never been a NEPA analysis done on this Allotment, with the exception of the Pinedale decision in 1995, authorizing 62 head yearlong. The best available data, information and research substantiate the current conditions, desired Future conditions, and effects predicted in the EA. Some changes were made to the EA as a result of these comments (see above).

68. *I see little flexibility in the proposals (1, 2).* More flexibility was put into the proposal by changing the range to a maximum on page 15, taking our initial stocking rates, changing from a rest rotation to a mix of deferred/rest and rest rotation. The Riparian pasture being grazed only during the dormant season is to protect the relatively young cottonwoods along Show Low Creek. See Comments 2, 9, and 12 for other changes or explanations.

69. *I don't understand how the Forest came up with the lower number in the range of stocking (2).* The lower numbers were based on immediately Post-RC fire (2002) acres that assumed only the non-burned portions of the northern pastures could be used, which meant very light stocking would be required {Doc 48}. Those figures were never updated; only the maximum numbers were updated. The Forest removed all bottom (lower) numbers in the EA in response to this and Comment 31.

70. *The document contradicts itself by saying light grazing and then saying 20% maximum use (2, 5).* The 20% maximum use was removed from the EA on pages 17. Originally, 20% use was recommended based on the Forest Handbook 2209.21, which recommends grazing at that intensity in areas with Poor Range Condition. However, due to recent monitoring showing very light use and the Good Condition Ratings on the southern portion, plus the dormant season grazing in the northern pastures, the proposal was changed to light grazing. The EA was changed.
71. *The center of discussion in almost every grazing EA and AMP is over numbers. Why don't we solve this by letting monitoring determine numbers (2)?* The grazing permit must have an authorized number of livestock on it. Also, the Forest has been directed to balance permitted use with capacity, which requires we estimate capacity {Appendix E}. Until permitted use is balanced with capacity, numbers will continue to be a central issue. Although the Forest would like to rely solely on monitoring, the reality is intensive monitoring is not likely given the current and future budget conditions, so relying on monitoring to estimate numbers for the next year may not be feasible. The EA does not require changing.
72. *We request actions be taken to reduce the severe wildfire conditions in light of the heavy growth of tall grasses and the large number of stumps and blow-downs. Increase the number of cow units or increase the grazing from 20% to light (32%). Close-cropped grasses would not spread fire as quickly as the larger fuels (3, 7).* Grazing management is not intended to be a fuels reduction program. However, scheduling can be arranged, in cooperation with the permittee, to allow grazing next to private land during the early spring and later in the summer. Such actions are distribution issues, not number issues. Be aware that complaints from private landowners about livestock next to their property will increase during this grazing to help reduce grass height. Treatment of RC Fire dead trees outside the scope of this analysis, but were covered under Rodeo-Chediski Fire EA, CE, and EIS. The treatment of woody residue with no commercial value will need to be addressed in future environment reviews. No change to the EA is required.
73. *We believe allowing more fuelwood cutting would clear some of the downed wood to allow access to the area for emergency response (3).* Fuelwood cutting has been allowed in the area during dry conditions (fall into early winter) since the fire, and continues this year. No change to the EA is required.
74. *There is concern regarding the hindrance of the narrow gate which limits access to the Forest at FSR 919D, mislabeled 916D, off the Pinedale Wash Road (3).* This is not an allotment fence and must be dealt with through the Lands personnel, who have been working with the landowners for some time. The mislabeling has been reported to the engineers for correction.
75. *While expressing agreement with the Proposed Action (Alt. 3), commenter asked if we were setting aside any forage for [wild] horses (4).* There is no special forage assignment to the unauthorized horses because they are unauthorized, and the Forest is in the middle of an analysis to determine how they will be controlled. No change to the EA is required.
76. *I would ask for a public review of the monitoring data (5).* The monitoring data is available to the public. We regularly send monitoring data results to interested publics.
77. *The Forest cites concern over riparian areas as justification for reducing numbers (5, 14, 15).* No where in the document does the Forest say that riparian issues must be addressed by reducing numbers. The Forest agrees that riparian issues are mainly distribution and timing issues, not numbers issues. Riparian areas were not used in the determination of capacity of the allotment (See pages 4 and 5 for an explanation of how capacity was determined). No change to the EA is required.
78. *The Forest has not provided site specific analysis of the economic impact of reducing livestock in Show Low and Navajo County. I ask this analysis be completed (6).* An analysis specific to the counties surrounding the Apache-Sitgreaves National forest was completed in 2005 and showed that grazing contributed less than 1% of the income provided by the Forest to local and county economies (EA, pages 46-49, 53). Trying to get economic data from less than a county-wide

