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Environmental Assessment

Capitan, Coolidge-Parker, Ranger Station Allotments

Globe Ranger District, Tonto National Forest
Gila County, Arizona

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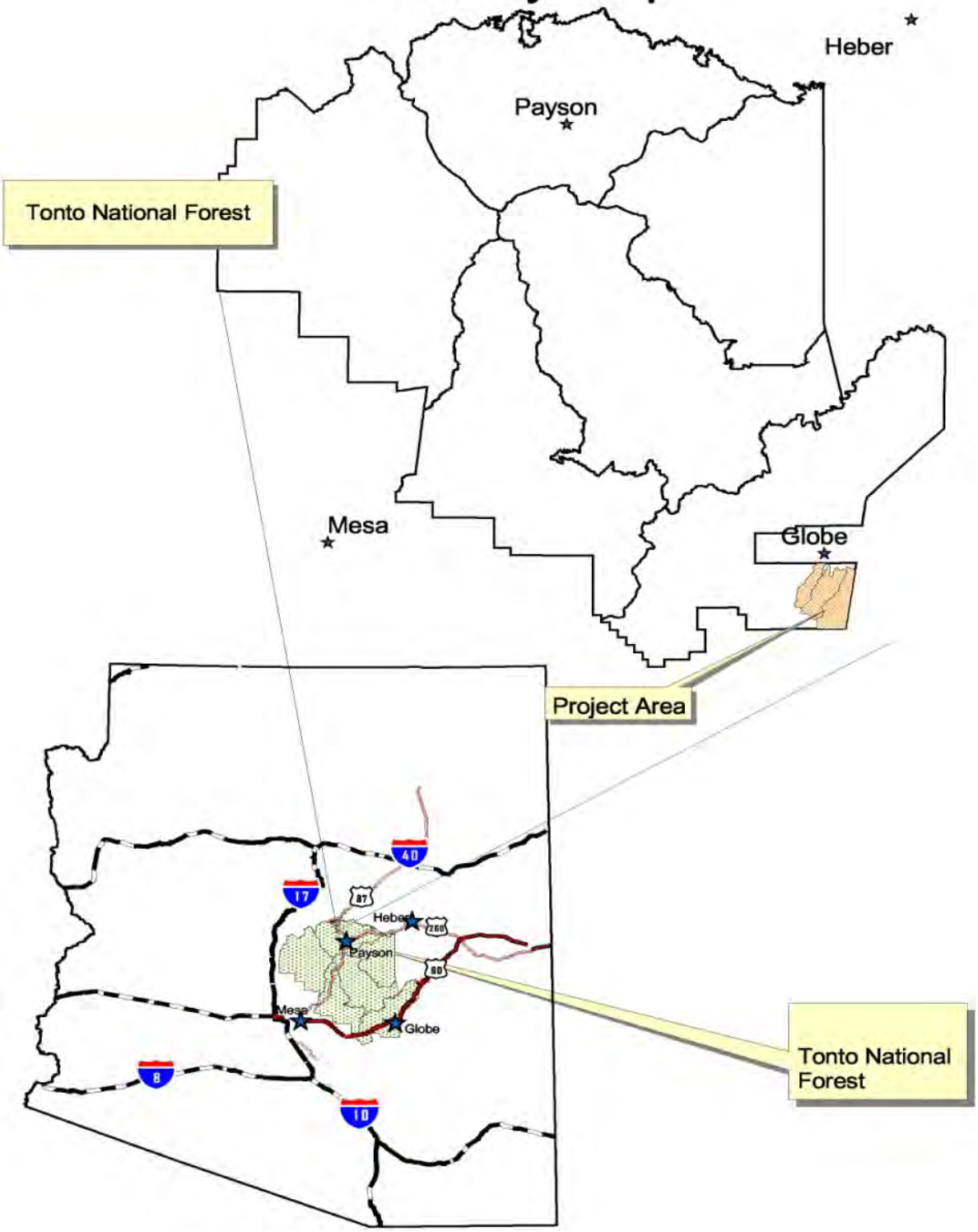

SUMMARY

This grazing analysis encompasses three separate grazing allotments covering approximately 28,550 acres, which include Capitan, Coolidge-Parker and Ranger Station allotments. Currently, they are managed under three separate Term Grazing Permits, one for each allotment. Forest personnel reviewed existing information and collected field data where needed to assess existing condition and develop the purpose and need for action. District Ranger Larry Widner formally initiated the NEPA analysis process in April of 2004. A scoping letter was sent to interested/affected parties to solicit comments from the public concerning the proposed action for all three allotments. Public comments were reviewed in May of 2004 to: (1) analyze comments received from interested/affected parties; (2) define issues with proposed action; and (3) develop alternatives to address the significant issues identified. In March of 2007 District Ranger Lee Thornhill met with permittees to modify this proposal to include adaptive management and monitoring aspects for a more effective and flexible management strategy. District Ranger Thornhill left Globe before completion of this modification and current ranger Richard Reitz has assumed responsibility for completion and subsequent decisions.

CHAPTER 1: INTRODUCTION

Document Structure

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 impacts that would result from the proposed action and alternatives. The document is organized into four parts:

- *Introduction:* includes information on the history of the project proposal, the purpose of and need for the project, and the agency's proposal for achieving that purpose and need. This section also details how the Forest Service informed the public of the proposal and how the public responded.
- *Comparison of Alternatives, including the Proposed Action:* provides a more detailed description of the agency's proposed action as well as alternative methods for achieving the stated purpose. Alternatives were developed based on significant issues raised by the public and other agencies. This discussion also includes possible mitigation measures. Finally, this section provides a summary table of the environmental consequences associated with each alternative.
- *Environmental Consequences:* describes the environmental effects of implementing the proposed action and other alternatives. This analysis is organized by resource area. Within each section, the affected environment is described first, followed by the effects of the No Action Alternative that provides a baseline for evaluation and comparison of the other alternatives that follow.
- *Agencies and Persons Consulted:* provides a list of preparers and agencies consulted during the development of the environmental assessment.
- *Appendices:* provide more detailed information to support the analyses presented in the environmental assessment.

Additional documentation, including more detailed analyses of project-area resources, may be found in the project planning record located at the Globe Ranger District Office in Globe, Arizona.

Background

Allotments in this analysis are located in Gila County, Arizona south of Globe on the north and east slopes of Pinal Mountains. Allotments total approximately 28,550 acres and range in elevation from 3600 feet to 7848 feet in elevation. These allotments fall within Management Areas 2D and 2F as described in the 1985 Tonto National Forest Plan (Tonto NF Plan).

Capitan Allotment

1963-1965- An Allotment Management Plan (AMP) was developed and approved recommending when pastures should be rested using a deferred rotation grazing system. A range analysis indicated 1300 Animal Unit Months (AUMs)[1] or 108 head of adult cattle

[1] AUM is the amount of forage one adult cow will consume in one month

yearlong (CYL) could be grazed. The plan only specified when pastures were to be rested and did not specify when they should be used. From this plan, pastures were to be rested as follows: Hayes and City Well Pasture rested every year from June 1 through October 31, and one of the pastures would be rested each year from first of March through October.

1970- Range analysis indicated improvement in range conditions and soil conditions with a stable or upward trend due to improved management.

1974 to 1976- Production/Utilization (P/U) survey indicated a capacity of 326 AUMs (27 head CYL). At this time very poor vegetative conditions indicated re-evaluation and implementation of prescribed burning or root-plowing to improve conditions. These poor conditions resulted from overstocking in years of low precipitation. However, permitted numbers remained at 2800 AUMs (203 head CYL, 104 yearlings 5 months). In November 1976 a letter was sent to grazing permittee summarizing the P/U survey (Table 1).

Table 1: Actual Use versus Capacity

Year	Actual AUM Use	Indicated Capacity
1974	2693	324
1975	3026	332
1976	3190	659

April 1977- Permittee recognizes need to remove 100 head of livestock from allotment and notifies Forest Office for approval. Approval was granted.

1980- Range inspection noted poor cattle distribution compounded by trespass livestock from a neighboring allotment and tribal lands. Utilization was highest on annual grasses (red brome and six weeks fescue). Perennial grasses were sparse and usually found in protected areas such as embedded in prickly pear cactus. In August 1989 drought was evident; several Globe permittees apply for and receive drought assistance.

1990- Capitan permittee takes non-use for resource protection and removes all livestock.

1991-1999- Permittee adds improvements and gradually rebuilds herd size (herd size is still at 50% stocking levels in 1999). A modified management plan is set in place for better distribution of livestock throughout allotment. Forest Service commends permittee for his efforts in conservation of resources.

2000- Severe drought conditions were prevalent leading to a removal of most livestock on Tonto National Forest (Tonto NF), many voluntarily. From recent Annual Operating Instructions (AOI), management on this allotment has been a deferred rotation grazing system, where each pasture is used each year, but not during the same time period as previous year. AOI use periods average 2-5 months for each pasture. Yearly averages of 528 AUM's have been grazed over the last 14 years.

Present- Forest Service and permittee continue to monitor effects of recent range improvement projects (primarily water development) on resource conditions. It is anticipated

these efforts by permittee in concert with Forest Service will likely improve distribution of livestock and subsequent resource conditions.

Coolidge-Parker Allotment

Prior to 1985 Coolidge and Parker Allotments were managed separately. In 1986 they were combined into one allotment. Records indicate there has been livestock grazing on the allotments since 1917.

1960-1962- Range analysis conducted on Coolidge Allotment determined there were 5420 suitable grazing acres in Coolidge. In addition it was determined that the allotment had a capacity of 497-830 AUM's depending on management. It suggested more AUM's could be added five years in the future if proper management continued. Analysis also determined that 1620 suitable acres in Parker Allotment were in poor or very poor vegetative condition, with an estimated capacity of 180 AUM's.

1963-1964- Permitted livestock numbers were temporarily increased but withdrawn one year later due to poor management and set at 627 AUM's

1974-1976- P/U survey conducted on Coolidge Allotment showed a capacity of 354 AUM's. 55% of grazable area was in very poor vegetative condition and 45% was in poor vegetative condition. It was concluded the allotment would not support livestock grazing.

1977-1978- An EA for Coolidge Allotment was prepared. Based on this analysis, livestock were slowly removed starting in 1979 and were completely removed by 1983.

1982-1983-Another P/U survey was conducted for Coolidge Allotment in a period of above average rainfall. Survey supported re-stocking and capacity was determined to be 250-350 AUM's. Allotment was re-stocked.

1986- Coolidge and Parker Allotment combined and a new AMP issued.

1986-1989-New Term Grazing Permit issued for both allotments for 779 AUM's.

1986-1997- Various P/U studies were conducted including a proposal to increase AUM's to1550. Reports concluded the allotment would support 898 AUM's. However, not all specialists agreed with this assertion. Ultimately, a proposed increase to 1550 AUM's was not granted.

1999-Years of drought have affected range conditions in all allotments. Most available forage becomes unavailable or unusable.

2000-Grazing permittee voluntarily removes all livestock from allotment due to drought.

Ranger Station Allotment

1920 to 1942- Permitted livestock ranged from 35 to 85 head cattle yearlong (CYL), through various temporary increases. In 1939 an agreement was made to temporarily reduce herd size. In 1934-1939, drought contributed to overgrazing creating unsatisfactory range and soil conditions. A 1944 Range Management Plan indicated a need to split the allotment with fencing between upper and lower elevations to ensure better livestock distribution. Taken from 1929 data, a Range Management Plan indicated 15 to 20 burros had been in trespass, but would be removed. The Plan recommended improved livestock distribution and salt placement, providing for yearlong use. Range condition showed a marked improvement. However, in 1944 a Range Management Plan indicated this allotment was in unsatisfactory condition and it was recommended to maintain current management of reduced numbers.

1962 to 1964- A range analysis indicated the majority of suitable acres (2708 acres) were in poor range condition, with an estimated capacity at 336 AUMs (28 head CYL). AMP indicated management should focus livestock use during summer months on higher elevation areas to allow for summer growing season rest in lower elevation areas. A range inspection in April 1964 indicated range improvements were in good condition and management was in compliance, however, there were trespass problems with neighboring private land goats. General range conditions were better than neighboring allotments.

1967 to 1975- Multiple range improvements were installed or improved upon by the permittee. A range inspection in March 1967 indicated over 50% of forage had not been utilized. Curly mesquite had approximately 50% use, bunch grasses and desirable browse had no notable use. A range inspection in May 1968 indicated allotment conditions were improving. Ridge top use was 55-65%, south slopes 45%, north slopes 0-10%, and grasses 0-10%. It was noted that management was in compliance.

1981- A range inspection and Tonto Salting Policy Compliance Survey indicated compliance. Range conditions observed as poor with invader annuals or brush dominating. Range improvements were mostly in good condition. Livestock distribution was good.

1989- A Decision Memo (12/12/89) indicated there had been no grazing in Dr. Fritz pasture for 25 years. Fritz pasture was to be incorporated into Coolidge-Parker allotment, leaving 30 acres with no grazing for administrative studies. Other pasture boundaries were also corrected, including splitting Hayes pasture between Ranger Station and Coolidge-Parker allotments. Fencing was required.

1990- AMP set utilization of forage at 60% and recommended deferred seasonal use of the Mountain pasture. The AMP also established protocols for water developments, fencing, monitoring, inspections, and surveys.

1992 and 1997- rangeland improvements included Deer Trap Corral Brush Treatment Project which accomplished mechanical crushing of eight acres of decadent brush, and cleared brush for a stock driveway.

1995 to 1996- an Environmental Assessment and Biological Assessment were completed. In addition, an AMP was developed and approved recommending deferred rotation on 3

pastures and rest-rotation on the Mountain Pasture with use of 6-months every other year. There was also a range improvement that installed the Doghouse pipeline extension into North East Pasture.

Rangeland Monitoring Summary for Capitan, Coolidge-Parker, and Ranger Station Allotments

In the late 1950's rangeland monitoring began by establishing permanent monitoring sites within key areas on the allotments. This was established ultimately to determine vegetative trends over time. Parker 3-step method cluster sites were designed to be read every 10 years to establish accurate trend analysis. These sites were not read on a regular basis and therefore may not be as useful in determining trend as they were originally designed. However, it does show clearly that there has been a significant change in vegetative composition. This change is consistent across analysis areas and shows big changes in the desert grassland/shrubland component of these allotments. In the last 50 years there has been change from desert grassland to desert shrubland vegetation type. This is generally consistent with a regional shift in vegetation composition as explained by Grover and Musick in 1990. Their conclusions were thought to be a function of: (1) domestic livestock grazing and rodent activity, (2) fire suppression, and (3) changes in climate. A fourth and equally viable hypothesis has to do with the contemporaneous increase in the CO 2 content of the atmosphere experienced over this period. Specifically, it is possible that the antitranspirant and aerial fertilization effects of atmospheric CO 2 enrichment may be favoring shrub growth over that of grasses (Grover and Musick 1990).

In addition to Parker 3-Step monitoring a monitoring program was initiated on Capitain and Coolidge-Parker allotments in 2005 and 2004 respectively. Protocols were established collaboratively by USDA-Forest Service, University of Arizona, University of Arizona's Gila County Cooperative Extension, Natural Resource Conservation Service and local livestock producers. Intent of this data collection is to assist rangeland managers in making timely decisions relative livestock management. Long term vegetative trend can be extrapolated from this data in future. This monitoring program involved selection of key areas (some of which were placed at existing Parker 3_Step locations) and gathering data on vegetative cover density {fetch}, utilization {primarily livestock}, forage production, onsite precipitation data and characterization of soils. This monitoring collection has occurred at most of the sites on an annual basis to present.

Current Management

Capitan Allotment

During 2006 to 2007, range analysis reports indicated stable range and soil conditions with very poor to fair watershed condition ratings as described through Parker 3-step sampling. However, multiple range improvements such as water developments were installed or improved upon by grazing permittee to enhance livestock distribution. Capitan permittees were among the first to begin participating in Reading the Range monitoring, beginning in 2005.

Current permit is issued for 198 cattle year long and 104 yearlings for 5 months. Five saddle horses are included. Most recent use (2012) is 74 cows, 5 bulls, 5 horses, and 11 yearlings (for 5 months). This represents 1107 AUM's. Average numbers since 2006 were approximately 40 cows/ bulls, 10 yearlings, and 5 horses.

Coolidge-Parker Allotment

In September 1985, Mr. Stan Parker of Parker Allotment agreed to sell his livestock and waive his permit to Mr. Larry Huff of Coolidge Allotment. Permits were combined and livestock managed as one herd with one brand.

2004-Allotment re-stocked with a permit issued for 779 AUM's

2004-Present-New monitoring protocols are implemented to augment existing data. Data collection that began in 1950 (Parker 3-Step) continued to be collected. New monitoring data collection is now conducted on a yearly basis in collaboration with the grazing permittee, Forest Service, University of Arizona, and Natural Resource Conservation Service.

The most recent allotment management plan was developed and approved in 1986, when the two allotments were combined and operated together as a single livestock management unit. This plan called for an eight-pasture rest-rotation grazing system, where lower elevation units (Antive, Exchange, 66 and Home Pastures) would be grazed during winter and spring, mid elevation units (CCC, East Harvey and West Harvey Pastures) would be grazed during early summer or fall/winter and mountain unit (Mountain Pasture) would be grazed during summer, generally every other year.

A study completed from 1986 to 1989 indicated fair and upward range condition trend in Hayes, Exchange, and Antive pastures. Rainfall was above long-term averages during these years and prior decade. The study estimated capacity to be a combined 1002 AUM's when all eight pastures were used.

In 1994, the permittee proposed an increase in livestock numbers. A subsequent recommendation from the District Ranger to Forest Supervisor suggested Coolidge-Parker Allotment be issued a new Term Grazing Permit for 85 adult cattle yearlong plus 43 fixed yearlings (through natural increase) January through May for a five year evaluation period. The recommendation of a temporary increase was predicated on installation of additional water sources that would likely improve distribution. This proposed increase was taken under consideration by other resource specialists in an interdisciplinary team approach. In December 1994, the Forest Supervisor announced he would not approve an increase as a result of findings from the interdisciplinary team.

A P/U study conducted from 1996 to 1998 resulted in an agreement to temporarily increase livestock numbers on Coolidge-Parker Allotment to determine if it would support an increase and at the same time move desired resource conditions in an upward trend. This temporary increase was never tested due to an extreme drought period that followed study period.

From 2004 to present several water developments were added to allotment. These improvements are expected to improve livestock distribution in allotment and are likely to change grazing patterns in such a way as to decrease areas of over-utilization of perennial grasses and browse. Additional rangeland improvements were planned for year 2012. Since that time the current permittee has installed several water developments to enhance distribution of livestock. Cooperative range monitoring has been implemented in conjunction with the permittee, Forest Service, Natural Resources Conservation Service and University of Arizona.

In 2011 the District Ranger approved a temporary increase to determine how livestock distribution would respond to completed range improvements. The permittee proposed an increase of 10 head of cow/ calf pairs. Increased monitoring of the allotment has ensued to document resource responses to this increase. Data collection is ongoing.

Recent management has closely followed the current AMP. Mid and lower elevation pastures are generally used 2 months each year, with at least one rested during fall, winter or spring periods. Mountain Pasture has been used during summer in even numbered years for 3.5-4 months. Over the last 16 years, average use has been 512 AUM per year; omitting three years of nonuse, there were 630 AUM's used on average. In the past two years, authorization has been for 65 adult cattle yearlong with 34 yearlings for 5 months. This represents 899 AUM's per year.

Ranger Station Allotment

The most recent allotment management plan was developed in 1996 and incorporated as an amendment in the 1996 Term Grazing Permit, Part 3. This plan prescribes a four pasture rotation system where Mountain Pasture is used for 6 months during the summer every other year and or pastures are used approximately 2-5 months. Use in other pastures is deferred, where use during the following year does not occur during same time period as it occurred in the previous year. Vegetation on allotments varies with elevation which ranges from 3600 ft. to nearly 8000 ft. Within ponderosa pine type and turbinella oak – manzanita type, significant increase in desired vegetation cannot be achieved without a wildfire or adequate prescribed burning. Therefore, at this time no significant improvement in forage can be expected. However, within lower and mid-elevation areas where perennial plants are present, there is potential to move toward specific desired conditions as described in Chapter 3.

Recent management has employed a deferred, rest-rotation grazing system, where one of the three pastures is rested during years Mountain Pasture is used. Current use is 24 cows and 2 bulls yearlong (319 AUM) with an average of 397 AUM over last 15 years. Current permit is issued for 52 head of adult cattle from 1/1/ to 12/31 each year, or 624 AUMs. Most recent use (2012) is 34 cows and 3 bulls for 12 months. This use represents 462 AUM's.

Annual Operating Instructions

Annual operating instruction (AOI) letters are written yearly for each allotment, taking into account various changes from year to year, such as precipitation, in order to best apply

annual grazing prescriptions. These AOI's cannot circumvent standards and guidelines contained in the Forest Plan nor can these AOI's circumvent Allotment Management Plans that are prepared post-Forest Plan to address specific uniqueness's inherent to individual allotments.

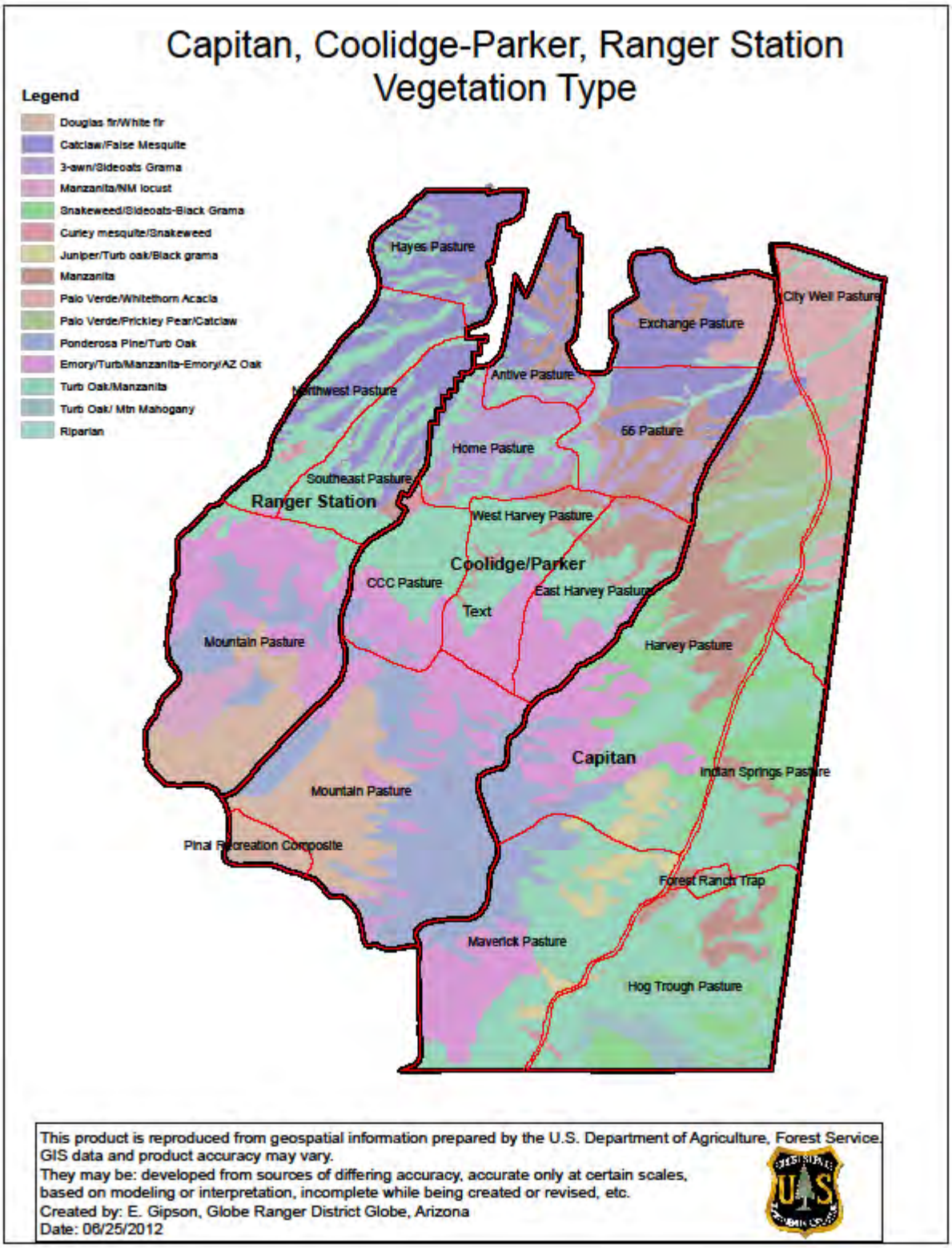

Figure 1: Vegetation map with allotment and pasture boundaries

Purpose and Need for Action

Purpose and need for this proposed action is to authorize livestock grazing in a manner that moves resource conditions toward Forest Plan objectives and desired conditions.

Where consistent with other multiple use goals and objectives there is Congressional intent to allow grazing on suitable lands. These allotments contain lands identified as suitable for domestic livestock grazing in Tonto Forest Plan and continued domestic livestock grazing is consistent with goals, objectives, standards, and guidelines of the Forest Plan.

It is Forest Service policy to continue contributions to economic and social well-being of people by providing opportunities for economic diversity and by promoting stability for communities that depend on range resources for their livelihood.

Proposed Action

In compliance with Forest Service policy and Forest Plan objectives, Globe Ranger District proposes to continue to graze livestock on a year round basis on Capitan, Coolidge-Parker, and Ranger Station allotments. Grazing authorizations would be accomplished through issuance of new 10-year term grazing permits in accordance with FSH 2209.13. New allotment management plans (AMPs) would be prepared included as Part 3 of any new term grazing permits issued. AMPs will describe: 1) management objectives for allotments; 2) livestock management practices, including allowable use levels, necessary to achieve the management objectives; 3) mitigation measures necessary to comply with Forest Plan standards and guidelines and with applicable terms and conditions of biological opinions; and 4) monitoring requirements necessary to determine if management objectives are being achieved. The AMPs will incorporate an adaptive management strategy under which the duration, timing and frequency of grazing, as well as the number of livestock authorized annually, may be continually modified in response to changing resource conditions and achievement of management objectives.

The proposed action is described in more detail in Chapter 2.

Management Direction

Tonto NF Plan identifies the following goals and objectives for range, wildlife, riparian, soils, and water programs on the Forest:

- Maintain a minimum of 30% effective ground cover for watershed protection and forage production, especially in primary wildlife forage producing areas. Where less than 30% exists, it will be the management goal to obtain a minimum of 30% effective ground cover (Page 40-1)
- Forage use by grazing ungulates will be maintained at or above a condition which assures recovery and continued existence of threatened and endangered species (Page 42)
- Provide wildlife access and escape ramps on all livestock and wildlife water developments (Page 42)
- Manage riparian areas to the level needed to provide protection and improvement (Page 42-2)

- Manage for a variety of renewable natural resources with primary emphasis on wildlife habitat improvement, livestock forage production, and dispersed recreation. Watersheds will be managed so as to improve them to a satisfactory or better condition. Improve and manage the included riparian areas (as defined by FSM 2526) to benefit riparian dependent resources (Page 193)
- Manage suitable rangelands at Level D (Page 195). Tonto NF Plan defines Level D as "Management seeks to optimize production and utilization of forage allocated for livestock use consistent with maintaining the environment and providing the multiple use of the range. From all existing range and livestock management technology, practices may be selected and used to develop cost effective methods for achieving improved forage supplies and uniform livestock distribution and forage use. Cultural practices such as brush control, type conversion, fertilization, site preparation and seeding of improved forage species may be used to improve quality and quantity of forage. Cultural practices may be combined with fencing and water developments to implement complex grazing systems and management methods.

The Multiple Use Sustained Yield Act states that management of National Forests must provide "sustained yields in perpetuity without impairment of the productivity of the land" (FSM 2550.1 Authority 1).

FSM 2550.3 policy states "Manage forest and rangelands in a manner that will improve soil productivity".

FSM 2521.03 objectives state "Manage terrestrial ecosystems and NFS watershed to protect soil productivity and hydrologic function. Implement soil and water conservation measures with management activities to maintain satisfactory or optimum watershed conditions."

The primary objective for a decision regarding these allotments is to move toward and eventually attain desired conditions as described in Chapter 3 of this document. If additional tools are needed to mitigate or enhance effects of livestock grazing and management, those tools will be assessed as a supplement to this analysis. Tonto NF land management planning is scheduled to be revised in the near future and may result in changes to desired conditions and objectives described in this analysis.

Decision Framework

Globe District Ranger is the official responsible for decisions regarding management of these allotments. As a result of this analysis process, the District Ranger will issue a decision notice that includes a determination of significance of environmental effects and whether an environmental impact statement (EIS) will be prepared. If the District Ranger determines there are no significant issues warranting an EIS, the decision will be documented in a Decision Notice. Implementation of a decision to continue to authorize livestock grazing would occur through allotment management plans and annual operating instructions. These would include any management actions, mitigation measures, and monitoring requirements necessary to the decision. These documents would also describe permitted numbers of animals, season of use, allowable utilization standards, and the terms of the grazing permit.

If there is a finding of significant impacts, an environmental impact statement will be prepared. The decision will also include a determination of consistency with the Tonto NF

Plan, National Forest Management Act, National Environmental Policy Act, and other applicable laws, regulations, and executive orders.

Public Involvement

The proposal was listed in Schedule of Proposed Actions on February 3, 2003. A scoping document was sent to the public on November 24, 2003, along with a public notice published as a general article in Arizona Silver Belt on December 17, 2003. The purpose of this document and notice was to describe proposed action to any interested/affected parties, and solicit comments from those who may have concerns with proposed action. Proposed Action was sent to the following: 12 individuals, 19 private organizations, 16 tribal officials, 7 state/county officials, 1 federal agency and 3 congressional delegates. From these scoping activities, 4 letters were received. The Forest performed a content analysis on this information and information gained through internal scoping. Comments received and content analysis are located in the Project Record.

Issues

Interdisciplinary team members separated issues into two groups: significant and non-significant issues. Significant issues were defined as those directly or indirectly caused by implementing the proposed action. Non-significant issues were identified as those: 1) outside the scope of the proposed action; 2) already decided by law, regulation, Tonto NF Plan, or other higher level decision; 3) irrelevant to the decision to be made; or 4) conjectural and not supported by scientific or factual evidence. The Council on Environmental Quality (CEQ) NEPA regulations require this delineation in Sec. 1501.7, "…identify and eliminate from detailed study the issues which are not significant or which have been covered by prior environmental review (Sec. 1506.3)…" A list of non-significant issues and reasons regarding their categorization as non-significant may be found in the project record.

There were no significant issues identified by comments received.

CHAPTER 2: ALTERNATIVES, INCLUDING THE PROPOSED ACTION

This chapter describes and compares alternatives considered for this project. It includes a description and map of each alternative considered. This section also presents alternatives in comparative form, sharply defining differences between each alternative and providing a clear basis for choice among options by the decision maker and the public. Some information used to compare alternatives is based upon design of the alternative and some information is based upon environmental, social and economic effects of implementing each alternative.

One comment received addressed economic impacts of individual permittee and economic needs of the community. After reviewing actual number of cattle that had been present during the last 15 years, it was determined that range of animal units to be grazed under the proposed action was nearly the same. Therefore economic impacts would not be measurably changed by the proposed action.

Current management, though thoroughly described, was not analyzed as an alternative because current Allotment Management Plans do not incorporate FSH 2209.13 Chapter 90 adaptive management guidance.

Alternatives

Alternative 1

No Grazing

All three Term Grazing Permits currently authorizing use on these three allotments would be cancelled following guidance in 36 CFR 222.4 and Forest Service Manual 2231.62. Traditionally, twenty percent of permitted numbers on the face of each permit would be removed from allotments each year until no more grazing is permitted (5 years). In the event that all cattle are removed from allotments upon implementation of this decision, due to drought or some or circumstances, permits would be canceled. If a reduced number of cattle were on the allotments due to resource conditions at the time of this decision, 20 percent of that stocking level would be reduced each year until no more grazing is permitted (5 years).

Alternative 2

Proposed Action

It is proposed to graze livestock on a yearlong basis. Management of grazing would periodically adjust timing, intensity and frequency of grazing to allow for increase in perennial forage plants. Timing and intensity of grazing in lower and mid elevation areas would be controlled in order to allow for physiological needs of remnant perennial grass populations. If adjustments are needed, they would be implemented through Annual Operating Instructions, which would adjust numbers so livestock use is consistent with current productivity and sufficient to obtain stated objectives based on monitoring. Total use at end of growing season on herbaceous forage plants (perennial grasses) should generally be within conservative use levels (Holechek et al 1998).

In high elevation pastures no human disturbance or construction activities associated with livestock grazing operations would occur within Protected Activity Centers (PACs) for Mexican spotted owls during breeding season (March 1 through August 31). Utilization of key areas within these pastures would be considered critical areas for monitoring purposes in ponderosa pine/Arizona white oak type and white fir/Douglas-fir/ponderosa pine type.

For purposes of clarification these definitions apply to Alternative 2:

Permitted use: Amount of livestock shown in current Term Grazing Permit for the respective allotments. This livestock number cannot exceed upper range of corresponding AUM's analyzed under Alternative 2. This amount cannot change unless a subsequent NEPA decision invalidates it.

Authorized use: Total number of livestock to be placed on allotment in any given year when Term Grazing Permit is valid as long as it does not exceed permitted use unless an extraordinary circumstance would arise, for example: an invasion of exotic plants could be lessened by intensified grazing pressure or a rangeland reclamation project would be enhanced by increased livestock numbers. This number may change from year-to year depending on localized factors such as changes in forage availability relative to varying climatic conditions.

Authorization of livestock will be dependent upon condition of allotments as defined in this proposed action. Initial authorization and permitted numbers are same. As proposed they are:

Capitan Allotment - 395 AUM up to 2830 AUM
Coolidge-Parker Allotment – 415 AUM up to 779 AUM
Ranger Station Allotment – 324 AUM up to 624 AUM

Proposed Improvements-Mountain Pasture (Coolidge-Parker Allotment)

Sawmill Tunnel Spring: Because existing spring-works at STS have limited utility as a livestock water development, they would be replaced with closed spring-works including a nearby wildlife drinker. New spring-works would be resistant to damage by wildlife and people. Water would be gravity-fed to a wildlife friendly water trough near Sixshooter Canyon, then down-slope to a mid-slope water trough location.

Squaw Spring- Pinal Creek pipeline and water troughs: Construct a pipeline with up to four livestock water troughs. It would begin at Squaw Springs, extend to the cement storage tank near Upper Pioneer Pass Recreation Area, and then parallel Pinal Creek downstream to the Mountain/West Harvey Pasture boundary fence.

Bear Paw Spring: Bear Paw springs needs a new water trough and spring works and perhaps a supplemental water supply. Water from Squaw Spring – Pinal Creek Pipeline may be used as an additional water source for BPS.

Pioneer Pass (Lower Corral) Improvement: Construct a 100-ft. x 100-ft. livestock corral, and 200-250-feet of low-standard access from FR-112 to lower corral. Move water trough and storage tank from lower East Mountain Trailhead to this site. Lower Corral is for temporarily holding livestock for management, which could include transport, medical attention, and other actions.

Pinal Peak Range Improvement: Construct a 100 ft. x 100 ft. livestock corral in the borrow pit and clear a twenty-five foot wide livestock trailing lane (lane) between the corral and recreation area/mountain pasture fence (~500 ft.). Within the lane, clear understory vegetation so livestock can be trailed from Pinal Peak Corral into mountain pasture. During grazing years, cattle will be trucked to Pinal Peak Corral and turned-out into Coolidge-Parker mountain pasture.

Coolidge-Parker Mountain Pasture Boundary Fence: construct a fence between the Mountain Pasture and CCC, West Harvey, and East Harvey pastures to the north.

Proposed Improvements-Mountain Pasture (Ranger Station and Coolidge-Parker Allotment)

Construct pipelines along major ridge lines and place water troughs for livestock and wildlife in functional locations along the ridge tops to improve livestock distribution and wildlife habitat quality. These areas would generally be within 100 feet of ridge tops in flatter, more open areas where improvements could be constructed, maintained, and animals would be likely to use them.

Proposed Improvements-Antive Pasture (Coolidge-Parker Allotment)

Watering facility: Four troughs with above ground pipeline will replace existing stock tanks. Cattle will be managed by turning water off to locations where forage has been utilized.

Corral: a small corral of about one-tenth acre will be built on northern end of Antive pasture. Purpose of corral is to cull out sick animals when needed for medical attention or branding.

Proposed Improvements-West Harvey Pasture (Coolidge-Parker Allotment)

Pipeline: an above ground pipeline to be brought from East Harvey windmill to an existing pipeline in West Harvey pasture, installing three troughs.

Gap stock tank cattle guard: replace wire gate with cattle guard.

Proposed Improvements-66 Pasture (Coolidge-Parker Allotment)

Cattle guard: Replace wire gate with cattle guard at allotment boundary.

Funding: A combination of funding would be used including grants from federal, state, and county agencies, permittee private funds, Forest Service range betterment funds and other opportunities as appropriate.

Alternative 3

Increase in Numbers and Utilization Levels on Coolidge-Parker Allotment

It is proposed to graze livestock on a yearlong basis as described under Alternative 2, including proposed range improvements. For purposes of clarification these definitions apply to Alternative 3:

Permitted use: amount of livestock shown in current Term Grazing Permit in Capitan and Ranger Station allotments. For Coolidge-Parker allotment, permitted use will be livestock numbers that correspond to 1550 AUM's. In all three allotments livestock number cannot exceed upper range of corresponding AUM's analyzed under Alternative 3. This amount cannot change unless a subsequent NEPA Decision invalidates it.

Authorized use: total number of livestock to be placed on allotment in any given year when Term Grazing Permit is valid as long as it does not exceed permitted use. This number may change from year-to year depending on localized factors such as changes in forage availability relative to varying climatic conditions.

Authorization of livestock will be dependent upon condition of allotments as defined in this proposed action. Initial authorization and permitted numbers are same.

Capitan Allotment - 395 AUM up to 2830 AUM
Coolidge-Parker Allotment – 415 AUM up to 1550 AUM
Ranger Station Allotment – 324 AUM up to 624 AUM

Utilization levels are proposed to increase from 30-40% up to 35-45% for Coolidge-Parker Allotment.

Management Common to All Action Alternatives

Adaptive Management

Under both action alternatives, Globe Ranger District would implement best management grazing practices, watershed practices, and activities associated with adaptive management and monitoring strategies to work to resolve any disparities between current conditions and the geographic area's site-specific desired conditions as derived from the Tonto NF Plan.

Adaptive management is defined as a type of natural resource management in which decisions are made as part of an ongoing process. Adaptive management involves planning, implementing, monitoring, evaluating, and incorporating new knowledge into management approaches based on scientific findings and the needs of society. Results are used to modify future management methods.

Under the proposed action and Alternative 3, current Tonto NF Plan direction would guide management. Livestock grazing as well as vegetation management practices on allotments

within this study area would be authorized incorporating adaptive management to meet Tonto NF Plan goals, objectives, standards, and guidelines. An allotment(s) specific defined starting point management that is believed to be capable of maintaining or moving toward desired resource conditions in a timely manner would be implemented. Monitoring would be employed as a tool to evaluate both implementation and effectiveness of management actions. If monitoring indicates that practices are being properly implemented and that resource trends are moving towards meeting desired conditions in a timely manner, management may continue. Livestock management within the analysis area would be implemented by following design criteria and specific actions (adaptive options).

If monitoring indicates that there is a need to modify management practices, adaptive options, as analyzed in the EA, would be selected and implemented following design criteria. In all cases, management would use vegetation management tools that would meet Tonto NF Plan Objectives, Standards and Guidelines, and maintain or move existing resource conditions toward project specific and Geographic Area desired conditions.

Any review of monitoring results would consider changed circumstances and site-specific environmental effects of range improvements in the context of the overall project. Based on the results of interdisciplinary review, the District Ranger would determine whether correction, supplementation or revision of this EA is necessary in accordance with Forest Service Handbook direction at FSH 1909.15(18) and FSH 2209.13(96.1), or whether further analysis under NEPA is required.

Management Practices

Management practices include measures to reduce or avoid resource impacts that are incorporated into the project design. These measures have been used on previous projects and are demonstrated to be effective at reducing environmental impacts. They are consistent with applicable Forest Plan standards and guidelines. Implementation of these practices in combination with the duration, timing and intensity of grazing proposed is intended to avoid the occurrence of adverse environmental impacts.

Soil, Water and Vegetation – the objective is to mitigate effects of livestock grazing and facility construction 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 managed to achieve the goal of light- to conservative-intensity grazing as a pasture average. The objective is to protect plant vigor, provide herbaceous residue for soil protection and to increase herbage producing ability of forage plants. Browse monitoring may also occur in key areas to manage for a utilization guideline of less than 50% browsing on current year's growth.

•In riparian areas, allowable use for obligate riparian trees species – limit use to < 50% of terminal leaders (top 1/3 of plant) on palatable riparian tree species accessible to livestock (usually < 6 feet tall). Deergrass – limit use to < 40% of plant species biomass. Emergent species (rushes, sedges, cattails, horse tail) – maintain six to eight inches of stubble height during the grazing period. Utilization will be measured seasonally, when livestock are in the pasture. Livestock will be moved from the critical area or pasture when recommended guidelines are met.

•Management practices will be used to achieve proper distribution or lessen the impact on sensitive areas. Practices include herding, salting and controlling access to waters. Salt will be placed on good feed, at least one quarter and up to one half mile from waters and salting locations will be moved annually. Placement of liquid or bulk supplements will require prior approval of the District Ranger.

Wildlife – the objective is to mitigate impacts to wildlife from livestock grazing and from disturbance associated with construction and maintenance of range facilities. Construction and maintenance of range improvements and management of livestock will follow guidelines for threatened, endangered and sensitive species along with agency standards and guidelines for general wildlife needs. Compliance with conservation measures described in the Biological Assessment and related concurrence from US Fish and Wildlife Service will also ensure impacts to wildlife are minimized.

Tonto NF Plan direction dictates that all livestock watering troughs be equipped with wildlife ramps for egress and ingress of avian and terrestrial wildlife. Annual Operating Instructions (AOI's) for Capitan, Coolidge-Parker and Ranger Station allotments also addresses this requirement; it states in 2010-2012 AOI's, "Per Tonto Forest Plan, access and escape ramp for wildlife must be installed." This does not address other water storage facilities such as water storage tanks. Nearly all water storage tanks have closed tops that would not allow wildlife entrapment. However, there will be implementation of the same requirements for other water storage facilities that could entrap wildlife, by either exclusion or escape ramps. All water troughs are to be left operational year round for wildlife accessibility unless in limited circumstances where freezing temperatures could do damage to facilities.

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

•Archaeological survey will be conducted prior to construction of any new range improvements and locations selected where impacts to heritage resource sites are avoided.

•Existing range facilities (water troughs, corrals) where cattle regularly congregate are periodically inspected to determine whether livestock are causing damage to heritage resource sites.

•Salting locations are placed outside the boundaries of heritage resource sites.

Monitoring

Effectiveness monitoring includes measurements to track condition and trend of upland and riparian vegetation, soil, and watersheds. Monitoring would be done following procedures described in the Sampling Vegetation Attributes (1999), Utilization Studies and Residual Measurements (1999), Region 3 Rangeland Analysis and Training Guide (FSH 2209.21), and Service wide Rangeland Analysis and Management Training Guide (FSH 2209.14). 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 would occur at least once over the ten-year term of the grazing authorization, or more frequently if deemed necessary. Changes in riparian vegetation and stream channel geomorphology condition and trend will be measured at five to ten year intervals. Protocols

are described in the Sampling Vegetation Attributes (1999), Utilization Studies and Residual Measurements (1999), Cowley and Burton (2005), or the most current acceptable method.