perspective is extremely difficult. For instance, the current economic profile published by the Arizona Dept. Commerce on Navajo County does not even mention agriculture as an employment sector for the county (www.azcommerce.com) (Profile: Navajo County, Arizona, 8/07), although it mentions ranching as historically important. Therefore, economic impacts to the city of Show Low could not be predicted, although they would be somewhat magnified due to the smaller area. However, given the employment factor, the difference between 461 head and 300 head yearlong would be less than one job.

79. *The Forest proposes to conduct juniper treatments of 1,000 acres per year over the next 10 years. However, they did not analyze the increased production or increased capacity. In the aftermath of the Rodeo-Chediski Fire, the areas are knee deep in good feed and I would like to see an increase – not a decrease – of grazing in those areas (6).* Juniper treatments are expected to result in increased production (EA, pages 29, 38), but because funding sources must be found to accomplish the treatments, to analyze increased production amounts by acre is too speculative. Adaptive management will allow increases in numbers based on increases in capacity after they occur.

80. *Ranchers are concerned a cutback in their stock numbers and pasture will drastically affect the local economy, not to mention their own livelihood (6).* As the EA explains on pages 46, 47, and 53, the local economy will not be significantly affected. The individual rancher would actually be allowed to increase his herd for the first time since acquiring it in 2002, so the local economy should be helped a little, not hurt. No change is required to the EA.

81. *We agree that the Desired Future Conditions can be achieved in a more reasonable time frame under Alternative G4, coupled with active vegetation treatments (V2) and appropriate road management (8).* The EA, pages 27, 34, 37, and 43 states that Alt. G4 would move conditions towards DFCs faster. However, page 47 notes that economic impacts to the rancher would be double those of G3. No change is required to the EA.

82. *The additional growing season rest in G3 would be best for the riparian resource, especially where it is recovering from the Rodeo-Chediski Fire (8).* The EA states this also (pg. 34, 43). No change is required in the EA.

83. *Alt. G4 would provide greater management flexibility to pursue the Forest Service Regional Priority for restoration of fire-adapted ecosystems, as well as providing the District with an improved ability to cope with the effects of drought with minimal impacts on the long term health of the allotment or disruption to the permittee (8).* Although not specifically mentioned in the EA, the Specialist's Reports confirm the Forest's management flexibility to accomplish burning and other priority ecosystem restoration work {Doc 51, 57}. The Social and Economic section points out the benefits of stable herd size (page 47). No change is required to the EA.

84. *We strongly support V2 to treat watershed, soil, and habitat improvements in addition to forage production. However, even treatment of up to 10,000 acres over the next decade does not even meet current treatment needs identified by our Department to address habitat concerns. Please consider expanding the treatments to meet our objectives (8, 9).* The Forest had to be realistic in its treatment acres based on its current and projects budgets. Please note on page 15 that grassland soil types are not included in this acreage, so invading juniper in grasslands may be treated, up to 10,000 additional acres, to be coordinated with other treatments. No change is required to the EA.

85. *We recommend that, if burning of alligator stumps cannot take place within the recommended timeframes, you consider using herbicide to assure attainment of your goals (8).* Herbicide use for noxious weeds and other vegetation treatments is being considered under a different analysis and is outside the scope of this analysis. No change is required to the EA.

86. *We support your proposal to monitor grazing intensity as well as other factors on which to base the sequence and timing of pasture moves(8).* The Department and other interested parties are invited to participate in the collaboration on the Monitoring Plan. No change is required to the EA.

87. *We have expressed concern in the past that strictly relying on utilization monitoring at the end of the season, even in conjunction with trend monitoring could fail to detect certain negative impacts from grazing. We are also concerned that monitoring be documented that sufficient herbaceous structure is present to provide wildlife cover requirements.* See Comment 88. No change is required to the EA.

88. *Monitoring of browse species was not mentioned even though 30% use on riparian species less than six feet tall was a mitigation factor. Due to its importance and current condition of riparian over much of the Complex, we recommend such monitoring (8).* The Forest is willing to work with the Department to identify methods and areas where critical riparian resources will be monitored. The permittee will be invited to participate. No change is required to the EA.