Implementation monitoring would occur yearly and would 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 Sampling Vegetation Attributes (1999), Utilization Studies and Residual Measurements (1999) and with consideration of the Principles of Obtaining and Interpreting Utilization Data on Southwest Rangelands (Smith et al. 2005). These data could include browse utilization measurements, perennial grass stubble height measurements, photo points, or height/weight relationships for certain perennial grass species. Utilization measurements in riparian areas are made following the Sampling Vegetation Attributes (1996), Utilization Studies and Residual Measurements (1996), and Cowley and Burton (2005) or the most current acceptable method and would gather the information described under the proposed action and alternatives.

Utilization would be monitored on key forage species, which are native perennial grasses that are palatable to livestock. At a minimum monitoring would include use in key areas, but may include monitoring outside of key areas. Data collection procedures and interpretation would consider guidance contained in the Principles of Obtaining and Interpreting Utilization Data on Southwest Rangelands (Smith et al. 2005) publication. Over time, changes in resource conditions or management may result in changes in livestock use patterns. Recent and future facility changes and additions i.e. water developments, fences is anticipated to positively affect favorable grazing patterns. Monitoring to detect effect of these facility changes is ongoing and determination of effect has yet been established. 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.

Permittees would be encouraged to participate in monitoring activities. Records of livestock numbers, movement dates and shipping records would be kept by the permittee and would be provided to the District Range Staff annually.

Wildlife Monitoring: Conduct project related MSO monitoring according to USFWS protocols.

Range management related monitoring trips will be spread throughout owl breeding season and limited to 7 or fewer, trips per Protected Activity Center (PAC), annually. Stops to collect range data are generally between 0.5-and-2 hours. Range monitoring will take place during daylight hours when owls are not actively foraging.

Vegetation Monitoring: Key area monitoring would follow procedures described in the Sampling Vegetation Attributes (1999), Utilization Studies and Residual Measurements (1999) and Region 3 Rangeland Analysis and Training Guide. Principles of Obtaining and Interpreting Utilization Data on Southwest Rangeland (Smith et al 2005) should also be used in utilization determinations on herbaceous vegetation. Utilization on browse species is limited to 50% of annual growth on terminal leaders.

Periodic (approximately 8-10 year intervals) monitoring for vegetation trend will include cover and frequency. Parker 3 step plots will be included. If it is concluded through monitoring that pastures have been over utilized or that trend is declining, then adjustments

to timing, intensity and frequency of grazing will be made to move toward desired conditions. If necessary, above ground water developments may be moved to achieve management objectives and improved distribution of cattle.

Riparian Monitoring: Utilization of critical riparian areas will be measured seasonally, while livestock are in pasture. If utilization reaches limits of recommended guidelines, livestock will be moved from critical area or pasture considering time of year and extent of area involved.

In accordance with Forest Service Handbook direction [FSH 1909.15(18) and 2209.13(96)], an interdisciplinary review of the decision will occur within 10 years, or sooner if conditions warrant. If this review indicates management is meeting standards and achieving desired condition, initial management activities would be allowed to continue. If monitoring demonstrates objectives are not being met and management options beyond the scope of the analysis are warranted, or if new information demonstrates significant effects not previously considered, a new proposed action would be developed and further analysis under NEPA will occur.

Comparison of Alternatives

This section provides a summary of the effects of implementing each alternative. Information in the table below is focused on activities and effects where different levels of effects or outputs can be distinguished quantitatively or qualitatively among alternatives.

Attribute	Alternative 1: No Action	Alternative 2: Proposed Action	Alternative 3: Increase in Livestock Numbers
National Forest Policy and Forest Plan (Forest Plan) Consistency	Consistent with Forest Plan. Not consistent with policy (FSM 2202.1, 2203.1).	Consistent with Forest Plan and policy.	Consistent with Forest Plan and policy.
Meets Purpose and Need	Does not meet purpose and need in regard to economic opportunities for local community	Authorizes grazing, Provides for adaptive management to meet management objectives. Meets purpose and need	Authorizes grazing, Provides for adaptive management to meet management objectives. Purpose and need for this proposed action is to authorize livestock grazing in a manner that moves towards Forest Plan objectives and desired conditions. Alternative 3 would likely meet Purpose and Need. Experimentation and trial increases would be needed to determine feasibility of increases.
Effects on Wildlife and Plants	Wildlife: No grazing would provide maximum protection to wildlife habitat from domestic livestock use. Water provided by range developments could be lost, impacting some segments of the wildlife population	Game species and bats are most likely to benefit from new water developments if they are maintained year-round. Acres of MIS habitat affected are small compared with forest-wide acres of habitat available. Effects to MIS species are	Overall effects to wildlife habitat quality are expected to be greater than Alternative 1 or 2. Effects can be summarized as additional food, water, cover, and nesting habitat affected as a result of increased numbers and utilization on

	Plants: With sufficient rainfall there would be up to a 10% improvement in presence of perennial grasses present on allotment	similar to existing condition and too small to alter forest-wide trends. Effects to MSO may include removing or altering vegetation that provides food and cover for prey species removing or altering vegetation that may develop into MSO habitat. Proposed range improvements may exacerbate these effects. Effects to Arizona hedgehog cactus and sensitive species in the area would be similar to effects of current management, which are small.	Coolidge-Parker. Effects to MIS species are too small to alter forest-wide trends for any management indicator species. Overall lower habitat quality is expected for MSO habitat on Coolidge- Parker Allotment. Effects to Arizona hedgehog cactus may be slightly higher than Alternative 2 due to higher numbers of cattle. Effects to sensitive species would increase over effects of Alternative 2.
Effects on soil condition	Amount of time required for recovery from degraded conditions can vary from several years to decades. Some areas will be slow to respond. Unsatisfactory soil conditions are not likely to improve rapidly while impaired soils may recover more quickly.	Success of meeting desired conditions will depend on timely monitoring and cattle management. Overall, light to conservative use should allow most areas to move toward desired conditions. It is possible that degraded conditions may persist in some areas. Improved livestock distribution through proposed developments may help move soils toward desired conditions unless developments are located on degraded or erosive soils.	Effects will be similar to Alternative 2 for Capitan and Ranger Station Allotments. Increased numbers and utilization levels on Coolidge-Parker may make it difficult to ensure that short-term vegetation goals are being met on an annual basis and soils may remain in less than satisfactory condition. Increased utilization levels would not maintain perennial grass production, which would not meet desired conditions for increasing grass vigor and

			production. Recovery of soils in some areas may be slower than under Alternative 2 with potential decrease in water infiltration, aggregate stability, and less soil organic material related to lower perennial plant vigor and production.
Riparian Areas and Stream Channels	Riparian area and stream channel conditions will improve to the greatest extent and at the fastest rate.	Use guidelines and monitoring may allow for recovery of riparian vegetation and improved stream channel conditions. Degraded channels may experience slow recovery and existing conditions may persist. Drought may negate or obscure expected responses of improved management. Construction of range improvements may benefit streams and springs by drawing livestock away from riparian vegetation and stream channels. Removing water may reduce available water for riparian and non-riparian vegetation. With continued drought and higher temperatures, small water sources may have less water available for livestock, wildlife, and vegetation. Should meet intent of Forest Plan if	Effects for this alternative would be the same as effects described for Alternative 2. However, because of the increased numbers, use guidelines may be reached at a faster rate than for Alternative 2, reducing the time cattle may spend in a pasture or area.

		mitigation measures are implemented and successful.	
Heritage Resources	No cattle use, therefore no impact to heritage resources	At the level proposed, cattle grazing would not significantly impact heritage resources.	A proposed increase in numbers on Coolidge-Parker Allotment may cause significant effects and will require further analysis by Tonto NF archaeologists prior to implementation.
Socio-Economics	Removal of the livestock would result in an initial reduction in gross economic returns to the permittee, unless the cattle could be placed on private land.	Personal characteristics such as self-sufficiency, independence, hard work and other traits associated with the ranching lifestyle would likely be protected under this alternative.	Personal characteristics such as self-sufficiency, independence, hard work and other traits associated with the ranching lifestyle would likely be protected under this alternative.
Recreation and Special Management Areas	Would help manage the Pinal Mountain Recreation Area, Management Area 2D, for Visual Quality Objective (VQO) of "Retention". It would enable the Forest provide the Roaded Natural (RN) and Semi-Primitive Motorized (SPM) recreation opportunities called for in Tonto NF Plan. This alternative would ease or eliminate conflicts between recreational use and livestock use in the project area.	Likely to perpetuate or increase conflicts between recreational use, campers and cabin owners, and livestock use. Conflicts could be alleviated by addition of fences to remove developed recreation areas from grazing allotments. Likely to increase cattle impacts to campsites and trails unless salt and mineral blocks, and water troughs, are placed well away from them. In general, proposed range improvements may make it difficult to manage for VQO of "Retention. It may interfere with the Forest's ability to	Same as Alternative 2 with a higher probability of conflict due to higher numbers.

		provide RN and SPM recreation opportunities called for in the Tonto NF Plan unless they are constructed in a manner so as not to be evident to the casual observer.	

CHAPTER 3: ENVIRONMENTAL CONSEQUENCES

This section summarizes physical, biological, social and economic environments of the affected project area and potential changes to those environments due to implementation of alternatives. It also presents scientific and analytical basis for comparison of alternatives presented in the chart above. Complete reports for these topics can be found in the project record for this analysis.

Vegetation

Historic Condition:
Parker 3-step cluster transects read beginning in the late 1950's were used in this analysis to depict vegetative trends relative to perennial grasses, shrubs, half shrubs, and trees. Condition ratings used in the past were not used in this analysis. Although ratings scorecards were entered in the project record early on, these scorecards are likely not a true depiction of current conditions in desert southwest landscapes.

Existing Condition:

Lower areas (3600 feet to 4300 feet)
Broom snakeweed dominates most sites. Understory contains few occurrences of perennial grasses except for occasional 3-awns. Most grass occurs under scrubs. Primary perennial grasses include 3-awn, squirreltail, bush muhly, curly mesquite and sideoats grama. Major forage for livestock is false mesquite (Calliandra). There are isolated areas that contain fair amounts of perennial grasses.

Table 2: Vegetation Type by Allotment and Pasture- Lower Elevation

Vegetation Type	Allotment	Pastures
Blue Paloverde/Whitethorn Acacia Scrubland	Capitan	City Well, Harvey
Blue Paloverde Chainfruit Cholla Scrubland	Capitan	Harvey
Catclaw Acacia/False Mesquite Shrubland	Capitan	Harvey
Catclaw Acacia/False Mesquite Shrubland	Ranger Station	Northwest, Hayes, Southeast
Catclaw Acacia/False Mesquite Shrubland	Coolidge-Parker	66, Antive, Exchange

Catclaw Acacia/False Mesquite Shrubland-This vegetation type is degraded semi-desert grassland. It normally occurs on south facing hills with slopes of 15 to 40%. Elevations range from 3560 to 4400 feet. Mean annual precipitation ranges from 14 to 17 inches.

Key indicator species are catclaw acacia *(Acacia gregii)* and false mesquite (*Calliandra eriophylla*). Or commonly occurring species include velvet mesquite *(Prosopis velutina)*, pricklypear cactus *(Opuntia phaeacantha)*, broom snakeweed (*Gutierrezia sarothrae*), cane cholla (*Opuntia spinosior*),Wright buckwheat (*Eriogonum wrightii*) and barrel cactus (*Ferocactus wislizenii*). Blue paloverde *(Parkinsonia florida)* can occasionally be found on hotter/drier areas of this type. Most of this vegetation type is fairly open except for some heavily used areas where catclaw acacia, catclaw mimosa, or pricklypear may dominate site. Perennial grasses are scarce, occurring only under shrubs. Grasses that can be found include threeawn, bottlebrush squirreltail (*Elymus elymoides*), and bush muhly (*Muhlenbergia porteri*).

Most of this vegetation type has been heavily impacted by domestic livestock. There is almost no forage production from perennial grasses. Forage production from false mesquite can range from 25 to 150 pounds per acre per year. In most places massive sheet erosion is occurring. Under climax conditions, this type should be able to produce around 500 pounds per acre per year.

Catclaw Mimosa Scrubland - This vegetation type is degraded semi-desert grassland. It normally occurs on flats and hills with slopes of 0 to 40%. Elevations range from 3760 to 4500 feet. Mean annual precipitation ranges from 15 to 19 inches.

Key indicator species is catclaw mimosa which dominates most sites with canopy coverage's ranging from 30 to 60%. Other commonly occurring species include catclaw acacia, velvet mesquite, prickly pear cactus, Wright buckwheat, and broom snakeweed. Species that may occasionally occur include redberry juniper *(Juniperus coahuilensis)*, turbinella oak *(Quercus turbinella)*, skunkbush sumac (*Rhus trilobata*), and mountain mahogany (*Cercocarpus montanus*) Perennial grasses are scarce, occurring only under shrubs.

Most of this vegetation type has been heavily impacted by domestic livestock. There is almost no forage production from perennial grasses. In some places massive sheet erosion is occurring, while in areas with a very dense cover of catclaw, the site is somewhat stabilized. Under climax conditions, this type should be able to produce around 500 pounds per acre per year.

Blue Paloverde/ Whitethorn Acacia Scrubland-This vegetation type occurs as semi-desert scrub on flats and low hills. Dominant slopes are less than 30%. Elevations range from 3400 to 3700 feet. Mean annual precipitation ranges from 14 to 17 inches.

Key indicator species are blue paloverde *(Parkinsonia florida)*, whitethorn acacia *(Acacia constricta)*, velvet mesquite *(Prosopis velutina)*, catclaw acacia *(Acacia gregii)*, and pricklypear cactus *(Opuntia phaeacantha).* Other commonly occurring species include broom snakeweed (*Gutierrezia sarothrae*), Christmas cactus (*Opuntia leptocaulis*), hedgehog cactus (*Echinocereus spp.*), barrel cactus (*Ferocactus wislizenii*), and wolfberry (*Lycium spp*.). In a few places false mesquite (*Calliandra eriophylla*) may occur.

Understory is almost completely devoid of perennial grasses except for occasional threeawn *(Aristida spp.)* or other perennial grass. In some places, false mesquite and Wright buckwheat provide a small amount of forage.

Most of this vegetation type has been heavily impacted by domestic livestock grazing. Herbaceous forage production is less than 50 pounds per acre per year. At one time, under climax condition, this type had the potential to produce 350 pounds per acre.

Blue Paloverde/Chainfruit Cholla Scrubland-This vegetation type occurs as semi-desert scrub on south facing hills. Dominant slopes are less than 40%. Elevations range from 3400 to 3700 feet. Mean annual precipitation ranges from 14 to 17 inches.

This vegetation type is dominated by chainfruit cholla (*Opuntia fulgida*). In most cases, canopy coverage of chainfruit cholla is around 30%. Other species include blue paloverde, whitethorn acacia, velvet mesquite, catclaw acacia, pricklypear cactus, broom snakeweed, Christmas cactus, hedgehog cactus, barrel cactus, wolfberry, and false mesquite.

Understory is almost completely devoid of perennial grasses except for an occasional three-awn *(Aristida spp.)* or other perennial grass. In some places, false mesquite and Wright buckwheat provide a small amount of forage.

Most of this vegetation type has been heavily impacted by domestic livestock grazing. Herbaceous forage production is less than 50 pounds per acre per year. At one time, under climax condition, this type had the potential to produce 350 pounds per acre.

Mid-elevation areas (4300 feet to 5500 feet)
Areas are characterized by a low density and diverse composition of grasses with increasing less palatable species. Broom snakeweed/black grama grassland on the Capitan Allotment includes other commonly occurring species such as three-awn and curly mesquite. Most of this vegetation type is open except where catclaw or prickly pear dominates site.

Table 3: Vegetation Type by Allotment and Pasture- Mid Elevation

Vegetation Type	Allotment	Pastures
Curly Mesquite/ Broom Snakeweed	Ranger Station	Northwest
Curly Mesquite/Broom Snakeweed	Coolidge-Parker	Home, CCC
Three-awn/side-oats grama	Coolidge-Parker	Home, Antive, 66, West Harvey, East Harvey
Broom snakeweed/black grama	Capitan	Harvey, Indian Springs, City Well, Hog Trough
Redberry Juniper/Turbinella Oak/Sideoats Grama Woodland	Capitan	City Well, Maverick, Harvey
Emory Oak/ Turbinella Oak/ Manzanita	Capitan	Maverick, Harvey

Turbinella Oak/Mountain Mahogany	Capitan	Hog Trough
Turbinella Oak/Manzanita Chaparral	Capitan	City Well, Indian Springs, Hog Trough, Maverick, West Harvey, East Harvey, Home, Northwest, 66, Antive
Turbinella Oak/Manzanita Chaparral	Coolidge-Parker	66, Antive
Turbinella Oak/Manzanita Chaparral	Ranger Station	Mountain, Southwest, Hays, Northwest
Manzanita	Coolidge-Parker	66, Antive
Manzanita	Capitan	Southwest, Hays
Catclaw Acacia	Capitan	City Well, Indian Springs, Hog Trough, Harvey
Catclaw Acacia	Coolidge-Parker	West Harvey, East Harvey
Catclaw Acacia/ Fairy duster (false mesquite)	Coolidge-Parker	66, Antive
Catclaw Acacia/ Fairy duster (false mesquite)	Capitan	Harvey, Northwest, Southwest, Hays
Catclaw	Capitan	City Well, Indian Springs, Hog Trough

Curly Mesquite/Broom Snakeweed Semi-Desert Grasslands-This vegetation type occurs as semi-desert grassland, normally on clay flats. Dominant slopes are less than 15%. Elevations range from 4280 to 4400 feet. Mean annual precipitation ranges from 15 to 20 inches.

Key indicator species are curly mesquite (*Hilaria belangeri*) and broom snakeweed. Other commonly occurring species include threeawn (*Aristida spp.)*, sideoats grama grama (*Bouteloua. curtipendula*), vine mesquite (*Panicum obtusum*), velvet mesquite, catclaw acacia, and pricklypear cactus.

Most of this vegetation type has been heavily impacted by domestic livestock grazing, affecting the density and composition of perennial grasses and leading to an increase in less palatable species. Most soils are compacted. Herbaceous forage production in most areas ranges from about 50 to100 pounds per acre per year. Under climax conditions, this type should be able to produce around 500 pounds per acre per year.

Three-awn/Sideoats Grama Semi-Desert Grasslands- This vegetation type occurs as semi-desert grassland, normally on flats and hills. Dominant slopes are less than 40%. Elevations range from 3900 to 4300 feet. Mean annual precipitation ranges from 15 to 20 inches.

Key indicator species are threeawn and sideoats grama (*Bouteloua curtipendula*). Other commonly occurring species include black grama (*B. eriopoda)*, hairy grama (*B. hirsuta*), curly mesquite (*Hilaria belangeri*), false mesquite, velvet mesquite, catclaw acacia, pricklypear cactus, desert ceanothus (*Ceanothus gregii*), catclaw mimosa (*Mimosa aculeaticarpa*), Wright buckwheat (*Eriogonum wrightii*) and barrel cactus. Blue paloverde can occasionally be found on hotter/drier areas of this type. Redberry juniper *(Juniperus coahuilensis)* and turbinella oak *(Quercus turbinella)* may occur on cooler/moister sites. Most of this vegetation type is fairly open except for some heavily used areas where catclaw acacia, catclaw mimosa, or prickly pear may dominate site.

Most of this vegetation type has been impacted by domestic livestock grazing, affecting density and composition of perennial grasses and leading to an increase in less palatable species. Annual herbaceous forage production in most areas ranges from about 150 to 300 pounds per acre. A few lightly used areas may produce around 400 pounds per acre. Under climax conditions, this type should be able to produce around 500 pounds per acre per year.

Broom Snakeweed/Black Grama/Sideoats Grama Semi-Desert Grasslands- This vegetation type occurs as semi-desert grassland, normally on flats and hills. Dominant slopes are less than 40%. Elevations range from 3700 to 5000 feet. Mean annual precipitation ranges from 15 to 20 inches.

Key indicator species are broom snakeweed, black grama (*Bouteloua eriopoda)*, and sideoats grama (*B. curtipendula*). Other commonly occurring species include threeawn, , curly mesquite (*Hilaria belangeri*) velvet mesquite, catclaw acacia, pricklypear cactus, desert ceanothus (*Ceanothus gregii*), catclaw mimosa (*Mimosa aculeaticarpa*), Wright buckwheat (*Eriogonum wrightii*) and barrel cactus. Blue paloverde is occasionally found on the hotter/drier parts of this type. Redberry juniper *(Juniperus coahuilensis)* and turbinella oak *(Quercus turbinellab)* may occur on cooler/moister sites. Most of this vegetation type is fairly open except for some heavily used areas where catclaw acacia, catclaw mimosa, or pricklypear may dominate site. On a few flats with heavy clay soil curly mesquite is more common and vine mesquite (*Panicum obtusum*) may occur. Black grama normally does not occur on these clay flats. Parts of this vegetation type were seeded with non-native Lehmans lovegrass (*Eragrostis lehmanniana*) following a wildfire.

Most of this vegetation type has been heavily impacted by domestic livestock. Only slopes greater than 40% or remote locations have improved cover and diversity of perennial grasses. Perennial herbaceous forage production in most of this type is around 50 pounds per acre per year. A very few steep slopes, mostly areas seeded with Lehmans lovegrass, produce 100 to 200 pounds per acre per year. Under climax conditions, this type should be able to produce around 500 pounds per acre per year.

Redberry Juniper/Turbinella Oak/Sideoats Grama Woodland- This vegetation type occurs as somewhat open woodland on south facing hills with slopes of 15 to 60%. Elevations range from 4600 to 5500 feet. Mean annual precipitation ranges from 16 to 22 inches.

Key indicator species are redberry juniper, turbinella oak, and sideoats grama. Other commonly occurring shrubs include sotol (*Dasylirion wheeleri*), red barberry (*Mahonia haematocarpa*), banana yucca (*Yucca baccata*), morman tea (*Ephedra spp*.), prickly pear, and skunkbush sumac, and desert ceanothus. Perennial grasses are sparse but include hairy grama (*Bouteloua hirsuta*), curly mesquite, and three-awn. Parts of this vegetation type were seeded with non-native Lehmans lovegrass following a wildfire.

Most of this vegetation type has been impacted by domestic livestock. Herbaceous forage production in most places is less than 100 pounds per acre per year. A few very steep slopes may produce more than 100 pounds per acre. Under climax conditions, this type should be able to produce 300 to 500 pounds per acre per year.

Turbinella Oak/Mountain Mahogany-This vegetation type occurs on limestone soils on moderately steep to very steep hills and mountains. Elevations range from 4500 to 5300 feet. Mean annual precipitation ranges from 18 to 22 inches.

Key indicator species are turbinella oak and birchleaf mountain mahogany. Other commonly occurring species include skunkbush sumac, sugar sumac (*Rhus ovata*), desert ceanothus, Wright buckwheat, hollyleaf buckthorn (*Rhamnus crocea*), beargrass (*Nolina microcarpa*), and red barberry. Turbinella oak with a canopy coverage of 45% and mountain mahogany with canopy coverage of 25% strongly dominate this type which occurs only within a small limestone outcropping in extreme southeast corner of the allotment.

Understory is normally sparse containing only a few perennial grasses. Species include sideoats grama, hairy grama, bottlebrush squirreltail, junegrass, and plains lovegrass.

Turbinella Oak/Manzanita Chaparral-This vegetation type occurs on moderately steep to very steep plains, hills and mountains on all aspects. Elevations range from 3720 to 5100 feet. Mean annual precipitation ranges from 15 to 22 inches.

Key indicator species are turbinella oak, pointleaf manzanita (*Arctostaphylos pungens*) and pringle manzanita (*A. pringlei*). Other commonly occurring species include catclaw mimosa, birchleaf mountain mahogany, skunkbush sumac, sugar sumac *(Rhus ovata),* desert ceanothus, Wright buckwheat,, and red barberry (*Mahonia haematocarpa*). Scattered redberry juniper occurs throughout allotments. Alligator juniper, (*Juniperus deppena*), Emory Oak (*Quercus emoryi*), and Arizona White Oak (*Q. arizonica*) may occur at higher elevations. Overstory of shrubs is dense, with total canopy coverage of 50 to 90%.

Understory is typically sparse. Normally, key browse species such as mountain mahogany and desert ceanothus occurs in substantial amounts on steep slopes or very rocky areas. On relatively small areas of the allotment this type offers fair browse however, in most areas; browse component is very limited.

High elevation areas (5500ft+)

Table 4: Vegetation Type by Allotment and Pasture- Upper Elevation

Vegetation Type	Allotment	Pastures
Emory Oak/Turbinella Oak/Manzanita Chaparral	Capitan	

Emory Oak/Turbinella Oak/Manzanita Chaparral	Coolidge-Parker	MountainMountain
Emory Oak/Turbinella Oak/Manzanita Chaparral AND Emory Oak/ Arizona White Oak Woodland	Ranger Station	Mountain
Emory Oak/Turbinella Oak/Manzanita Chaparral AND Emory Oak/ Arizona White Oak Woodland	Coolidge-Parker	CCC, West Harvey, East Harvey
Ponderosa Pine/Arizona White Oak	Capitan	Maverick, HarveyMaverick,
Ponderosa Pine/Arizona White Oak	Coolidge-Parker	Mountain, CCC
Ponderosa Pine/Arizona White Oak	Ranger Station	Mountain
Manzanita/ New Mexico Locust Chaparral	Ranger Station	Mountain
White Fir/Douglas Fir/Ponderosa Pine	Coolidge-Parker	Mountain
White Fir/Douglas Fir/Ponderosa Pine	Ranger Station	
White Fir/ Douglas Fir	Ranger Station	Mountain

Emory Oak/Turbinella Oak/Manzanita Chaparral-This vegetation type occurs on moderately steep to very steep hills and mountains. Elevations range from 4600 to 6900 feet. It normally occurs at slightly higher elevations than Turbinella Oak/Mountain Mahogany Chaparral type. Mean annual precipitation ranges from 20 to 24 inches.

Key indicator species are Emory Oak, turbinella oak, Arizona white oak, pointleaf manzanita, and Pringle manzanita. Other common species include alligator juniper, birchleaf mountain mahogany, skunkbush sumac, sugar sumac, desert ceanothus, Wright buckwheat, hollyleaf buckthorn, beargrass and manzanita. Canopy coverage of shrubs normally exceeds 50%.

Understory is normally sparse containing only a few perennial grasses. Species include sideoats grama, bottlebrush squirreltail, and junegrass. Much of this vegetation type contains palatable shrubs including mountain mahogany and desert ceanothus.

Emory Oak/Arizona White Oak Woodland-This vegetation type occurs on moderately steep to very steep hills and mountains. Elevations range from 4600 to 6900 feet. It occurs as a transition between lower elevation chaparral and ponderosa pine forest. Mean annual precipitation ranges from 20 to 24 inches.

Key indicator species are Emory Oak, Arizona white oak, alligator juniper and scattered ponderosa pine *(Pinus ponderosa scopulorum)*. Other common species include birchleaf mountain mahogany, skunkbush sumac, sugar sumac, desert ceanothus, Wright buckwheat, beargrass, pointleaf manzanita and Pringle manzanita. Canopy coverage of shrubs normally exceeds 50%.

Understory is normally sparse containing only a few perennial grasses. Species include sideoats grama, bottlebrush squirreltail, and junegrass. Much of this vegetation type contains palatable shrubs including mountain mahogany and desert ceanothus.

Ponderosa Pine/Arizona White Oak-This vegetative type occurs at higher elevations within the allotment. Elevations range from 4800 to 7400 feet on steep hills and mountains. Mean annual precipitation ranges from 20 to 24 inches.

Key indicators are ponderosa pine, alligator juniper, Arizona oak, and Emory oak. Small amounts of Gambel oak *(Quercus gambelii*) occur on north aspects. Other species present include pointleaf and Pringle manzanita, mountain mahogany and desert ceonothus, blue grama, sideoats grama, mutton bluegrass, dryland sedge (*Carex geophila*), goldenrod (*Solidago spp.*), and a variety of other perennial forbs. Herbaceous vegetation in this type is normally very sparse.

Manzanita/New Mexico Locust Chaparral-This vegetative type occurs within an old burn near Signal Peak. Elevations range from 6300 to 7400 feet on steep hills and mountains. Mean annual precipitation ranges from 22 to 24 inches.

This vegetation type is characterized by dense thickets of Pringle and pointleaf manzanita along with New Mexico locust *(Robinia neomexican)*. Other species may include ponderosa pine and Gamble Oak with occasional Douglas fir *(Pseudotsuga menziesii glauca)* and quaking aspen (*Populus tremuloides*). Little herbaceous production is the result of a dense overstory.

White Fir/Douglas Fir/Ponderosa Pine-This type occurs on steep, north facing slopes or at highest elevations within allotment. Elevations range from 5800 to 7800 feet. Mean annual precipitation ranges from 22 to 30 inches.

Indicator species present include White Fir *(Abies concolor)*, Douglas fir, ponderosa pine, southwestern white pine (*Pinus strobiformis*), gambel oak, and New Mexico locust. Overstory is normally dense and understory herbaceous vegetation is sparse. Soil conditions are generally satisfactory since soils are protected by a thick litter layer. Herbaceous forage production is normally less than 100 pounds per acre but includes small amounts of mutton grass (*Poa fendleriana*) and longtongue muhly *(Muhlenbergia longiligula)*. Included within this vegetation type are small stands of quaking aspen.

Slope

Varying slope of rangelands in this project area is an important contributor to livestock distribution, and thus in determining appropriate stocking rates of livestock. Even though forage is available on steeper slopes it may not be utilized by livestock. Slopes are used less incrementally as steepness increases. In rough, rugged, and steep terrain, cattle congregate on more convenient, flat areas such as valley bottoms, riparian zones, and ridge tops. Forage on slopes over 60% generally receives little or no use (Holechek, 1988).

Table 5: Percent Slope by Acres

SLOPE ACRES/LIVESTOCK ACCESSIBILITY					
ALLOTMENT NAME	SLOPE CLASS				TOTAL ACRES
	0 - 10	10 - 30	30 - 60	60+	

Capitan	2598	21%	5518	45%	3673	30%	401	3%	12190
Coolidge-Parker	1043	10%	4472	42%	4468	42%	714	7%	10698
Ranger Station	428	8%	2291	40%	2451	43%	494	9%	5665
Combined	4069	14%	12280	43%	10591	37%	1609	6%	28553

Desired Condition: grazing by domestic livestock can impact vegetation by changing the mix of species in plant communities (species composition), by changing density and frequency of perennial herbaceous plants (frequency), and by changing vigor of grazed plants. The combined condition of composition, density, and plant vigor can be used to measure condition and trend in rangeland plant communities. Desired conditions for these communities are to:

- Increase cover of native herbaceous species with an ultimate goal of achieving ecosystem potential
- Increase plant basal area and litter cover
- In grasslands, increase foliar canopy cover, basal cover, and vigor of perennial grass species that decrease under grazing pressure
- In chaparral, increase foliar canopy cover and vigor of shrub species preferred by grazing animals
- In pinyon-juniper woodlands, increase all of the above attributes
- For all communities, allow for physiological needs of remnant perennial grass populations

Most of the project area consists of shrub-dominated vegetation types. Research in the southwest has shown that these areas are likely in a state where a change in livestock management alone will not generate appreciable change from current condition. Pieper explains, “Removing livestock from rangelands is unlikely to return these ecosystems [in the Southwest] to their pristine conditions. Many other changes including climatic shifts, increases in woody plant species, reduction in fire frequency and intensity, introduction of alien plant species, and or human activities have occurred, resulting in undetermined impacts on native vegetation. Livestock grazing has played a role in reducing the amount of fuel for wildfires, altering nutrient distribution, acting to create patchiness at landscape levels in the environment for many animal species, and disrupting cryptogamic crusts. However, “domestic livestock grazing at conservative levels appears to be sustainable, even on sensitive western rangelands” (Holechek and Pieper 1992).

Alternative 1-No Action

Effects

Lower Elevations

This alternative provides for taller residual herbaceous cover and benefit species associated with taller perennial grass. It is expected to see improvement of perennial grass production, but overtime natural succession, a tendency for an area to change vegetation over time, and occasional fire will move succession between grass and shrub composition. An increased

perennial grass seed source will allow for competition, post fire, with shrubs, potentially decreasing shrub growth.

Mid-elevations

There will be an increase in perennial grasses in Catclaw Mimosa Scrublands and Broom Snakeweed/Black Grama/Sideoats Grama types with sufficient rainfall. Perennial grass production will improve, but natural succession and occasional fire will have similar effects on vegetation as lower elevations.

Higher Elevations

This vegetation types consists of the steepest slopes and comprises about 5320 acres. Vegetation types have a very low amount of herbaceous vegetation. An improvement of vigor on preferred browse, with continued slight to light use by wildlife, is expected under this alternative.

Cumulative Effects

Other actions impacting vegetation and soil will continue. Herbivory by wildlife species will continue. Monitoring of utilization levels does not discern livestock and wildlife use, and allowable use limits are based on combined forage use.

Prior to 1974 when smelters were retrofitted with scrubbers (air filter equipment) outflow from smelters in the Globe area may have affected vegetation quality. Vegetation studies showed that substantial decreases in herbaceous vegetation occurred on all three allotments in the mid 1970's. This may have been a result of light sulfur precipitating out of smelter discharge, potentially having a fertilizing effect on vegetation at further distances within the outflow path of smelters. It is likely this precipitate affected vegetation in an undesirable much closer to the smelters.

Alternative 2-Proposed Action

Effects

Lower to Mid Elevation Areas

Lower to mid elevations are grazed by cattle primarily during fall, winter and spring. During these seasons, livestock primarily utilize false mesquite and annual grasses. Under a rest rotation system it is expected there will be slight improvement in perennial grasses within 10 years.

Plant community succession will continue with emphasize on shrub and half shrub establishment. In the past 45 years, areas have essentially changed from desert grassland to a desert shrub land. False mesquite, broom snakeweed, and mimosa, are just a few shrubs and half shrubs that increased, while most perennial grasses have decreased.

Under certain circumstances, annual grasses are expected to take grazing pressure off perennial grasses. Livestock must be placed in these areas at precise times, relative to precipitation events, that vary from year to year. Although grazing pressure will be reduced, perennial grasses production is expected to remain static or slightly. Flexibility is important for adjustment of livestock grazing to best meet desired conditions.

In most areas conservative use (30 to 40% as measured at the end of the growing season on upland herbaceous vegetation) is expected to allow vegetation and soil conditions to improve. However, some areas improvement is likely to be slow and short term monitoring may be difficult. Measurements of in-season and end-of-season use may be problematic since key species normally monitored are sparse or absent or occur on steep slopes not accessible by livestock. Particularly, most of Exchange Pasture and northern parts of Antive Pasture are examples of areas where monitoring may be problematic. In these areas very sparse plant and litter covers leads to less than satisfactory soil conditions.

In "Principles of Obtaining and Interpreting Utilization data on Rangelands", Smith et al (2005) indicates differences in utilization of up to10 % is considered non-significant. Variability is important in much of rangeland monitoring. Utilization percentages reaching 50% (40% including 10% variability) places plant production on the edge of plant maintenance rather than maximization of perennial production. This literature and other pertinent documents are taken into account when management decisions are made on allotments. Conservative use is between light and moderate grazing, averaging 35 percent.

Higher Elevations

These vegetation types consist of the steepest slopes on the allotments. Most slopes in this area are greater than 40%. Grazing will confined to narrow stream bottoms and ridge tops. These vegetation types have a very low amount of herbaceous vegetation. Chaparral communities in northern portion of allotments contain fair amounts of preferred browse species of mountain mahogany and desert ceanothus. It is expected there would be no change in vegetation with the Proposed Action.

Cumulative Effects

Desired vegetation condition will likely be achieved in most areas and watershed conditions are expected to be maintained or improved. Grazing may slow or prevent recovery in some degraded areas.

Off highway vehicle use and recreation, roads can slightly effect plant production. Historic brush control with aerial chemical removed brush in the 1960s, since then grass and shrubs have come back. Pinaladera Wildland/Urban Interface Project, a fuels reduction project is slated to be completed in the future and will affect vegetation species in higher elevations. Allowing fire to return in some systems created healthier stands of all vegetation types. Pinal Peak Powerline APS Project will only have minor effects to vegetation where powerlines are maintained. EQIP (Environmental Qualities Incentive Program) projects affect livestock distribution and can help create more uniform utilization throughout pastures. Recent and on-going drought and possible future climate change can also impact conditions.

The Peak Fire (2000) and Mill Two Fire (2010) burned very small portions of Mountain Pasture on Ranger Station Allotment. The Pioneer Fire (2009) burned 1632 acres on Coolidge-Parker and Capitan Allotments.

Historic livestock use and stocking levels have most likely contributed to the existing condition of vegetation. Once herbaceous biomass is removed consistently, affects to plant regrowth and root production decreases. If drought or other natural event occurs, this plant

may not have an ability to recover. Other species, often non palatable, will fill empty niches. Some are cyclical, like snakeweed, and others like mimosa, can dominate a site.

Other actions impacting vegetation and soil will continue. Herbivory by wildlife species will continue. Monitoring of utilization levels does not discern livestock and wildlife use, and allowable use limits are based on combined forage use.

Prior to 1974 when smelters were retrofitted with scrubbers (air filter equipment) outflow from smelters in the Globe area may have affected vegetation quality. Vegetation studies showed that substantial decreases in herbaceous vegetation occurred on all three allotments in the mid 1970's. This may have been a result of light sulfur precipitating out of smelter discharge, potentially having a fertilizing effect on vegetation at further distances within the outflow path of smelters.

Rangelands are adversely affected by drought regardless of condition, but those in fair or poor condition are more adversely affected and recover more slowly than rangelands in good or excellent condition (Howery 1999).

Heavy historic grazing, especially around late 1800's and early 1900's left a lasting impression. Stocking rates have declined markedly since early 1900's with adoption of basic tenets of rangeland management. Livestock numbers declined with adjusted carrying capacity from noticeable shifts in vegetation composition. Secondary results include loss of soil fertility and water holding capacity (Asner, G. and Archer, S. 2010). As livestock grazing continues, recovery is mixed especially with changes in climatic carbon dioxide, temperatures and precipitation fluctuations, which affects soil and vegetation response. Historical overuse by livestock in the lower elevations and flatter terrain of the allotments has led to impaired soil conditions and a reduction in the vigor and diversity of desirable plant species.

Cattle act as a vector for the transportation and seed dispersal of noxious weeds. Disturbance caused by cattle grazing will increase likelihood of noxious weed establishment.

Federal, state and local agency contracts are maintained providing water for wildlife and improved management possibilities for livestock operators.

Climate change and drought affects vegetation response and growth with or without presence of livestock. A recent summary of scientific information provided in Rangelands (Archer and Predick, 2008) projects a likely effect on vegetation composition, diversity, and rate of growth in desert ecosystems, reduce water availability, and trigger soil erosion losses through a reduction in stability as soil moisture content decreases and the intensity of rainfall events increases. Current management continues to remove some vegetative cover through grazing that protects soil and stabilize stream channels from extreme weather events. Predicted climatic changes over the next several years indicate warmer and drier conditions will develop in the southwest.

Alternative 3-Increased Numbers and Utilization

Effects

Low to Mid elevation

Lower to mid elevations are grazed by cattle primarily during fall, winter and spring. During these seasons, livestock primarily utilize false mesquite and annual grasses. Under a rest rotation system it is expected there will be slight improvement in perennial grasses within 10 years.

Plant community succession will continue with emphasize on shrub and half shrub establishment. In the past 45 years, areas have essentially changed from desert grassland to a desert shrub land. False mesquite, broom snakeweed, and mimosa, are just a few shrubs and half shrubs that increased, while most perennial grasses have decreased.

Under certain seasons, annual grasses are expected to take grazing pressure off perennial grasses. Livestock must be placed in these areas at precise times, relative to precipitation events, that vary from year to year. Although grazing pressure will be reduced during active annual growth, perennial grasses production is expected to remain static. Flexibility is important for adjustment of livestock grazing to best meet desired conditions.

An increase of grazing utilization guidelines to up to 45% may potentially affect perennial vegetation. In "Principles of Obtaining and Interpreting Utilization data on Rangelands", Smith et al (2005) indicates differences in utilization of up to10 % is considered non-significant. After season utilization of 45% may increase up to 55% percent before livestock management would be adjusted. According to Holecheck et al (1999), grazing levels greater than 50%, which applies to southern pine forests, humid and annual grasslands, deteriorates in semi desert rangelands. Although this is not the only document used when making management decisions, the implications to perennial grass production is important.

As described by Klipple and Bement in "Grazing Studies, What We Have Learned" (Holecheck 1999), the difference between light and moderate grazing is maximization of herbage production and maintenance, respectively. Conservative use is between light and moderate grazing, averaging 35 percent. Increasing grazing utilization to 45% (and an upper limit of 55%) would not maintain perennial grass production which wouldn't meet desired conditions of increasing grass vigor (and thus production).

Measurements of in-season and end-of-season use may be problematic since key species normally monitored are sparse or absent. Particularly, most of Exchange Pasture and northern parts of Antive Pasture are examples of areas where monitoring may be problematic. In these areas very sparse plant and litter covers leads to less than satisfactory soil conditions. Key perennial herbaceous species that are normally monitored are sparse, absent, or occur in substantial numbers only on steeper slopes (areas not normally established as key areas). Since monitoring is difficult in such areas, increasing the number of cattle could make it difficult to ensure that short-term vegetation goals critical for improving soil condition are being met on an annual basis.

Stocking rates are strongly tied to utilization levels and subsequently plant production. Plant responses to defoliation and related abiotic factors, can decrease above and below ground response. If consistent removal of at least 45% occurs, plant production may decrease. Desert ecosystems commonly have above and below precipitation patterns over several

seasons, affecting plant response to defoliation. It is uncertain if plant production will occur after defoliation.

Higher Elevations

These vegetation types consist of the steepest slopes on the allotments. Most slopes in this area are greater than 40%. Grazing will confined to narrow stream bottoms and ridge tops. These vegetation types have a very low amount of herbaceous vegetation. Chaparral communities in northern portion of allotments contain fair amounts of preferred browse species of mountain mahogany and desert ceanothus. It is expected there would be no change in vegetation with the Proposed Action.

Cumulative Effects

Other actions impacting vegetation will continue. Off highway vehicle use and recreation, roads can continue to effect plant production. Historic brush control with aerial chemical removed brush in the 1960s, since then grass and shrubs have come back. Pinaladera Wildland/Urban Interface Project, a fuels reduction project is slated to be completed in the future and will affect vegetation species in higher elevations. Allowing fire to return in some systems created healthier stands of all vegetation types. Pinal Peak Powerline APS Project will only have minor effects to vegetation where powerlines are maintained. Herbivory by wildlife species will continue. Monitoring of utilization levels does not discern livestock and wildlife use, and allowable use limits are based on combined forage use.

The Peak Fire (2000) and Mill Two Fire (2010) burned very small portions of Mountain Pasture on Ranger Station Allotment. The Pioneer Fire (2009) burned 1632 acres on Coolidge-Parker and Capitan Allotments.

Prior to 1974 when smelters were retrofitted with scrubbers (air filter equipment) outflow from smelters in the Globe area may have affected vegetation quality. Vegetation studies showed that substantial decreases in herbaceous vegetation occurred on all three allotments in the mid 1970's. This may have been a result of light sulfur precipitating out of smelter discharge, potentially having a fertilizing effect on vegetation at further distances within the outflow path of smelters.