89. *The recovery of grasses in the RC area is due to rehabilitation, including seeding. Those seeding activities, coupled with temporary post-fire nutrient availability, favorable precipitation events, and the absence of livestock grazing has resulted in atypical and unsustainable conditions. Forage production estimates calculated from forage clippings conducted just three years after the fire has likely resulted in estimates that are well above the natural range of variability (8).* District personnel will monitor conditions under adaptive monitoring and will make adjustments according to that monitoring. Also see Comment 89. No change is required to the EA.

90. *Efforts to meet the Ari-Pine Resource Area recommendations are appreciated, but is unclear on how calculations were performed because of the range of AUMs presented (8).* The maximum possible AUMs were used in all calculations. It was assumed that the lower number of AUMs would meet or exceed the forage ratios as well. No change is required to the EA.

91. *The fencing specifications on pages 16 and 57 do not match. We recommend at least an 18" above ground bottom smooth wire except in antelope areas, which should be 20" from the ground (8).* Using a 20" bottom wire only leaves 7-8 inches between the four wires. The Forest standard for wildlife fences (page 16) will be the minimum applied as fences are reconstructed. When stretches of fence are repaired in antelope habitat the permittee will be asked to make the bottom wire 18" from the ground. It is beyond the scope of the analysis to make changes in fencing standards. The EA was changed on page 59 to reflect the current forest standard of 16".

92. *There is an error on page 22. The acres don't match (8).* The EA was corrected on page 23 {Doc 89}.

93. *The EA states that a basic assumption of the analysis is that normal climatic conditions will prevail. Drought should be considered as being within normal climatic conditions here in the southwest (8).* Regional drought guidelines will apply as well as monitoring and close coordination with permittee. Capacity was determined based on normal (average) rainfall. No change is required to the EA.

94. *A new fence has been built in close proximity and parallel to an old existing fence along Forest Road 132 south of FR 219. This makes movement for wild animals difficult (8).* The Forest will work with the Department to address this concern. Due to a lack of funding, the fence must be removed by volunteer labor. No change is needed in the EA.

95. *Past management has been ongoing since at least 1964. Starting in 1969 all pastures added to the Carlisle Complex, beginning with Dodson Allotment had some kind of rest provided for every pasture for a year plus time of use. The response in the last three summers demonstrates the condition recorded in your document is not very accurate. It has never looked this good before (10).* Numbers being managed were reduced in this allotment beginning in 2001, seven years ago, to 180 head, then 120 head, from 500 head that were run prior to that time. During the drought many grass plants died, and plant density may just now be approaching its former level. However, there has been a noticeable improvement in plant vigor. Most of the positive changes were due to improved management coupled with reduced numbers, not just past management. No change is required to the EA.