Heavy historic grazing, especially around late 1800's and early 1900's left a lasting impression. Stocking rates have declined markedly since early 1900's with adoption of basic tenets of rangeland management. Livestock numbers declined with adjusted carrying capacity from noticeable shifts in vegetation composition. Secondary results include loss of soil fertility and water holding capacity (Asner, G. and Archer, S. 2010). As livestock grazing continues, recovery is mixed especially with changes in climatic carbon dioxide, temperatures and precipitation fluctuations, which affects soil and vegetation response. Historical overuse by livestock in the lower elevations and flatter terrain of the allotments has led to impaired soil conditions and a reduction in the vigor and diversity of desirable plant species.

Cattle act as a vector for the transportation and seed dispersal of noxious weeds. Disturbance caused by cattle grazing will increase likelihood of noxious weed establishment.

Federal, state and local agency contracts are maintained providing water for wildlife and improved management possibilities for livestock operators.

Climate change and drought affects vegetation response and growth with or without presence of livestock. A recent summary of scientific information provided in Rangelands (Archer and Predick, 2008) projects a likely effect on vegetation composition, diversity, and rate of growth in desert ecosystems, reduce water availability, and trigger soil erosion losses through a reduction in stability as soil moisture content decreases and the intensity of rainfall events increases. Current management continues to remove some vegetative cover through grazing that protects soil and stabilize stream channels from extreme weather events. Predicted climatic changes over the next several years indicate warmer and drier conditions will develop in the southwest.

Rangelands are adversely affected by drought regardless of condition, but those in fair or poor condition are more adversely affected and recover more slowly than rangelands in good or excellent condition (Howery 1999).

Desired vegetation condition may not be achieved in most areas throughout allotment. Grazing may slow or prevent recovery in some degraded areas.

Soils

Existing Condition

Capitan Allotment

Table 6: Capitan Soil Condition Class

Category	Acres	Relative Percent
Satisfactory	6,314	52%
Impaired	71	1%
Unsatisfactory & Impaired	605	5%
Unsatisfactory	5,199	43%

Satisfactory - 6,314 acres (52%). These soils are generally found in dense chaparral or ponderosa pine forest, primarily on steep slopes. Within chaparral communities, dense canopy coverage protects soils from erosion; however, interspaces between shrubs may experience excessive erosion.

Impaired- One percent of soils (71 acres) are predominantly impaired. These soils occur in thick stands of catclaw mimosa on slopes ranging from 10 to 45%. Leaves of catclaw provide a thick enough litter cover to protect soil from erosion. In most places excessive erosion has occurred in the past. Few perennial grasses are present and vegetation has shifted towards

more increaser or invader types of species (annual forbs and annual grasses) with poor distribution of litter in the interspaces.

Unsatisfactory and Impaired- About 5% of soils (605 acres) are a mixture of unsatisfactory and impaired. These soils occur in thickets of catclaw. In areas where coverage of catclaw is thick enough leaf litter offers some protection against soil erosion. In other areas, where catclaw density is lighter, there is not enough litter to protect soils and erosion is excessive. In all areas occupied by catclaw, excessive soil erosion has occurred in the past. Few perennial grasses are present and vegetation has shifted towards more increaser or invader type of species (annual forbs and annual grasses) with poor distribution of litter in the interspaces.

Unsatisfactory - 5,199 acres (43%). A large part of unsatisfactory soils occur in flats and hills within semi-desert grasslands. Unsatisfactory soils on flats have high amounts of surface compaction and poor soil porosity and root distribution. Unsatisfactory soils on steeper slopes have moderate compaction but a large amount of sheet and rill erosion. All sites have very poor diversity, density, and composition of perennial grasses with little litter cover.

Coolidge-Parker Allotment

Table 7: Coolidge-Parker Soil Condition Class

Category	Acres	Relative Percentage
Satisfactory	6,580	62%
Impaired	1,984	19%
Unsatisfactory	2,133	20%

Satisfactory soil condition class- Covers about 6,580 acres (62%). These soils are generally found in dense chaparral, ponderosa pine or mixed conifer forest; primarily occurring on steep slopes. Within chaparral communities, dense canopy coverage protects soils from erosion; however, some interspaces are experiencing excessive erosion.

Impaired- Nineteen percent of soils (1,984 acres) are predominantly impaired. These soils occur on grassy slopes or in thick stands of catclaw mimosa on slopes ranging from 10 to 45%. On grassy slopes, perennial grass is dense enough to somewhat control erosion; however, many of these soils have experienced excessive erosion in the past and are armored by rock fragments. In catclaw thickets, leaves of catclaw provide a thick enough litter cover to protect soil from erosion. In most places excessive erosion has occurred in the past. Few perennial grasses are present and vegetation has shifted towards more increaser or invader type of species (annual forbs and annual grasses) with poor distribution of litter in interspaces.

Unsatisfactory soil condition class- 2,133 acres (20%). A large part of unsatisfactory soils occur in flats and hills within semi-desert grasslands, catclaw thickets, or areas dominated by false mesquite. Unsatisfactory soils on flats have high amounts of surface compaction and poor soil porosity and root distribution. Unsatisfactory soils on steeper slopes have moderate

compaction but a large amount of sheet and rill erosion. All sites have very poor diversity, density, and composition of perennial grasses with little litter cover.

Ranger Station Allotment

Table 8: Ranger Station Soil Condition Class

Category	Acres	Relative Percent
Satisfactory	4,024	71%
Impaired	79	1%
Unsatisfactory	1,560	28%

Satisfactory - 4,024 acres (71%). These soils are generally found in dense chaparral, ponderosa pine or mixed conifer forest; primarily occurring are on steep slopes. Within chaparral communities, dense canopy coverage protects soils from erosion; however, in some areas interspaces between shrubs are experiencing excessive erosion.

Impaired- One percent of soils (79 acres) are predominantly impaired. These soils occur on grassy slopes or in thick stands of catclaw mimosa on slopes ranging from 10 to 45%. On grassy slopes grass is dense enough to somewhat control erosion; however, many of these soils have experienced excessive erosion in the past and are armored by rock fragments. In catclaw thickets, leaves of catclaw provide a thick enough litter cover to protect soil from erosion. In most places excessive erosion has occurred in the past. Few perennial grasses are present and vegetation has shifted towards more increaser or invader type of species (annual forbs and annual grasses) with poor distribution of litter in shrub interspaces.

Unsatisfactory - 1,560 acres (28%). A large part of unsatisfactory soils occur in flats and hills within semi-desert grasslands, catclaw thickets, or areas dominated by false mesquite. Unsatisfactory soils on flats have high amounts of surface compaction and poor soil porosity and root distribution. Unsatisfactory soils on steeper slopes have moderate compaction but a large amount of sheet and rill erosion. All sites have very poor diversity, density, and composition of perennial grasses with little litter cover.

Desired Condition: Tonto NF Plan (pg. 44) articulates the following desired conditions for soils:

- Management activities within the desert zone must fully recognize the limitation this unique ecosystem has to the impacts of man's uses and activities.
- The Tonto NF Plan recognizes the need for watershed improvement. The intent of the Plan is to have over 90% of the Tonto NF in satisfactory watershed condition by the end of the 5th planning period. Management direction is to: "Manage vegetation to achieve satisfactory or better watershed conditions."

- Management prescriptions for Management Area 2D are to "…maintain or improve watersheds to a satisfactory or better condition." (Tonto NF Plan). For this analysis, soil condition will serve as a method to assess upland watershed conditions.

- A management prescription for Management Area 2F states "Watersheds will be managed so as to improve them to a satisfactory or better condition..." (Tonto NF Plan)

Forest Service Manual 2550 provides the following direction:

- 2550.1- the Multiple Use Sustained Yield Act states that management of national forests must provide "sustained yields in perpetuity without impairment of the productivity of the land."
- 2550.3-"manage forests and rangelands in a manner that will improve soil productivity."
- 2520.02-"to protect National Forest System watersheds by implementing practices designed to maintain or improve watershed condition, which is the foundation for sustaining ecosystems and the production of renewable natural resources, values, and benefits."

Forest resource managers desire to have all soils in satisfactory condition as described in FSH 2509.18-99 however this is a long-term goal. Complete recovery of all soils is unlikely to occur within ten years. Rates of recovery will differ depending on several factors such as magnitude of past soil loss, inherent soil properties, current vegetative ground cover, and type of ecosystem. Desired condition for soils can be summarized as follows:

- Maintain or improve soils currently in satisfactory condition
- Improve soils in impaired condition so they are attaining or moving towards satisfactory condition
- Improve soils in unsatisfactory condition so they are attaining or moving towards impaired or satisfactory condition

Determination of Effects: Alternatives are contrasted based on likelihood of upland vegetation and soils attaining short and long-term desired conditions described above. Likelihood of attaining desired conditions depends largely on the type of management and stocking rates. Short-term desired conditions limit annual impacts of livestock grazing. Long-term desired conditions are measured through effectiveness monitoring. Generally grazing intensity has a greater influence on impacts to soils and vegetation than timing of grazing.

Livestock grazing can affect soil quality in several ways. Pressure exerted on the soil surface by large animals can cause compaction. As defined by Klipple and Bement (1961) in "Grazing Studies: What we've learned" (Holecheck et al 1999) heavy grazing is a degree of utilization that does not permit forage species to maintain production. Heavy grazing can reduce vegetation and litter cover. These factors can lead to decreased rainfall infiltration,

increased runoff, increased erosion, and reduced soil organic matter and root growth. Grazing can impact vegetation communities by impacting plant species that are more palatable to livestock or those species that are less able to withstand grazing. Changes in soil quality can also affect the productivity and composition of plant communities.

Cumulative Effects Common to all Alternatives

Heavy historic grazing, especially around late 1800's and early 1900's left a lasting impression. Stocking rates have declined markedly since early 1900's with adoption of basic tenets of rangeland management. Livestock numbers declined with adjusted carrying capacity from noticeable shifts in vegetation composition. Secondary results include loss of soil fertility and water holding capacity (Asner, G. and Archer, S. 2010). As livestock grazing continues, recovery is mixed especially with changes in climatic carbon dioxide, temperatures and precipitation fluctuations, which affects soil and vegetation response. Historical overuse by livestock in the lower elevations and flatter terrain of the allotments has led to impaired soil conditions and a reduction in the vigor and diversity of desirable plant species.
Current management, in some cases, has prevented or slowed recovery.

Other actions occurring in the project area that can impact soils and vegetation include off highway vehicle use, recreation, roads, historic aerial application of chemicals for brush control, the Pinaladera Wildland/Urban Interface Project (fuels reduction), Pinal Peak Powerline (APS) Project, and EQIP Projects. Recent and on-going drought and possible future climate change can also impact conditions.

The Peak Fire (2000) and Mill Two Fire (2010) burned very small portions of Mountain Pasture on Ranger Station Allotment. The Pioneer Fire (2009) burned 1632 acres on Coolidge-Parker and Capitan Allotments.

A long history of livestock grazing has most likely contributed to the existing condition of watersheds and stream channels. The existing soil conditions on many of the flatter, more accessible portions of these allotments are less than satisfactory and this has reduced their ability to function. It is likely that much of the degraded condition is attributable to historic grazing management.

Alternative 1 - No Grazing

Effects

Most rapid rates of recovery from past grazing normally occur with complete protection from grazing. The amount of time required for complete recovery after degradation can vary from several years to decades depending on severity of soil impacts and abiotic factors.

Unsatisfactory and impaired soils are largely attributable to effects of historic grazing. Even with complete rest, areas in unsatisfactory condition will improve slowly. Soils in impaired condition would recover more quickly. Erosion rates on some highly erosive soil may remain excessive for many years until enough ground cover is reestablished in order to slow erosion. Some areas that are likely to be slow to respond include:

(1) Areas on Gila Conglomerate soils with Catclaw Acacia/False Mesquite vegetation, occurring on all 3 allotments, totaling 3000 acres. Erosion is excessive with sparse vegetation trapping some sediment but not enough to stabilize the site. These sites are likely to remain unstable for years.

(2) Lower elevation, many gentler slopes and flatter areas on all three allotments have sparse cover of herbaceous vegetation.

Cumulative Effects

Removal of livestock improve watersheds to a satisfactory or better condition, improve soil productivity and move soil conditions to, at least, satisfactory.

Lack of perennial grasses and litter cover is limiting ability of soils to rebuild their supply of organic matter. For soils to recover, compacted layers must be allowed to achieve bulk density near 15% of normal. Critical for recovery is buildup of organic matter from both surface litter and a dense network of plant roots, primarily perennial grasses.

In absence of livestock, compaction is decreased and water infiltration increased by increased soil aggregate stability and soil nutrient retention (Castellano and Valone 2009). Many studies suggest sufficient time and removal of livestock will increase perennial grass re-establishment, assuming a grass seed source is present and readily available.

Alternative 2 – Proposed Action

Effects

In most areas conservative use, 30-40%, on upland herbaceous species is expected to allow soil conditions to improve. Throughout much of these allotments, very sparse plant and litter cover indicates less than satisfactory soil conditions. In combination with other adaptive management techniques, such as herding, salting and culling, increased plant production, litter cover and plant vigor may occur. Above ground production affects soil stability, water infiltration by organic matter integration.

Lighter utilization on herbaceous and woody species, an adaptive management tool, may increase plant productivity and stabilize steeper slopes. Herding may also reduce livestock trailing, which creates opportunities for more erosion. Highly erosive soils, considered sensitive areas, may be difficult to achieve desired conditions. Of particular concern are moderately steep to steep slopes occurring on Gila Conglomerate with Catclaw Acacia/False Mesquite vegetation. Soil condition on these slopes is unsatisfactory because sheet and rill erosion is excessive and soil is moving off site. Vegetative ground cover is minimal and ineffective in controlling soil movement. Evidence of soil movement includes large amounts of soil being deposited on uphill sides of plants (especially false mesquite), large areas of eroding bare soil, erosion pavement, and lack of adequate perennial bunch grasses and desirable forbs. Sparse cover of false mesquite is providing limited soil protection and is insufficient to prevent continued degradation of soil resources. In these areas continued grazing on false mesquite may lead to slower recovery, no improvement, or further degradation of these soils. Trailing by livestock on these slopes or removal of limited plant material that helps to slow erosion can lead to continuing high amounts of soil loss. Given

existing degraded conditions in some areas, it is also possible that degraded conditions may persist in those areas.

Use of adaptive management tools, such as season of grazing, may decrease opportunity of soil compaction. Livestock hoof action, especially during wet seasons, can compact soils. Compaction restricts rooting depths, decreases infiltration which increases runoff, and increase risk of water erosion (NRCS, 1996). Trailing by cattle on steeper slopes can physically displace soils, leading to erosion. Cattle tend to concentrate on flatter areas especially if they are fairly open. Impaired and compacted soils are found on gentler, flatter slopes. Holechek (1992) reports that cattle tend to use 10 to 30% slopes thirty percent less than 0 to 10% slopes and 30 to 60% slopes sixty percent less than flats. Slopes over 60% are seldom used.

By increasing or maintaining forage production and litter results in protective soil cover. Recent and historic loss of vegetation and litter reduces infiltration and exposes the soils to raindrop impact and overland flow, leading to soil crusting and increased erosion. Reduced cover results in a loss of soil organic matter and reduction in soil microbes, which play a big role in nutrient cycling. Soils that are lower in organic matter have poorer structure which can also affect infiltration and root growth.

Direct effects of EQIP projects are very minor but indirect effects are greater, both positive and negative. Positive effects are a better distribution of cattle as a result of water developments. Negative effects would occur when waters are developed in areas of erosive soils

Cumulative Effects

Off highway vehicle use, recreation, roads, and historic aerial application of herbicides represent small and localized disturbances. Pinaladera Wildland/Urban Interface Project represents short term, 1 to 3 years, increases in soil compaction and erosion and nearly all fuel reduction treatments occur where soil conditions are currently satisfactory. Effects of Pinal Peak Powerline project are small and localized and not likely to contribute to cumulative effects.

The Peak Fire and Mill Two Fire burned less than 100 acres of Mountain Pasture on Ranger Station Allotment. Overall cumulative effects of these fires are small. Pioneer Fire burned 1632 acres on the Coolidge-Parker and Capitan Allotments. Most of the fire was in Mountain Pasture of Coolidge-Parker Allotment and Harvey and Maverick Pastures of Capitan Allotment. The burn was mostly on slopes greater than 40% in ponderosa pine vegetation. Since most of the burn occurred outside of areas normally grazed, the cumulative effects on grazing lands were small.

Soil conditions that are unsatisfactory or impaired are largely attributable to historic grazing. Management prescriptions, especially related to sensitive soil areas, are followed, would minimize effects and desired conditions of soils will slowly be achieved and watershed conditions are expected to be maintained or improved. However, as mentioned above, grazing may slow or prevent recovery in some degraded areas.

Studies suggest that grazing under conservative management practices, the impact of livestock grazing on sediment movement is minimal (Daniel 2001).

Studies suggest that light grazing is the most sustainable {organic carbon} grazing management system for northern mixed grass prairies (Gangegunte et al, 2005).

Soils from moderately grazed meadows showed highest microbial count and enzymatic activity, whilst intensively grazed meadows showed lowest microbial activity and enzyme activities (Singh and Sanjeeva 2004).

Overall this alternative is likely to reach desired conditions slower than the No Grazing Alternative.

Alternative 3 – Increase in numbers and utilization

Effects

On Coolidge-Parker allotment, increased utilization levels of 35-45% and up to 1550 AUMs will show a decrease in plant productivity and overall range condition.

Lighter utilization on herbaceous and woody species, an adaptive management tool, may increase plant productivity and stabilize steeper slopes. Herding may also reduce livestock trailing, which creates opportunities for more erosion. Highly erosive soils, considered sensitive areas, may be difficult to achieve desired conditions. Of particular concern are moderately steep to steep slopes occurring on Gila Conglomerate with Catclaw Acacia/False Mesquite vegetation. Soil condition on these slopes is unsatisfactory because sheet and rill erosion is excessive and soil is moving off site. Vegetative ground cover is minimal and ineffective in controlling soil movement. Evidence of soil movement includes large amounts of soil being deposited on uphill sides of plants (especially false mesquite), large areas of eroding bare soil, erosion pavement, and lack of adequate perennial bunch grasses and desirable forbs. Sparse cover of false mesquite is providing limited soil protection and is insufficient to prevent continued degradation of soil resources. In these areas continued grazing on false mesquite may lead to slower recovery, no improvement, or further degradation of these soils. Trailing by livestock on these slopes or removal of limited plant material that helps to slow erosion can lead to continuing high amounts of soil loss. Given existing degraded conditions in some areas, it is also possible that degraded conditions may persist in those areas.

An increase of grazing utilization guidelines to up to 45% may potentially affect perennial vegetation. Short term plant responses to defoliation and related abiotic factors, can decrease above and below ground response, affecting root growth. Long term responses affect soil infiltration, aggregate stability and decrease soil organic matter. These responses create varying types of soil erosion and loss of top soil horizons.

In “Principles of Obtaining and Interpreting Utilization data on Rangelands”, Smith et al (2005) indicates differences in utilization of up to10 % is considered non-significant. After season utilization of 45% may increase up to 55% percent before livestock management would be adjusted. According to Holecheck et al (1999), grazing levels greater than 50%, which applies to southern pine forests, humid and annual grasslands, deteriorates in semi desert rangelands. Although this is not the only document used when making management decisions, the implications to perennial grass production and subsequent soil condition is important.

Use of adaptive management tools, such as season of grazing, may decrease opportunity of soil compaction. Livestock hoof action, especially during wet seasons, can compact soils. Compaction restricts rooting depths, decreases infiltration which increases runoff, and increase risk of water erosion (NRCS, 1996). Trailing by cattle on steeper slopes can physically displace soils, leading to erosion. Cattle tend to concentrate on flatter areas especially if they are fairly open. Impaired and compacted soils are found on gentler, flatter slopes. Holechek (1992) reports that cattle tend to use 10 to 30% slopes thirty percent less than 0 to 10% slopes and 30 to 60% slopes sixty percent less than flats. Slopes over 60% are seldom used.

Increased vegetation removal by livestock results in a loss of protective soil cover, including litter. Loss of vegetation and litter reduces infiltration and exposes the soils to raindrop impact and overland flow, leading to soil crusting and increased erosion. Reduced cover results in a loss of soil organic matter and reduction in soil microbes, which play a big role in nutrient cycling. Soils that are lower in organic matter have poorer structure which can also affect infiltration and root growth.

As described by Klipple and Bement in "Grazing Studies, What we have learned" (Holecheck 1999), the difference between light and moderate grazing is maximization of herbage production and maintenance, respectively. Conservative use is between light and moderate grazing, averaging 35 percent. Increasing grazing utilization to 45% (and an upwards of 55%) would not maintain perennial grass production which wouldn't meet desired conditions of increasing grass vigor (and thus production).

Stocking rates are strongly tied to utilization levels and plant production. If consistent removal of at least 45% occurs, plant production may decrease. Desert ecosystems commonly have above and below precipitation patterns over several seasons, affecting plant response to defoliation. It is uncertain if plant production will occur after defoliation.

Hoof impact by grazing stock will measurable affect the crypotogamic community even under moderate stocking policy (Hodgkins and Rogers 1997).

Cumulative Effects

Soil condition in relation to climate change and drought affects the associated plant recovery and potential invasion of non-desirable species, with or without livestock. A recent summary of scientific information provided in Rangelands (Archer and Predick, 2008) projects a likely effect on vegetation composition, diversity, and rate of growth in desert ecosystems, reduce water availability, and trigger soil erosion losses through a reduction in stability as soil moisture content decreases and the intensity of rainfall events increases. Predicted climatic changes over the next several years indicate warmer and drier conditions will develop in the southwest. Natural plant cycles transport air into the soil, which improves soil microbial processes, which assists in breaking down materials. Conversely, plant stress will provide less nutrients to soil microbes and decrease soil organic matter.