96. *The permitted numbers is about half what the State allows (10).* The State and the National Forests have very different mandates for the management and use of lands under their stewardship. The Forest Service has Multiple Use mandates and the Apache-Sitgreaves has requirements to maintain satisfactory range condition. No state lands are included in this allotment. No change is required to the EA.
97. *I think 461 should be the target number and 300 the base. This is after all based on 25 lbs. per day for 1000 lb. cow (10).* This is the same reference the Forest used. See comments 2, 28.
98. *The EA says the Ari-Pine area was overallocated by 10% in 1993. Consequently there have been heavy reductions in most of the other permits. Use has been light and you [the Forest] are looking at ways to put cattle back on. When are you going to stop and evaluate your past decisions (10)?* The District checked with the other Range conservationists, and no plans to increase numbers are being made on Black Mesa or other Districts at this time. No changes to the EA are required.
99. *The Complex already had about 10% reductions plus phenomenal increase in production on the 40% [of land] in the pine type. The numbers should be driven by monitoring, not some document (10).* The EA is a summary document of past management, current management, monitoring, and proposed actions to address concerns. No change is required to the EA.
100. *I oppose the Proposed Alternative. I have traveled extensively throughout the Forest and have never seen overgrazing or any sign of damage caused by cattle, therefore I see no need for reductions in grazing (11).* Anecdotal observations are good to have, and the Forest appreciates the fact that you have seen no problems with our current management of grazing. No change is needed to the EA.
101. *Along with the introduction of wolves, this and other actions by Land Managers is just is an attempt to drive ranchers out of the Forest (11).* Grazing has been a major portion of the Forest Service mandated multiple uses since its creation. No change is required to the EA.
102. *The EA is a results driven analysis, not facts driven, that predetermined the reduction by using 25% forage allocation. Nothing cited in the EA measures on the ground production (12).* On the ground production and range condition are measured and estimated {Doc 1B, 1C, 3, 46, 57A, B, 59, 60, 64, 82}. The process requires a Team to analyze existing and desired conditions and determine possible management practices from the differences between the two. Forage production is always a moving target, with some years producing more than others. The years when production was calculated were normal or average precipitation years {Doc 1B, 1C}. Since that time the Complex has had exceptionally dry and exceptionally wet summers, and mostly below normal winters. Basing forage production on normal years allows for drought and wet years to be taken into account. Forage utilization was recalculated at 32.5% based on monitoring and the increased production after the R-C Fire {Doc 84}. See Comment 2 for the complete methodology. No change is required to the EA.
103. *The Complex is located in one of the higher rainfall, higher producing areas of the state. How can such a large and productive area be capable of sustaining 1 or 2 head per section (12)?* The Snowflake area receives an average of 12.2 inches of rain per year, based on a 51 year record period (1931-1995) {Doc 1C}. The Carlisle Complex receives average rainfall of between 10-20 inches, which makes it an arid zone, and could only be considered a "higher rainfall" area in Arizona. When the analysis began, almost 70% of the range was producing less than 100 lbs. per acre, which, by direction, is potentially capable range {Doc 1B, 1C}. Now, based on post-Rodeo-Chediski production, only about 16% of the land is still producing less than 100 lbs/acre {Doc 66, 84, 89}. See EA, page 4 and 5 for the methods used. Almost 40% of range is producing only about 10%-33% of its present potential production capability. The R-C area is producing more forage, and while it might work out mathematically to put all the cattle on the Rodeo-Chediski area yearlong, that part of the allotment is usually snow bound at least a few months of the year. The Forest is attempting to put the trajectory of the range back towards satisfactory. No change is needed to the EA.

104. *I invite the writer(s) of the EA to look at areas on the Apache-Sitgreaves not now stocked – and that won't be stocked because numbers were reduced to the point that it isn't economical to run a ranch. Resource protection motivated reductions in stocking will produce less, not more of the protected resource. Protected (not used) tree resources led to the Rodeo-Chediski Fire (12).* The only areas on the Forest not currently permitted for livestock are the Sandrock Allotment and the West Fork Allotment, both closed for resource protection. Extended rest did indeed produce more grass in the Sandrock allotment. However, the West Fork Allotment, with 100+ feral horses and numerous trespass cattle plus the resident elk herd, has not shown as much improvement. Other allotments where fire and/or thinning treatments were followed by rest or extended rest have more grass, depending on soils and tree cover. Some areas on Clifton Ranger District have shown an increase from 400 lbs. to 2400 lbs. after thinning and burning. The Forest recognizes that tree resources in the Rodeo-Chediski area were not thinned frequently enough and usually thinned too conservatively for several cycles. The intent of the proposal is not to put anyone out of business. In fact, the permittee could potentially increase numbers by one-third over the highest numbers he has ever stocked. The EA does not require changing.

105. *Has regular and continuous monitoring been documented on this allotment. If not, how do you determine the reported usage? Without proper monitoring assessment is invalid and unfair (13).* Monitoring of use has been ongoing and continuous since at least 2000 {Doc 57A, B, 58-60, 72-77}. The document states on page 3 that numbers were increased in 2006 based on monitoring of light use and increased forage. The EA was changed on page 3 to add the references.

106. *It appears there is a bias against livestock grazing and this permittee. Monitoring records should be made available to the public to see how valid and unbiased they are (13).* Monitoring records are available to the public and have been made available to the permittee on several occasions {Doc 67}. Since at least 10 different specialists from differing backgrounds have been involved in the monitoring and/or writing of the EA and Specialist Reports, bias is not likely. Monitoring of utilization can show collector bias when conducted by relatively untrained or inexperienced personnel. No change is needed in the EA.

107. *I was intimately involved with the Carlisle Allotment from 1988 to 2002. During this drought period we voluntarily reduced numbers to fit the amount of forage the range produced. When we moved out of one pasture it was a year plus one month before the pasture was used again. Never once did we exceed use standards. There has never been an actual study done on the ground forage production study done. They come up with a fictitious set of numbers while sitting at a desk and expect that to fly so they don't have to do their job (14).* The first part of the comment refers to the production/utilization studies that required a minimum of three years of data collection. The method used to estimate forage production by the Forest is also recommended in the Rangeland Analysis and Training Guide and is a standard methodology for estimating forage production. The rest of this comment is personal opinion. See comment 2. The EA does not need to be changed.