Heavy historic grazing, especially around late 1800's and early 1900's left a lasting impression. Stocking rates have declined markedly since early 1900's with adoption of basic

tenets of rangeland management. Livestock numbers declined with adjusted carrying capacity from noticeable shifts in vegetation composition. Secondary results include loss of soil fertility and water holding capacity (Asner, G. and Archer, S. 2010). As livestock grazing continues, recovery is mixed especially with changes in climatic carbon dioxide, temperatures and precipitation fluctuations, which affects soil and vegetation response. Historical overuse by livestock in the lower elevations and flatter terrain of the allotments has led to impaired soil conditions and a reduction in the vigor and diversity of desirable plant species.

Hydrology/ Riparian

Existing Condition:

Capitan Allotment

Capitan Allotment lies entirely within Gilson Wash 5th code watershed just east of Pinal Creek and its watershed boundary. It includes the ephemeral headwaters of Gilson Wash and other drainages that flow only in direct response to precipitation. Named drainages within the allotment include Spring Branch Creek and Arrastra Gulch.

Key reaches, similar to upland key areas (Sampling Vegetation Attributes (1999), Utilization Studies and Residual Measurements (1999)), are stream channels/ springs/ riparian areas that are representative, responsive to changes in management, accessible to livestock, and contain key species. Key reaches are synonymous with designated monitoring areas (DMA's) defined by Burton et al. (2008) as the location where monitoring occurs.

Arrastra Gulch was selected as the only key reach for this allotment. Two riparian stream reaches were assessed within Arrastra Gulch and adjacent to springs.

Table 9: Capitan Streams and Condition

Stream Name	Pasture	Condition
Arrastra Gulch #1	Indian Springs	Unstable
Arrastra Gulch #2	Indian Springs	Severely Impaired

Arrastra Gulch originates on the north side of East Mountain and drains east approximately three miles through the allotment to the Forest boundary. It then crosses the San Carlos Indian Reservation to its confluence with Ranch Creek. FR 2270 parallels and runs in the creek for approximately a mile east of the highway, contributing sediment and impacting stream channel and floodplain shape and function.

The lower mile of Arrastra Gulch is intermittent and supports riparian vegetation. The channel above this is ephemeral. Two channel assessments were done on the intermittent stream channel in 2002. The first reach, approximately 0.25 mile long lies between FR 2270 and the reservation boundary. The channel is wide and in some places divided by mid channel bars. There are no distinguishable bank features. Dominant sediment is cobble imbedded with large amounts of sand, probably coming from road and uplands. It was assessed as an "F" type in unstable condition. Overall riparian vegetation diversity and cover is low. Dominant riparian vegetation is pole and larger size Arizona sycamore. Desert

broom is common. Vegetative diversity and potential for recovery increase at the lower end of this reach (approximately 100 feet above the Forest boundary fence). Goodding's willow (indicating higher water table), velvet ash, California buckthorn and a few deergrass plants occur. Similar conditions extend downstream onto reservation lands.

Reach 2 is from FR 2270 upstream approximately 0.5 mile. This reach is a single channel, but still wide and shallow. Dominant sediment is also cobble imbedded with large amounts of sand. The edge of the channel is dominated by cobbles and boulders, and is mostly not alterable. There are some areas of finer sediment forming incipient banks that could be impacted by livestock trampling. The reach was assessed as an "F" in severely impaired condition. Vegetation is similar to the downstream reach. Fremont cottonwood occurs, in addition to sycamore, ash and Goodding's willow. Deergrass is more common, although cover remains low. Seep willow and desert baccharis is also present.

Very little recruitment of tree seedlings or deergrass is occurring. This lower reach has potential for increased woody species age class diversity, and higher cover of both ground, mid- and upper level canopy cover. Stream channel geomorphology changes (narrowing and deepening channel, building floodplains) will follow more slowly. These changes should result in increased areas of surface flow and lengthening of the riparian zone.

Two springs that were inventoried on the allotment have significant riparian vegetation and show potential to develop into larger riparian areas. The springs, Greer Spring and Branch Creek Spring, should be evaluated as possible key reaches.

Table 10: Water Sources Capitan Allotment

Pasture	# of Tanks	# of Springs	# of Wells
City Well	1	0	1 (City of Globe)
Indian Springs	3	3	0
Hog Trough	4	8	1
Maverick	0	0	5
Harvey	3	4	1

Coolidge-Parker Allotment

Coolidge-Parker Allotment lies mostly within Pinal Creek 5th code watershed. The northeastern portion of the allotment is in Gilson Wash 5th code watershed. The headwaters of Pinal Creek originate on the allotment in the Pinal Mountains. The major tributary within the allotment is Sixshooter Canyon. Pinal Creek in CCC and Home Pastures and the northern reach in West Harvey Pasture and Sixshooter Canyon just above its confluence in CCC Pasture were selected as key reaches for this allotment.

Stream channel condition was assessed for Pinal Creek in the vicinity of Home, West Harvey, and lower CCC Pastures. The channel is wide and shallow with boulders and cobble imbedded with gravel. Flow regime is intermittent, but may have some interrupted perennial stretches. It is a "B" type stream in impaired condition. There is Arizona sycamore, Goodding's willow, Fremont cottonwood and walnut. Older trees are dominant, but seedlings and saplings are present, and appeared to have increased in number between 2002

and 2007. Seep willow, desert baccharis, false indigo, net leaf hackberry, coyote willow, hummingbird trumpet and salt cedar are present. Deergrass, monkey flower, rushes and sedges are present with low cover. Riparian vegetation in Sixshooter Canyon above the confluence with Pinal Creek is similar to the downstream reach of Pinal Creek.

According to National Wetland Inventory (NWI) maps, there are no perennial reaches on Coolidge-Parker Allotment. There are no stream channels with riparian vegetation in Exchange, 66, Antive or Home Pastures. Remaining pastures contain about 4 miles of stream channels with riparian vegetation mapped by NWI. There are long headwater reaches of Pinal Creek and Sixshooter Canyon that have no NWI delineations that may have intermittent reaches and scattered vegetation. These stream delineations have been revised to show intermittent channels based on field visits. There is no information for many of these reaches.

Table 11: Coolidge-Parker Stream and condition

Stream Name	Pasture	Condition
Icehouse Canyon	Home	Unstable
Pinal Creek	CCC	Impaired
Pinal Trib	66	Unstable
Sixshooter Canyon #1	CCC	Impaired
Sixshooter Canyon #2	CCC	Stable

Pinal Creek: Pinal Creek is an intermittent stream that originates in the Pinal Mountains near Pioneer Pass. It flows north for approximately six miles through the center of the allotment in Mountain, West Harvey, CCC, Home, and 66 Pastures. It then continues north downstream to its confluence with the Salt River.

Mountain Pasture: The road to Pioneer Pass parallels about 1.5 miles of Pinal Creek's headwater channel. Coniferous trees dominate the stream channel with occasional Arizona sycamores. Herbaceous vegetative cover is moderately high, consisting of annuals, seeded grasses and native perennials. The channel is in a gentle valley bottom and easily accessible to recreationists and livestock. Utilization has not been monitored. The lower 1.5 miles of Pinal Creek in the Mountain Pasture lie in a steep, narrow canyon. Some of this reach appears inaccessible to livestock, but there is no data on livestock patterns of use in this reach.

West Harvey and Home Pastures: Pinal Creek flows from the Mountain Pasture into West Harvey Pasture. There is no data for this 1.5 mile-long reach. It is not accessible by road. A trail is located nearby. NWI maps do not delineate either a flow regime or riparian vegetation for this reach.

The creek then crosses into CCC Pasture for about 0.5 mile, and then back into the extreme northwest corner of West Harvey Pasture. Many of the fences in the area were not continuous, making pasture determinations difficult.

Stream channel condition was assessed for Pinal Creek in the vicinity of Home and West Harvey Pastures. The channel is wide and shallow with boulders and cobble imbedded with gravel. Flow regime is intermittent, but may have some interrupted perennial stretches. It is

a "B" type stream in impaired condition. There is Arizona sycamore, Goodding willow, Fremont cottonwood and walnut. Older trees are dominant, but seedlings and saplings are present, and appeared to have increased in number between 2002 and 2007. Seep willow, squaw waterweed, false indigo, net leaf hackberry, coyote willow, hummingbird trumpet and salt cedar are present. Deergrass, monkey flower, rushes and sedges are present with low cover. Adjacent side slopes have a dense cover of chaparral species.

CCC Pasture: Pinal Creek through CCC Pasture for about 0.5 miles to its confluence with Sixshooter Canyon, and then jogs east back into West Harvey Pasture. Riparian vegetation is similar to that described for West Harvey/Home Pastures. The area is accessible to livestock and light use was observed in 2007, mostly on squaw waterweed.

66 Pasture: An assessment was done on an unnamed tributary to Pinal Creek just above the private property in 66 Pasture. The road runs parallel to and supplies sediment to the creek. Recreation impacts were evident. The stream is an "F" type with gravel as the dominant sediment. It was rated as unstable due to large eroding cutbanks and little vegetative cover. There were some old Fremont cottonwood and net-leaf hackberry trees, many of which are dying, possibly from drought. There were a few cottonwood seedlings and deer grass plants in the channel.

Sixshooter Canyon: Sixshooter Canyon is an intermittent stream that originates on Signal Peak and flows north about 5.5 miles to its confluence with Pinal Creek. It flows through Mountain and CCC Pastures.

Mountain Pasture: NWI maps delineate 0.5 miles of Sixshooter Canyon's 2.5 miles as broadleaf deciduous forest. All of Sixshooter Canyon in Mountain Pasture is in a steep, narrow canyon. This reach is accessible by Forest Service Trail 197. There is no data available for this reach on accessibility, use or type of vegetation.

CCC Pasture: All of Sixshooter Canyon is mapped as intermittent with riparian vegetation (NWI). A vegetation inventory in was completed in 1992. It is dominated by Arizona sycamore with representation of all age classes. New Mexico locust, Goodding willow, false indigo, alder, and a diverse understory of rushes, grasses and deergrass are also present. The inventory team noted high use of herbaceous species. This reach was thought to be showing signs of upward trend. The only use monitoring for riparian areas on this allotment was from a production/utilization study in 1988, when use of 60% was recorded.

Two channel condition assessments were done on upper Sixshooter Canyon. Reach 1 is below the Forest Road 222 road crossing in CCC Pasture. This reach is a steep "B" type stream with boulders as the dominant sediment. It was rated as impaired due to the large amount of sand sized sediment in the stream from the road. This reach is accessible to livestock.

Reach 2 is above the road. It is steep and narrow with boulders as the dominant sediment, making it fairly inaccessible to cattle. There is little sand in the stream. It was rated as a "A" type in stable condition.

Lower Sixshooter Canyon was visited in 2002 and 2007. Riparian vegetation on Sixshooter Canyon above its confluence is similar to the downstream reach of Pinal Creek.

Icehouse Canyon: Icehouse Canyon is an intermittent stream that originates on Signal Peak and parallels Sixshooter Canyon. It flows north about six miles to its confluence with Pinal Creek. Most of it lies within the adjacent Ranger Station Allotment. About 0.75 mile of Icehouse Canyon occurs on this allotment in two different stream reaches, as it crosses back and forth between the two allotments. FR 112 runs adjacent to the creek and contributes a large amount of sediment to it within the allotment. There is a spring box and two masonry dams on the channel. Sediment and small pockets of Fremont cottonwood and seep willow are found above these small dams. Between the dams there are few mesic areas with deergrass, arroyo willow, cattails and rushes.

An assessment was done near the private property boundary in CCC Pasture. It was rated as an unstable "F" type with boulders as the dominant sediment. There was a large gully near the road. Downstream, the channel was narrow, downcut, and full of sand. The vegetation consisted of seep willow with a few deer grass plants.

Ranger Station Allotment

Ranger Station Allotment lies entirely within the Pinal Creek 5th code watershed. The headwaters of Pinal Creek originate on Coolidge-Parker Allotment in the Pinal Mountains. Major tributaries within Ranger Station Allotment include Kellner Canyon and Icehouse Canyon.

Icehouse Canyon in Mountain Pasture was selected as a potential key reach. The upper two miles of Icehouse Canyon fall within a Mexican Spotted Owl Protected Activity Center (PAC). Riparian vegetation and stream channel of this upper reach have not been inventoried or assessed. According to Natalie Robb, Game and Fish Biologist (personal communication, 2007), the channel supports intermittent flow, with adjacent sycamore and oaks, and obligate riparian herbaceous and shrub species. This area should be evaluated for its potential as a key riparian reach. The 0.75 mile reach of Icehouse Canyon below the PAC is delineated by the National Wetland Inventory as having riparian vegetation. Most of this is Arizona sycamore. This reach should also be evaluated for its potential as a critical area.

Table 12: Ranger Station Stream and condition

Stream Name	Pasture	Condition
Icehouse Canyon #2	Southeast	Impaired
Icehouse Canyon #3	Southeast	Stable
Kellner Canyon	Northwest	Impaired

Stream Descriptions

Icehouse Canyon is an intermittent stream that originates on the north slope of Signal Peak and drains north about six miles though Mountain and Southeast Pastures and private lands to its confluence with Pinal Creek. An adjacent sycamore dominated forest should also be evaluated for its potential as a critical area.

Downstream, Icehouse Canyon in Southeast Pasture crosses back and forth into the adjacent Coolidge-Parker Allotment. Two allotment fences divide the creek in several places, with a road crossing. Two reaches were assessed. The lower reach lies below Forest Road 112 and above private property. A thicket of catclaw, snakeweed, turbinella oak, algerita, coffee-berry and other chaparral species dominate the abandoned terrace. The channel at the upper end of this stream reach below the road is a deep headcut resulting from concentrated road runoff. Downstream the channel is an "F" type with boulders and sand as dominant sediment. Vegetation in the channel and on cut banks is sycamore, net-leaf hackberry, squaw waterweed and seep willow. This reach has low potential for recovery.

The reach above Forest Road 112 is segmented by a masonry dam about 0.25 miles upstream of the road. The channel above the dam is filled with sediment. This short reach below the dam is a downcut, steep, narrow "F" type stream. Dominant sediment size is boulders filled in with sand deposits from eroding banks. The reach was rated impaired. There is some sycamore and deer grass. The reach is accessible to livestock and high use has been observed. The reach above the dam to the spring is a narrow confined "A" type with cobble bed material. It was rated stable. The channel is an impenetrable thicket of seep willow and blackberry, and seems inaccessible to livestock. Other vegetation includes Fremont cottonwood, sycamore, Goodding willow, net-leaf hackberry, false indigo, deergrass and seep willow.

Kellner Canyon is an intermittent stream that also originates on Signal Peak. It parallels Icehouse Canyon lying about one mile to the west. It drains north about 5.5 miles through National Forest and private lands to its confluence with Icehouse Canyon. No riparian vegetation is delineated on the Kellner Canyon headwaters in the Mountain Pasture. No field data is available for this headwater reach.

About one mile of Kellner Canyon lies in the upper part of the Northwest Pasture. It extends from above the campground to private land. The upper half mile lies in a canyon and is delineated as mature cottonwood forest (USDI NWI maps). A stream channel assessment was done in this reach near Kellner Campground in 2002. Vegetation in this reach was inventoried in 1992 (TRIMM survey). The vegetation has developed in response to the construction of four large dams in this reach, three of which are approximately 30 feet high. They were installed by the CCC in the 1930s for erosion control. The dams are now filled with sediment and have caused large, low gradient floodplains to develop with extensive riparian areas. The site is dominated by sycamore, Arizona oak, alder and Fremont cottonwood. The upper area is used for camping. Some of the lower areas show past sign of cattle use. The reach was rated impaired. Between dams, the channel is a steep, narrow "B" type in bedrock with cobble sediment. Some of these reaches had perennial pools with Goodding willow, false indigo, seep willow and sedges.

The lower one-half mile reach lies below the series of dams in a lower gradient, less confined valley. There is no data on the lower reach's vegetation, accessibility or use by livestock. Several developments were inventoried on Ranger Station Allotment.

Desired Condition for all allotments: Forest Service Manual 2520, Chapter 40 provides direction for managing Forest Service lands. Objectives and policy for riparian areas (FSM 2526.02 and 2526.03) include:

- To protect, manage, and improve riparian areas while implementing land and resource management activities
- To manage riparian areas in the context of the environment in which they are located, recognizing their unique values
- Manage riparian areas under the principles of multiple-use and sustained-yield, while emphasizing protection and improvement of soil, water, and vegetation, particularly because of their effects upon aquatic and wildlife resources. Give preferential consideration to riparian-dependent resources when conflicts among land use activities occur
- Give attention to land along all stream channels capable of supporting riparian vegetation (36 CFR 219.27e)
- Give special attention to land and vegetation for approximately 100 feet from the edges of all perennial streams, lakes, and other bodies of water. This distance shall correspond to at least the recognizable area dominated by the riparian vegetation (36 CFR 219.27e). Give special attention to adjacent terrestrial areas to ensure adequate protection for riparian-dependent resources

Direction for managing riparian areas is found in the Tonto NF Plan. The intention of the plan is to manage riparian areas for protection of soil, water, vegetation, wildlife, and fish populations. The Tonto NF Plan defined long-term management direction as follows:

- Emphasize improvement of soil productivity, air and water quality
- Enhance riparian ecosystems by improved management
- Ensure coordination that provides for species diversity and greater wildlife and fish populations through improvement of habitat

Key standards and guidelines from the forest plan include:

- Coordinate with range to achieve utilization in the riparian areas that will not exceed 20% of current annual growth by volume of woody species
- Coordinate with range to achieve at least 80% of the potential riparian overstory crown coverage
- Coordinate with range to achieve at least 50% of the cottonwood-willow and mixed broadleaf acres in structural Type I (tall trees with well-developed understory) by 2030
- Rehabilitate at least 80% of the potential shrub cover in riparian areas through the use of appropriate grazing systems and methods
- Rehabilitate and maintain, through improved management practices, mixed broadleaf riparian to achieve 80% of the potential overstory crown coverage. Natural

regeneration is anticipated to achieve most of this goal. Artificial regeneration may be necessary in some areas

- Re-establish riparian vegetation in severely degraded but potentially productive riparian areas. Natural regeneration is anticipated to achieve this goal, but artificial regeneration may be necessary in some areas
- Rehabilitate cottonwood-willow Type II (tall trees with little or no understory) to achieve conversion to Type I by the year 2030. Natural regeneration is anticipated to achieve most of this goal, but artificial regeneration may be necessary in some areas

Desired conditions for key reaches include both short-term and long-term timeframes. The most important short-term desired conditions are:

- Maintain residual herbaceous vegetation along the greenline or streambank whenever precipitation is expected
- Re-introduce riparian vegetation if native riparian species are absent
- Minimize the annual impacts to seedling and sapling riparian woody species
- Limit physical impacts to alterable streambanks and greenlines

The most important long-term desired conditions are:

- Optimize riparian tree and shrub establishment, especially following episodic, regional winter storms
- Increase the density, vertical and horizontal canopy cover of woody riparian tree species
- Increase the proportion of obligate and facultative riparian species
- Maintain or increase canopy cover of herbaceous species to at least 50% (or 5% to 25% for reaches now at a trace to 1%)
- Decrease greenline to greenline width
- Optimize the establishment of floodplains and streambanks
- Improve stream channel function and stability

The most common conditions limiting proper functioning condition of stream channels on these allotments are high width-depth ratios, excessive erosion or deposition, and lack of riparian vegetation. Restoration and recovery of stream channel stability and proper functioning condition is dependent upon restoration and recovery of riparian vegetation.

Based on direction from FSH 2209.13 (Grazing Permit Administration Handbook) Chapter 90 (2007), specific statements of desired condition should be developed for each allotment within the context of the Forest Plan (USDA Forest Service 2007, p. 7). The following project-specific desired condition statements have been developed for the riparian areas and stream channels on these allotments, with the intent of achieving stream channel proper functioning condition (Barrett et al 1993).

Desired conditions for key reaches include both short-term and long-term timeframes. The most important short-term desired conditions are to:

- Maintain residual herbaceous vegetation along the greenline or streambank whenever precipitation is expected;
- Re-introduce riparian vegetation if native riparian species are absent;
- Minimize the annual impacts to seedling and sapling riparian woody species; and
- Limit physical impacts to alterable streambanks and greenlines.

The most important long-term desired conditions are to:

- Optimize riparian tree and shrub establishment, especially following episodic, regional winter storms;
- Increase the density, vertical and horizontal canopy cover of woody riparian tree species;
- Increase the proportion of obligate and facultative riparian species;
- Maintain or increase canopy cover of herbaceous species to at least 50% (or 5% to 25% for reaches now at trace to 1%);
- Decrease the greenline to greenline width;
- Optimize the establishment of floodplains and streambanks; and
- Improve stream channel function and stability.

Reaching desired conditions for riparian areas and stream channels will depend not only on management activities, but on climatic events. Both drought and floods have the potential to affect riparian areas and stream channels. High flows (> 10 year recurrence interval) are likely to scour impaired or unstable channels. Even moderate flows (> 2 year recurrence interval) could cause unstable channels to widen or incise.

Wild and Scenic Rivers

There are no designated or potential wild and scenic rivers on the allotments.

Effects:

Riparian areas have ecological importance beyond their small percentage of land area. This percentage is even smaller in the arid southwestern United States, and inversely, their importance more critical. Although volumes of literature have been written on riparian systems in the southwest, little actual research has been accomplished (Milchunas 2006). Limited research available shows that grazing has greater effects on southwestern riparian understory plant communities than adjacent upland plant communities. Southwestern riparian plant communities are more sensitive to livestock grazing and more likely to experience reductions in plant species diversity, than plant communities that evolved with ungulate grazing (Milchunas 2006). Clary and Kruse (2003) concur that southwestern riparian systems have not had the intensive study that other regional riparian ecosystems have had. In their review of environmental impacts, management practices and management implications for Southwestern riparian areas, they state the necessity to rely on proven principles and practices from other similar riparian areas to fill the gaps in management applications in the Southwest.

Direct Effects: Riparian areas, with their high species diversity and structural complexity, provide critical terrestrial and aquatic habitat to wildlife species from adjacent upland and riparian area environments. Cattle tend to congregate in many riparian areas. They favor

riparian forage and water availability, shade in warm months and gentle topography. Excessive grazing and trampling impacts can destabilize and break down stream banks, cause mechanical damage to shrubs and small trees, reduce or eliminate woody seedlings and saplings, expose soils, eliminate or shift native herbaceous species to weedy or exotic species with reduced root systems, and cause widening or incision of stream channels (Trimble and Mendel 1995, Clary and Kruse 2003). These changes may lead to loss of stream stability and function (Rosgen 1996). Stream channel profile, stream bank stability, streamside vegetation, channel bottom embeddedness, stream sediments and stream temperature are all aquatic species habitat features that can be directly or indirectly affected by livestock grazing practices. Maintaining native obligate riparian plants is extremely important to many streams because of their resistance to the erosive energy of flowing water (Clary and Kruse 2003). Herbaceous riparian vegetation is especially important to stabilizing stream bank, point bar and floodplain deposits, critical to the channel restoration process (Clary and Kruse 2003). One of the most important factors influencing riparian conditions is utilization (Mosley et al 1999, Clary and Kruse 2003).

Indirect effects: Stream channels and riparian areas can also be affected indirectly by watershed condition and/or stream channel conditions above and below the stream reach of interest. Soil compaction, decreased infiltration, and loss or alteration of upland vegetation can cause increased runoff and higher peak flows, leading to channel adjustments and decrease in stream function (Gori and Backer 1995).

Cumulative Effects Common to All Alternatives

Existing condition of streams and riparian areas on these allotments is the result of cumulative effects of historic and recent management, natural disturbances, and interactions between these two agents of change. This discussion includes 5th code watersheds and begins with settlement of lands in the vicinity of Globe and surrounding areas in the 1870s.

Existing condition of most of the stream channels on these allotments is degraded and this has reduced their ability to function. All of the allotments have been grazed since the late 1800s. Range records indicate that over the last century these allotments have been impacted by overgrazing, drought, change in fire regime intervals, natural successional processes and poor management resulting in unsatisfactory range and soil conditions. It is likely that much of the degraded stream condition is attributable to historic grazing management.

Mining also had a large impact in the project area. In 1875, silver was discovered in Richmond Basin. Subsequently, the Mack Morris Mine was established and a ten-stamp mill was installed on Pinal Creek to reduce its ore (Dobyns 1981). There were also smelters and mills in operation in Globe and Miami. In the early 1880s, when production of copper surpassed silver and gold, three water jacket furnaces were built on Pinal Creek (Dobyns 1981). All these mining operations required huge amounts of wood for fuel and building purposes which resulted in severe depauperation of timber in surrounding areas (Dobyns 1981). Pinal Creek was also subjected to placer mining (Dobyns 1981). There are several small, dispersed mines (active and inactive) and mining related activities within the project area.

Roads are a source of sediment to stream channels which, when combined with sediment from poor upland conditions and sediment introduced during channel adjustments, can cause a stream to be overloaded with sediment and inhibit stream function. Road maintenance that

includes Best Management Practices (BMPs) should reduce sedimentation into streams and be beneficial to watersheds.

Unauthorized cross country travel can negatively impact streams and riparian areas through removal, destruction or degradation of herbaceous / woody vegetation, aquatic emergent vegetation and stream banks. Travel Management Rule (TMR) is intended to analyze alternate motorized routes in order to provide access and a recreation experience sufficient so vehicle operators no longer feel compelled to travel off established roads or trails. Once routes are established, maps will be available to the public and modified as needed to reflect any changes. Enforcement of TMR is imperative to assure compliance.

Other actions occurring in the project area that can impact streams and riparian areas include recreation, wildfire, prescribed fire, fire suppression and wildlife grazing and browsing.

Climate change presents additional considerations. According to the Arizona Drought Monitor Report (ADWR 2012), the long-term drought status for Gila County is "abnormally dry" as of January 2012, which has likely had an effect in the project area. According to NOAA National Climatic Data Center data, there has been a marked upward trend in globally averaged annual mean surface temperatures since the mid-1970s (Shein 2006). Models used by Seager et al. (2007) to predict how climate change will affect the southwestern United States indicate that this region has begun the transition to a dryer climate which will continue into the 21st century. However, models are too broad-scale to predict how climate change might affect monsoons, which contribute 40% of the total annual precipitation received on Tonto NF (Lenart 2005).

Environmental Consequences by Alternatives

Criteria used to evaluate alternatives: alternatives are contrasted based on the likelihood of riparian vegetation and stream channels in key reaches attaining short and long-term desired conditions described in the Affected Environment. Short-term desired conditions limit annual impacts of livestock grazing. Long-term desired conditions are measured through effectiveness monitoring. Key reaches are listed below.

Table 13: Key reaches by pasture within the Capitan, Coolidge-Parker, and Ranger Station Allotments.

Allotment	Pasture	Key Reach
Capitan	Indian Springs	Arrastra Gulch
Coolidge-Parker	Home	Pinal Creek
	CCC	Pinal Creek
	West Harvey	Pinal Creek
	CCC	Sixshooter Canyon
Ranger Station	Mountain	Icehouse Canyon

Alternative 1 – No Action:

Direct Effects: The most rapid rates of riparian recovery from past grazing impacts normally occur with complete protection from grazing (Clary and Kruse 2003). Riparian areas are generally regarded as having high inherent potential for recovery from disturbance (Milchunas 2006). Potential for recovery is highly variable, dependent on biotic and abiotic factors, including flow regime, channel gradient, dominant channel substrate, past disturbance history, watershed area, and cover and diversity of riparian vegetation (Kindschy 1987, 1994). The amount of time required for riparian recovery after severe degradation can vary from several years to decades (Clary and Kruse 2003).

Eliminating livestock grazing on Capitan, Coolidge-Parker and Ranger Station Allotments would eliminate the adverse, direct effects to riparian areas described above. All key reaches have moderate to high potential for recovery. Rates of riparian area and stream channel recovery may be variable, but direct effects of eliminating livestock grazing will be beneficial and provide the best potential for achieving or maintaining desired conditions.

Indirect Effects: Much of the flatter portions of the allotments are in impaired or unsatisfactory condition (see soils report). A No Grazing Alternative usually provides the most rapid increase of upland vegetative cover, species diversity, and improvement of impaired and unsatisfactory condition soils. These changes reduce surface runoff, dampen peak flows, and decrease the probability of channel adjustments, impacts to riparian vegetation and loss of channel function. Implementation of this alternative should maintain or improve the existing condition of the upper watersheds.

Cumulative Effects: direct and indirect effects of this alternative, when combined with other past, present or reasonably foreseeable actions (cumulative effects) as listed above, should result in reaching desired conditions at the fastest rate.

Consistency with the Riparian Area Management Direction: A No Grazing Alternative eliminates direct and indirect effects of cattle grazing to recovering stream channels, riparian areas and watersheds within the allotments. This alternative meets the intent of Forest Plan to protect, manage, and restore riparian areas.

Alternative 2 - Proposed Action: Livestock grazing would continue year-long and would be managed through adaptive management.

Direct Effects: elements most likely to affect riparian area and stream channel condition and recovery are existing condition of riparian areas, riparian vegetation utilization, residual vegetation heights and availability of off-channel water developments. Most stream channels on the allotments are in impaired or unstable condition (Mason and Johnson 1999). Much of the water available to livestock is located in springs and riparian areas.

Riparian utilization guidelines were developed to maintain or increase existing riparian vegetation. The proposed action recommends mitigating direct effects of livestock grazing in key reaches by using riparian utilization measurements (implementation monitoring) (Sampling Vegetation Attributes (1999) and Utilization Studies and Residual Measurements (1999)). For Pinal Creek, Icehouse and Sixshooter Canyons, if riparian area utilization guidelines are followed and cattle are moved when use guidelines are met, negative, direct

effects of grazing will be minimized and riparian area and stream channel condition should improve.

Use guidelines proposed may allow some recovery of riparian vegetation in Arrastra Gulch. It is likely that rate of recovery will be slow. Given existing degraded condition of stream channel and low density of woody seedlings and riparian grass plants, it is also possible that existing conditions may persist (Belsky et al. 1999). Drought conditions add an additional consideration. Drought may negate or obscure any expected response to improved management.

Indirect Effects: Much of the flatter portions of the allotments are in impaired or unsatisfactory condition (see soils report). Grazing of impaired and unsatisfactory condition uplands may slow the rates of upland recovery, indirectly slowing the rate of riparian area and stream channel recovery from the scouring effects of increased runoff and higher peak flows. If management prescriptions are followed and cattle are moved when use guidelines are met, the negative, indirect effects of grazing will be minimized.

Direct Effects of improvements: Construction of pipelines will not adversely impact riparian areas or stream channels. New troughs (or drinkers) will be located outside the riparian area which could have the positive effect of drawing cattle away from riparian vegetation and stream channels. Removing water from springs and streams may reduce water available for riparian vegetation. Springs proposed for development have very limited riparian vegetation and low potential for an increase. Removing water from springs for stock watering may reduce the amount of water in channels for non-riparian species, which grow more densely in channels, but will have negligible effects on riparian species.

Effects of any new water developments will be minimized by use of the groundwater policy and Best Management Practices (BMPs).

Corrals will be built to avoid riparian areas; therefore there will be no direct effects.

Indirect Effects of improvements: Alternative water sources could lead to better cattle distribution (Holechek 1997). However, placing new waters in areas that have received little use may cause new areas of heavy use (McAuliffe 1997).

New corrals will cause new areas of heavy use and compaction. However, areas will be small and will have negligible indirect effects on riparian areas and stream channels.

Effects to water quality: No streams within the allotments have been monitored by the Arizona Department of Environmental Quality. Any potential impacts to water quality would be mitigated with Best Management Practices (BMPs).

Effects from climate change: With continued drought and higher temperatures, small water sources may have water less frequently or dry up leaving less water for cattle, wildlife and riparian vegetation.

Cumulative Effects: direct and indirect effects of this alternative, when combined with other past, present or reasonably foreseeable actions (cumulative effects discussed above), are likely to result in attainment of desired conditions for Pinal Creek, Icehouse and Sixshooter Canyons but at a slower rate than the No Grazing alternative. Continued drought and higher temperatures may contribute to slow recovery in Arrastra Gulch.

Consistency with Riparian Area Management Direction: This alternative should meet the intent of Forest Plan direction to protect, manage, and restore riparian areas if described mitigation measures are successful. Mitigation measures have a high probability of success for Pinal Creek, Icehouse and Sixshooter Canyons.

Alternative 3 – Increased numbers and utilization. Livestock grazing would continue year-long and would be managed through adaptive management as in Alternative 2, but with increased numbers and slightly higher utilization in upland areas. Utilization levels would remain the same for riparian vegetation.

Direct Effect: direct effects of this alternative would be the same as Alternative 2. Because of the increased numbers, use guidelines may be reached at a faster rate than Alternative 2, reducing the time cattle may spend in a pasture or area.

Indirect Effects: indirect effects of this alternative would be the same as Alternative 2.

Direct Effects of improvements: direct effects of this alternative would be the same as Alternative 2.

Indirect Effects of improvements: indirect effects of this alternative would be the same as Alternative 2.

Effects to water quality: Same as Alternative 2.

Effects from climate change: Same as Alternative 2.

Cumulative Effects: Cumulative effects of this alternative would be the same as Alternative 2. Because of increased numbers, use guidelines may be reached at a faster rate than for Alternative 2, reducing the time cattle may spend in a pasture or area.

Consistency with Riparian Area Management Direction: This alternative should meet the intent of Forest Plan direction to protect, manage, and restore riparian areas if described mitigation measures are successful. Mitigation measures have a high probability of success for Pinal Creek, Icehouse and Sixshooter Canyons.

Supporting documentation for this section can be found in the project record.

Wildlife

Existing Condition:
The project action area (PAA) contains diverse habitats for a variety of animals and some special status plants. These species are classified in a number of ways. Through the *Endangered Species Act* (ESA), some species are listed as Threatened or Endangered (T&E) by the US Fish & Wildlife Service (USFWS). The Regional Forester (USFS), Southwest Region, has designated some species as Sensitive (S). The Forest Plan lists Management Indicator Species (MIS) on the Tonto NF. Migratory Birds are considered through Executive Order 13186 and the Memorandum of Understanding between the Forest Service and USFWS to promote conservation of migratory birds.

Federally Listed and Forest Service Sensitive Species: Tonto NF has 16 federally listed species, designated critical habitat for 4 species, and 58 forest sensitive species.

Management Indicator Species: TNF has 29 MIS representing 30 types of habitat features; however, only six MIS are analyzed because for the remaining species, either the MIS does not occur within the PAA or livestock grazing would not affect habitat features (USFS, 2005).

Migratory Birds: TNF provides habitat for 39 breeding bird species (table W3 in Appendix A) that occur on lists from either *Birds of Conservation Concern 2008* (USFWS, 2008) or *Arizona Partners in Flight Conservation Plan* (Latta et al. 1999). Three Important Bird Areas and one over wintering area occur within TNF boundaries.

Desired Condition:
General wildlife resource goals are outlined on Page 20 of the Tonto NF Plan and include providing for species diversity, maintaining viable populations of existing species, improving habitat for selected species, and managing to increase population levels of threatened and endangered species. Wildlife standards and guidelines that apply to Capitan, Coolidge-Parker, Ranger Station Allotments analysis include:

• Maintain a minimum of 30% effective ground cover for watershed protection and forage production, especially in primary wildlife forage producing areas. Where less than 30% exists, it will be the management goal to obtain a minimum of 30% effective ground cover.

• Coordinate with Range to achieve at least 80% of the potential riparian overstory crown coverage.

• Coordinate with Range to achieve at least 50% of the cottonwood-willow and mixed broadleaf acres in structural Type 1 (by 2030).

• Rehabilitate at least 80% of the potential shrub cover in riparian areas through the use of appropriate grazing systems and methods.

• Allow for forage to maximize threatened and endangered species, management indicator species, and emphasis harvest species.

• Identify, survey, map, and analyze habitat for all Federally-listed species. Identify management conflicts and enhancement opportunities. Correct any management conflicts or problems.

• Manage Mexican Spotted Owl and Northern Goshawk habitats within the project area according to standards and guidelines in the Tonto NF Plan (Replacement Pages 40-1 through 40-13).

• Manage Mexican spotted owl using appropriate recommendations and conservation measures from their species recovery plan.

• Forage use by grazing ungulates will be maintained at or above a condition which assures recovery and continued existence of threatened and endangered species.

• Manage chaparral type to emphasize production of whitetail deer.

• Manage pinyon-juniper type to emphasize production of mule deer.

• Provide wildlife access and escape ramps on all livestock and wildlife water developments.

• Conduct surveys and write reports on allotments scheduled for re-analysis and possible stocking adjustments. Allow for forage to maximize Threatened and Endangered (T&E) species, management indicator species, and emphasis harvest species.

• Continue to clear future proposed projects for threatened, endangered, proposed, and candidate plant and animal species. Clearances will be done by a wildlife biologist and reviewed by the Forest Biologist.

Effects: This section summarizes expected effects to wildlife and plant species from implementing each alternative; it includes brief discussions of how grazing and livestock management activities may affect general wildlife species and habitats, species protected under the Endangered Species Act (Federally listed), Forest Service Sensitive Species, Management Indicator species (MIS), and migratory birds. All 16 Federally listed species were initially considered during this analysis. The Mexican spotted owl (MSO or owl) and Arizona hedgehog cactus were selected for more analysis because they occur within the Analysis Area (AA). All 58 Tonto NF Sensitive Species were initially considered during this analysis. Thirty MIS were initially considered and six species with indicator habitat in the AA are evaluated in a Draft MIS Report. Migratory bird species of concern on the Tonto NF with habitats in the AA are evaluated in a draft Migratory Birds Report.

Livestock grazing can affect wildlife species and their habitats in several ways. Grazing may reduce vegetation growth and litter cover. Litter encourages plant recovery after drought because it traps seeds and lowers evaporative loss (Milchunas 2006). Seeds and subsequent plants provide wildlife with food, nesting sites, and cover. Livestock consume and trample vegetation, which may lead to potentially reducing establishment of additional vegetative cover, reduced vegetation density, reduced ground cover, and changes in plant species composition. Livestock can trample nests of ground nesting birds and dislodge nests of shrub-nesting birds causing displacement, poor condition, and mortality of individuals.

Effects of livestock grazing on riparian areas and stream channels are described on pages 43-58. Grazing can affect wildlife habitat quality in riparian areas by reducing, changing, or eliminating cover, food, and water resources needed by wildlife species using these habitats. Many of these effects also occur in upland habitats, but riparian and wetland communities represent a small percentage of the landscape in the Southwest, but support high plant and animal diversity and productivity (Milchunas 2006).

Livestock management activities can include stock tanks and water developments, fences, corrals, herding routes (trails), branding, shipping, and transporting livestock, and other range improvements. Effects can be intensive, but generally occur in small areas scattered across

the landscape. Effects can include removal of vegetation, soil compaction, dust accumulation, noise, and avoidance of areas by wildlife. They can affect important wildlife nesting, roosting, feeding, or watering areas if located in these habitats.

Livestock water developments can have beneficial and undesirable effects on wildlife. They may benefit local wildlife by providing additional water sources and aquatic habitat if they contain appropriately designed wildlife access and escape ramps and are maintained yearlong, even when cattle are not in that pasture. If they are located far enough from natural water sources they may help distribute grazing over a larger portion of the landscape and reduce grazing effects in riparian habitats somewhat. Intensive grazing surrounding water developments affects local wildlife habitats by removing herbaceous and woody vegetation. This can remove cover, increase predation, and decrease access to the water. Constructing water developments can also reduce or eliminate habitat at spring sources, and reduce or eliminate water at and downstream from developed springs. Constructing water developments that include placing livestock drinkers (troughs) in riparian areas can reduce or eliminate riparian and aquatic habitats in those areas and downstream. Incorrectly designed water developments can also cause mortality to individual animals.

Livestock management fences occur throughout the AA. They are generally built to manage livestock within pastures, but can also serve other purposes like enclosing special emphasis areas such as springs and research plots. Fences can affect some species of wildlife, such as big game, if they are poorly designed or located. They can inhibit wildlife movement, occasionally cause mortality, affect forage resources available to wildlife, and cause trailing effects in wildlife critical areas. Fences can generally benefit wildlife habitat by controlling livestock distribution and use of forage resources if they are properly designed, located and maintained.

Livestock management activities and grazing may also transport disease organisms and seeds of invasive plants, which may affect local wildlife and habitat. Many forest roads were originally constructed for building range improvements, and are used primarily for livestock management activities such as maintaining water developments and other range improvements.

Sensitive Species:

Tonto NF has 58 sensitive plants and animals, which were considered for this analysis. Thirty-six sensitive species either did not have suitable habitat in the AA or would not be affected by project actions. Twenty-two species are either present or have suitable habitat in the AA and could be affected by project actions. The effects of project actions to forest sensitive species are similar to effects to general wildlife. While project actions may affect individuals, remove small amounts of habitat, or decrease habitat quality; in all instances, project actions would not cause forest sensitive species to 1) lose viability or 2) create significant trends toward federal listing. Effects and determinations for sensitive species are documented in a project biological evaluation.

Migratory Bird Effects for all Alternatives

Migratory bird species of concern for the TNF were evaluated for six habitats that occur within the AA. Migratory bird populations are not expected to be affected by project actions. No Important Bird Areas or overwintering areas will be affected by the project. Snags and dead and downed wood are not expected to be affected by project actions. Individual migratory birds, especially ground and shrub nesting birds may be affected by project actions. A migratory bird report is being prepared for this project.

Environmental Consequences by Alternative

Alternative 1- No Action

General Wildlife Effects: Implementing Alternative 1 would result in an improvement in overall wildlife habitat quality for most species; habitat for a few species that do well in grazed habitats with lower cover may improve.

Food, water, and cover resources available for use by wildlife species would increase. Local wildlife living near livestock water developments could be affected if developments were not maintained, but this effect would be temporary and would occur gradually over a five year period. As livestock water developments were removed, more water would be available in streams and springs for recovery of riparian vegetation and stream channels, which would improve wildlife habitat quality.

MIS: Habitat quality for five of these species is expected to improve with a cessation of livestock grazing on the allotments; habitat quality for one species would decrease. With an improvement in soils and vegetation, increases in high-quality wildlife habitat should occur over time in all life zones and vegetation communities. Eliminating livestock from stream courses should result in overall improvements in water quality, elimination of bank trampling and trailing from livestock, and should improve conditions for riparian and aquatic wildlife species. While project level habitats for five of six MIS would improve from implementing this alternative, increases in habitat quality and quantity are too small to alter Forest-wide habitat and population trends for any MIS. An MIS report is being prepared for this project and a Forest-wide MIS Report was last updated in 2005 (TNF 2005). Management Indicator species are also discussed in the 1985 Tonto Plan.

Special Status Species:

Mexican spotted owl: Implementing this alternative would result in highest overall MSO habitat quality. Vegetation would provide maximum food and cover resources for MSO prey species, vegetation would be able to develop into owl habitats at the maximum rate, and owls would not be disturbed by grazing related activities. This alternative would meet forest plan standards and guidelines and MSO recovery plan guidelines at the fastest rate. It should be noted that both action alternatives provide rest from livestock grazing in MSO habitats (mountain pastures) generally every other year, thereby providing some benefits similar to the no grazing alternative and reducing potential differences among alternatives.

Arizona hedgehog cactus (AHC): AHC would not be trampled or consumed by livestock under the no grazing alternative. Plants could have a slightly increased probability of burning during fires because of increased herbaceous cover. However, because most plants occur in rocky habitats such as bedrock and rock crevices, the increased probability would be small.

Sensitive species: Implementing this alternative would improve habitat quality for most sensitive species. There would be more food, water, and cover resources available for wildlife, and no disturbances to wildlife from grazing or livestock management activities.

Alternative 2- Proposed Action

General Wildlife Effects: Wildlife habitat quality for game, non-game and riparian species in the AA after implementing the proposed action is expected to be similar to existing habitat quality.