108. *Fact is, analyze on the ground with an unbiased range professional, such as Perkins hired, and they will find adequate forage production and range condition to raise allotted numbers (14).* Personal opinion, unsubstantiated with data. No change is needed in the EA.

109. *The allotment only needs to produce 48 lbs/acre over the allotment to sustain full allotted numbers. With the proposed juniper control and the forage produced by the R-C burn, this ranch should be able to sustain over a thousand cows (14).* Using the 48 lb/acre, a total of 4,252,800 lbs of forage could be produced if every acre of the 88,600 were equal. Then, if you divide by 7,911 lbs per year for a 900 lb. cow/calf pair, 537 cow/calf pairs could be sustained. That assumes that all 48 lbs. of forage produced on every acre would be consumed by those cows. This assumes no wildlife use, no recreation needs, and no value for holding the soil or anything other than foraging livestock. The Forest Service is mandated under law to consider multiple uses and values of the land. No change is required in the EA.

110. *I would like the Forest to identify how many years the Complex was overstocked and provide the data that supports the claim. I find it hard to believe given that there is currently less than 10% use (15).* The data are in the project file {Doc 112}. The EA states on page 3 that historic data show the allotments were stocked at 150% of estimated capacity from at least 1916 through about the 1960s. This was based on the estimated capacity and the actual use numbers given in those documents {Doc 112}. The EA also states that current management is not responsible for the current conditions and stocking has been light (page 3, and 36). No change is required in the EA.
111. *Capacity was derived using GIS techniques and aerial photos. Making assumptions without on the ground truthing is irresponsible. Providing site specific data only makes GIS techniques more accurate (15).* See the response to comment 2 and 7. Data collected on the ground were entered into GIS, not the other way around. Aerial photos were used to make rough estimates of VSS classes, which were then ground truthed {Doc 48}. Both the present and former permittees participated in ground truthing VSS classes {Doc 3}. The former permittee participated in data collection on the Parker 3-Steps for the Pinedale Allotment {Doc 1B} but declined for the other allotments {Doc 1C}. No change to the EA is required.
112. *I would like the Forest to provide the source of the specific suite of species named in the EA (15).* The sources are two-fold: personal observations and TES. Each species mentioned on pages 2-4, 17, 24 and 36 were mentioned in the TES under the individual soil types, and have been observed and recorded on the Complex. No changed to the EA is required.
113. *The effects to the local economy were not addressed (15).* The effects were addressed on pages 46-49 and 53. See comment 80 for more detail. The EA was not changed.
114. *It appears that the forest in deriving its range conditions is unsubstantiated. Regardless of the classification system, one cannot and indeed must not ignore the Parker Three-Step data by which different outcomes can clearly be drawn (15).* The Forest agrees that Parker Three-Step data is valuable and as stated under Comment 2 and now on pages 4-5, Parker 3-Steps were the first method used to develop a sense of what the range conditions were {Doc 1B, 1C}. The classification system was developed for use with Parker 3-Step clusters.
115. *It does not take a range management specialist to know that visual estimates of production are not an honest way to determine carrying capacities without clipping studies (15).* Clipping studies were used to estimate actual production in some areas, and were used to verify visual estimates here {Doc 48, 87}. However, even the most comprehensive clipping studies are merely sampling techniques that are then extrapolated across the landscape to estimate carry capacity. In other words, all production studies use estimates to map forage production. The visual estimates made by a Team of range and watershed professionals are a valid technique to make estimates over a very large landscape (Range Analysis Technique and Training Guide). Later visits {Doc 13, 82} by different range professionals along with the some of the Team members verified or modified estimates as conditions changed. The latest clipping studies verified earlier reported estimates in the northern pastures {Doc 64}. No change is needed in the EA.
116. *There is no analysis of the effects of the Rodeo-Chediski fire on Forage production (15).* There have been numerous data collected on the Rodeo-Chediski area {Doc 46A, 57A, 57B, 59, 60, 64} that were used in analyzing recent gains in forage production and range condition {Doc 66, 82, 84, 89}. This lead to new estimated carrying capacity {EA, page 5}. No change is needed in the EA.