Grazing under the proposed action will be similar to current grazing and is expected to continue to produce similar effects on wildlife habitat quality.

New water developments may have both positive and negative effects on local wildlife habitats and species. Game species and bats are species most likely to benefit from new livestock water developments, and only if they are maintained year-around for wildlife water. Observations over the previous 17 years indicate that water developments in the AA are only kept functioning when livestock are grazing in the pasture, and only a portion of water troughs have adequate access and escape ramps.

MIS: Acres of MIS habitats affected by implementing the proposed action are small compared with forest-wide acres of habitat available. The effects on MIS species from implementing the proposed action are similar to existing conditions and are too small to alter Forest-wide trends for any MIS.

Special Status Species:

Mexican spotted owl: Grazing, range improvements, and livestock management activities will affect this species and its nesting and roosting habitats within 3,300 acres of the AA. Owl habitats are within higher elevations of mountain pastures of the Coolidge-Parker and Ranger Station Allotments. Three Protected Activity Centers (PACs) and other nesting and roosting areas (protected and restricted habitats) occur within mountain pastures. The AA is within MSO Critical Habitat (CH) Unit BR-W-6; however, these areas are not CH because they are within Wildland Urban Interface areas excluded when CH was designated (69 CFR 53182), Pg. 53217). Grazing, and water development maintenance and emergency repairs will occur in MSO habitats during owl breeding season. Anticipated effects may include 1) Removing and altering vegetation in riparian areas and uplands that provide food and cover resources needed by MSO prey species (USFWS 2012), 2) removing or altering vegetation that may develop into owl nesting or roosting habitat (USFWS 2011), and 3) disturbance effects caused by constructing or repairing livestock water developments or other grazing

support infrastructure in or near owl habitats. The extent of effects of the proposed action is estimated to be similar to effects of ongoing grazing, but may be somewhat greater because of new range improvements. Effects will be reduced by implementing management practices described under mitigation measures in this document. A Biological Assessment that evaluates anticipated effects of the proposed action will be prepared and submitted to US Fish and Wildlife Service (USFWS). They will evaluate our assessment and make recommendations to minimize effects. Any required Conservation Measures will be incorporated into the Final EA and Decision Notice.

Arizona hedgehog cactus (AHC): Cattle have been observed to trample AHC at a rate of 1/400-500 plants monitored (Cedar Creek Associates, Inc. and USFS 1996). Since those observations, no instances of trampling have been observed during incidental monitoring on the Globe Ranger District during a 17 year period. During a similar time period, a local, experienced Forest Service biologist observed 4-5 instances where portions of plants were apparently consumed by cattle (Personal Communication, Mark Taylor 2012). There is a small probability that an individual AHC could be trampled or consumed under the proposed action.

Under this action, the anticipated effects to AHC would be similar to the existing effects of ongoing grazing; therefore there would be no change in extent of effects. This species will be included in a BA, which will be evaluated by USFWS.

Sensitive species: Implementing this alternative would result in effects on sensitive species similar to those already occurring.

Grazing would continue to reduce food, water and cover resources otherwise available to wildlife, cattle would continue to disturb individual animals and impact components of habitat; but there would be little change from existing conditions. New livestock water developments may slightly improve local habitat quality for some species if they are designed properly and water is available to wildlife year-around.

Alternative 3- Increased Numbers and Utilization Levels

General Wildlife Effects: Grazing effects on overall wildlife habitat quality after implementing Alternative 3 can be expected to be greater than after implementing Alternative 2 or Alternative 1. In Alternative 3, Animal Unit Months (AUMs) would be increased from 779 to 1550, a 99 percent increase. Effects can be summarized as additional food, water, cover, and nesting habitat affected when compared with Alternative 2. The extent of these effects is difficult to estimate because management practices such as utilization guidelines are designed to limit effects of grazing on range plants; however they do not necessarily translate directly to minimizing effects on wildlife habitat quality. In addition, actual number of livestock placed on the allotment annually would vary based on resource conditions. Additional effects on habitat quality for some wildlife species are expected as a result of increasing livestock numbers, however, the extent of effects is uncertain.

MIS: Acres of MIS habitats affected by this alternative are greater than acres affected by implementing the proposed action, but are still small compared with forest-wide indicator habitat available. The effects on MIS species from implementing this alternative are too small to alter Forest-wide trends for any MIS.

Special Status Species:
Mexican spotted owl: Effects of grazing and livestock management activities for this alternative would be similar to the proposed action, but because the average number of cattle in the Coolidge-Parker Mountain Pasture will be greater during grazing years, effects are expected to be larger resulting in lower overall MSO habitat quality. Grazing will remove vegetation faster, earlier in the breeding season, and from a larger area than in the proposed action; this reduces food and cover resources needed by MSO prey species. More livestock will concentrate in riparian areas, and more disturbances to owls may occur because of more intensive livestock management activities. The amount of increased effects caused by increasing livestock numbers is difficult to estimate because management practices are designed to reduce effects, but will not eliminate them. There will be no effects on the Ranger Station or Capitan allotments from increasing cattle numbers on the Coolidge-Parker Allotment.

Arizona hedgehog cactus (AHC): Cattle have been observed to rarely trample and consume portions of AHC. Under the increase in numbers alternative, the anticipated effects to AHC could be slightly greater than under the proposed action because there would be more cattle that could trample and consume plants.

Sensitive species: Implementing this alternative would increase effects on sensitive species when compared with alternative 2. There would be additional effects on food, water and cover resources otherwise available for sensitive species, and more disturbances to individual animals.

Although there would be additional effects, they would be limited somewhat by management practices such as utilization guidelines, but effects would not be eliminated. Increased effects would not lead to trends toward listing any sensitive species.

Cumulative Effects Common to all Alternatives
Cumulative actions affecting wildlife resources (species and habitats) can be summarized as follows: grazing, range/shrub vegetation, timber/fuels fire, recreation, roads, and other miscellaneous actions.

More detailed information about specific cumulative actions for this project is listed throughout the resource specialist's sections of this EA. Existing wildlife habitat quality in many portions of the analysis area can be attributed to past and recent grazing and livestock management activities combined with fire suppression, while other cumulative actions have affected wildlife resources at smaller scales. In low to middle elevations, grasslands have shifted to scrublands, while at higher elevations; tree and shrub densities have increased, reducing native grasses. Components of wildlife habitats including vegetation, soils,

riparian areas, stream channels, and aquatic habitats are in degraded conditions in many parts of the analysis area.

Alternative 1 - No Grazing
The direct and indirect effects of this alternative would be beneficial to wildlife resources with a few exceptions. Therefore there would be no increase in cumulative effects to wildlife resources from implementing this alternative. Alternative 1 would provide the highest potential for attaining desired conditions for wildlife resources at the fastest rate. It would produce the highest overall wildlife habitat quality for the most wildlife species.

Alternative 2 – Proposed Action
Historic overgrazing effects and other past actions have modified wildlife habitats for many wildlife species in the analysis area. Because effects of the proposed grazing actions would be similar to current grazing management, implementing the proposed action is expected to cause little, if any, "additive" effect, when the proposed action is combined with other past, present, and reasonably foreseeable future actions (cumulative effects). If management practices listed in the proposed action are implemented successfully, the contribution of the proposed action to overall cumulative effects would be even smaller.

Alternative 3 – Increase in numbers and utilization
This alternative increases livestock numbers on one of the three allotments (Coolidge-Parker) as described in Chapter 2. In summary, AUMs would increase from 779 up to 1550. Alternative 3 would have added effects on wildlife habitat quality when compared with Alternative 2 because greater numbers of livestock grazing on the allotment would affect food, water, and cover resources otherwise available to wildlife species. The additional increase in AUMs potentially grazed on the Coolidge-Parker Allotment decreases from a 100 percent increase in AUMs on the allotment to a 17 percent increase of AUMs grazed in the analysis area. The percentage increase would decrease further when compared with district-wide or forest-wide AUMs. The "additive effect of implementing the increased livestock numbers alternative, including management practices, appears to be minor when combined together with the effects of other past, present, and reasonably foreseeable actions (cumulative effects).

Supporting documentation for this section can be found in the project record.

Heritage

Existing Condition:

Capitan, Coolidge-Parker, and Ranger Station Allotments contain 195 known heritage sites. However, three allotments probably contain hundreds of undocumented prehistoric and historic archaeological sites. The prehistoric sites represent occupation and agricultural modification and use of this area by people related to the Hohokam and Salado archaeological traditions over a period of 8,000 to 10,000 years. Allotments contain at least 61 historic sites reflecting use and occupation by Anglo and Hispanic ranchers, stockmen, miners and prospectors, Civilian Conservation Corps (CCC), and U.S. Forest Service.

Only a few blocks within two allotments have been surveyed. A total of 4,184 acres, or 14.7% of total area, has been previously surveyed. Heritage specialists have determined that only surveys dating back to 1990 are valid and dependable. Only 1,843 acres, or 6.5% of project area, have been surveyed since 1990.

Limited previous archaeological surveys have revealed potential for a large number of prehistoric and historic sites. Known heritage properties include a variety of features, ranging from historic roads to historic campgrounds and from simple prehistoric artifact scatters to large habitation sites. A great majority of these features are prehistoric and consist of collapsed stone masonry structures, various water control devices such as check dams, and terraces, and roasting pits for processing of agave. There are also a large number of features associated with a long history of mining and ore processing, cattle ranching, and CCC projects. Many other prehistoric and historic archaeological sites are represented by nothing more than a scatter of artifacts on ground surface.

No traditional cultural properties, native plant gathering areas, or tribal sacred sites are currently known to be located within allotment; however, no specific efforts to identify and inventory such areas have been made.

From 1870s to early 1920s, grazing of what would become Capitan, Coolidge-Parker and Ranger Station Allotments was heavy and unregulated. This resulted in an initial reduction of vegetative cover, which may have affected heritage resources by soil loss, erosion, and trampling. Since establishment of allotment and implementation of grazing management, known heritage resources inventoried have stabilized and, in many cases, improved in condition as vegetative cover has returned.

Effects: Impacts to heritage resources, especially archeological sites, are generally defined as anything that results in the removal of, displacement of, or damage to artifacts, features, and/or stratigraphic deposits of cultural material. In the case of heritage resources which are eligible for inclusion in the National Register of Historic Places, this can also include alterations of a property's setting or context. For traditional cultural properties and sacred places, additional considerations may include alterations in the presence or availability of particular plant species. Heritage resources, depending on their nature and composition, are subject to several different types of impact from activities associated with grazing. Direct impacts from grazing are those resulting from concentrated livestock trampling or construction. Indirect impacts include erosion and changes in vegetative composition and density that alter the setting and geographic context of sites.

Since site condition assessments for heritage resources are not available for any time prior to the introduction of European livestock species to the Southwest, some level of effect is assumed to have contributed to the current condition of all sites on the allotment. Given the non-renewable nature of heritage resources -- particularly archeological and historic sites -- any portion of them that has been damaged or removed diminishes their cultural and scientific value permanently. The missing parts cannot be replaced. Therefore, all effects to heritage resources are considered cumulative.

Based on a history of observation and consultation with the State Historic Preservation Officer (SHPO), managed grazing is not considered in and of itself to constitute an effect on heritage resources when the grazing strategy is designed to match herd size with capacity and distribute livestock as evenly as possible across the allotment in order to avoid localized

concentrations of animals and the resultant impacts to soils and vegetation associated with intense trampling. Changes in grazing strategy are likewise not considered to have an effect provided that whatever new strategy is implemented does not alter these conditions.

Adverse effects are likely if a proposed grazing strategy were to introduce livestock into an area not known to have been grazed historically. They may also be expected when a grazing strategy proposes shifting to a more intensive system where higher permitted numbers or high intensity/short duration schedules would concentrate livestock in confined areas where either the absolute or relative stock density would cause a significant increase in surface disturbances due to trampling that would be above previous or existing levels. This could result in either direct or indirect adverse effects depending on the degree of trampling resulting from localized concentration and on the presence or absence of heritage resources in the concentration area, the nature of the resource and its resistance to such impacts, and the distance to other heritage sites. For the most part, these conditions tend to be associated with the construction of range improvements designed to provide water or to concentrate and hold stock for roundup or shipping. Thus, the greatest potential for direct adverse effects to heritage resources is associated with the construction of range improvements and the access roads needed to build and maintain them.

Cumulative Effects Alternative 1

This alternative would also have the least amount of cumulative effects on historic properties as there would be no livestock in the project area. This alternative would not cause an irreversible or irretrievable commitment of the heritage resource.

Cumulative Effects Alternative 2

In addition to cumulative effects common for all alternatives, this alternative would have a reduced amount of cumulative effects on historic properties as there would be adaptive management of livestock based upon the design criteria in the project area. This alternative would not cause an irreversible or irretrievable commitment of the heritage resource.

Cumulative Effects Alternative 3

A programmatic agreement between USFS, Region 3, and New Mexico and Arizona State Historic Preservation Officers (SHPO) provides that permits do not require further inventory if they are continuing at current or reduced stocking levels (2003). A proposed increase in numbers on Coolidge-Parker Allotment may cause significant effects and will require further analysis by Tonto NF archaeologists prior to implementation.

Supporting documentation for this section can be found in the project record.

Recreation

Existing Condition

There are five developed recreation sites in the analysis area, Pinal Recreation Area, Upper Pinal Recreation Area, Kellner Reservation Recreation Area, Icehouse CCC Picnic Area, and Pioneer Pass Recreation Area.

Pinal Recreation Area is located along forest road 651 just west of the recreation residence cabins at the top of the Pinal's. Though in heavy use most of the year, this campground is

effectively closed for several months a year due to winter driving conditions. There are 3 concrete vault toilets available for use from the 13 camping sites, each with a picnic table and fireplace.

Upper Pinal Recreation Area is located along forest road 651 just east of the recreation residence cabins at the top of the Pinal's. Like Pinal Recreation Area it is in heavy use most of the year, in spite of being effectively closed for several months a year due to winter driving conditions. There is a concrete vault restroom available for use from the 3 camping sites, each with a picnic table and fireplace.

Kellner Reservation Recreation Area is located at the base of the Pinal's off of Forest Road 55. This campground is available to be reserved for group use throughout the year. There is a concrete vault restroom available for use from the 6 camping sites, each with a picnic table and fireplace.

Icehouse CCC Picnic Area is located at the base of the Pinal's along forest road 112. This busy day use picnic area is a trailhead and parking place for various forms of recreational use. There is a concrete vault restroom available for use from the 7 picnic sites, each with a picnic table, 6 of them with a fireplace.

Pioneer Pass Recreation Area is located in the Pinal's along forest road 112 between East Mountain and Pinal Peak. Besides camping, this area is used as a parking place for the three available trailheads, and to facilitate various other forms of recreation. There are 4 concrete vault restrooms available for use from the 22 camping sites, each with a picnic table and fireplace.

At the top of the Pinal's, roughly between Pinal Recreation Area and Upper Pinal Recreation Area there are 13 Recreation Residence Cabins. These privately owned cabins are under permit with the Tonto NF to remain on forest land through 12/31/2030. Ferndell Springs is the source of water for the water system that supplies these cabins. Not permanent residences, these cabins are vacation sites for their owners.

There are 30 electronic sites interspersed amongst the recreation areas and cabins at the top of the Pinal's. These sites are a source of constant maintenance for their various owners, whose trucks frequently travel up forest road 651, sometimes through the snow of winter. Electronic site owners range from small businesses to large corporate and governmental organizations.

The Tonto NF requires, and monitors, cabin and electronic site building and grounds maintenance.

There are 117 miles of road along 95 different roads in the project area. Forest Road 651 is the main route to the top of the mountain, while forest road 112 is the route to Pioneer Pass. Forest road 138 leads from town to the "pipeline" area which can also be entered from State Route 77 that bisects the eastern portion of the project area as it runs south to Tucson.

There are 37.5 miles of trails along 13 trails in the project area. The four main trails from the base of mountain to the top are the Sixshooter Canyon Trail (197), Icehouse Trail (198), Kellner Trail (242), and Telephone Trail (192). The Pipeline area has the Check Dam Trail (190) and the Toll Road Trail (200) which runs up to Pioneer Pass. The short Una Del Oso Trail (201) connects the Toll Road Trail (200) with forest road 112. Pioneer Pass hosts the East Mountain Trail (214) and the Pioneer Trail (196). The Bobtail Trail (194) starts on Pinal Peak in the project area and quickly runs out of it down the south side of the mountain. The Pineline Trail (193), Middle Trail (202) and Ferndell Trail (204) connect recreation areas and cabins on Pinal Peak.

In 1979 Sixshooter Canyon Trail (197) was designated a National Recreation Trail.

According to interviews with district personnel all of the following types of recreational activities have increased in the Pinal Mountains Recreation Area.

Camping: The developed recreation sites of the Pinal's are host to a variety of diverse groups and people throughout the spring, summer and fall. During the seasons for taking large game hunters fill the campsites. Many groups of Boy Scouts, Girl Scouts, church groups, and family camping groups from the Phoenix metropolitan area seek the cool, shady pines of the Pinal's for their yearly camping trip in the spring.

Hiking: For the most part, hiking in the Pinal's is day hiking, with little overnight backpacking. Hiking activity is year round, moving from lower elevations upward with the seasons.

Hunting: A year round activity in the Pinal's, hunting is heaviest during the deer, bear, and quail seasons. Hunters frequently use OHVs, hike, and sometimes camp for lengthy periods of time.

Mountain Bike Riding: There has been a steady increase in the popularity of the Pinal's as a destination for groups of people who ride mountain bikes. Often, mountain bike riders will shuttle their bikes and selves to the top of the mountain and ride back down the trails to meet their vehicle.

Horse Back Riding: Pioneer Pass Recreation Area and Icehouse CCC picnic area are frequent starting points for equestrian recreationists. Horse Back Riding is a year round activity and takes place on the roads and the trails.

Off Highway Vehicle Riding: Besides camping, OHV riding is very likely the most frequent recreational activity in the Pinal's. The pipeline area hosts an inordinate amount OHV use. People also recreate on dirt bikes, jeeps and four wheel drive trucks.

Bird Watching and Wildlife Viewing: As the highest point between the Salt and Gila rivers, Pinal Peak constitutes a "sky island". While it is north of the typical southeastern sky islands and isolated from the forests of the Mogollon Rim it shares birds from both regions. The Pinal's are now a frequent destination for bird watching groups and individuals, as well as

others wishing to view wildlife like Coues white-tailed deer, black bear, and javelina. Currently, discussion is underway for a potential partnership with the City of Globe to construct an eco-tourism/wildlife viewing trail linking Icehouse CCC Picnic Area and Kellner Reservation Recreation Area. Currently, Kellner Canyon is included in Bureau of Land Management's "Watchable Wildlife" program.

The Tonto NF Plan identifies a Recreation Opportunity Spectrum (ROS) class system to be used on forest lands, including the analysis area, to help guide development and management in order to provide a variety of recreation experiences desired by the public. These types of recreation experiences are described in Recreation Appendix 1. The table below shows the number and percentage of acres of each classification in the project area.

Table 14: ROS Acres by Recreation Experience Classification

Classification	Acres	Percentage
Semi-Primitive Motorized	12,726	45%
Roaded Natural	14,490	50%
Rural	1,322	5%
ROS Total	28,538	100%

Interviews with Globe Ranger District Recreation personnel indicated that at times there are conflicts between campers and livestock. When a pasture that includes a campground is grazed, recreation personnel receive frequent complaints about the presence of cattle feces and flies in the campsites, and occasional concerns over the safety of sharing campsites with large animals.

Globe Ranger District Recreation personnel indicated that at times livestock management practices, like placing salt or mineral blocks, have led to livestock congregating on and heavily impacting a short section of trail.

Recreation residence cabin owners have raised similar concerns over livestock. A barbed-wire fence at the top of the Pinal's surrounds the Recreation residence cabins, Pinal and Upper Pinal Recreation Areas, and most of the electronic sites, but is typically in a state of disrepair, as it is damaged by falling trees on a yearly basis.

There are a number of existing range improvements that are evident to a casual forest observer including; a water tank and trough at the trailhead of the Toll Road Trail, and a water tank along the road in the Icehouse CCC Picnic Area, a feeding trough along the Sixshooter Canyon Trail, and a plastic water trough at Sawmill Tunnel Spring, the junction of the Telephone Trail and Sixshooter Canyon Trail.

Effects:

Alternative 1:

This alternative would help the Forest manage the Pinal Mountain Recreation Area, Management Area 2D, for the Visual Quality Objective (VQO) of "Retention" where in

general "man's activities are not evident to the casual observer", especially if some of the existing range improvements along trails were removed. Accordingly, it would enable the Forest provide the Roaded Natural (RN) and Semi-Primitive Motorized (SPM) recreation opportunities called for in the Tonto NF Plan
.
This alternative would ease or eliminate conflicts between recreational use and livestock use in the project area.

Alternative 2 - Proposed Action

The proposed action is likely to perpetuate, or increase, conflicts between recreational use, campers and cabin owners, and livestock use. These conflicts could be alleviated by the addition of pasture fences (including the existing fence on Pinal Peak) to exclude developed recreation areas from the grazing allotments. These pasture fences should be placed out of the view of the recreation areas or constructed of natural materials (wooden split-rail fence for instance) where that is not possible. In addition, this alternative is likely to increase cattle impacts to campsites and trails unless salt and mineral blocks, and water troughs, are placed well away from them.

In general, the proposed range improvements will make it difficult for the Forest to manage the Pinal Mountain Recreation Area, Management Area 2D, for the Visual Quality Objective (VQO) of "Retention" where in general "man's activities are not evident to the casual observer". It will interfere with the Forest's ability to provide the Roaded Natural (RN) and Semi-Primitive Motorized (SPM) recreation opportunities called for in the Tonto NF Plan, unless they are constructed in a manner so as not to be evident to the casual observer.

Proposed Improvements

Sawmill Tunnel Spring: The proposed spring works and drinker would be evident to a casual observer from both the Six Shooter Canyon Trail (197) and the Telephone Trail (192). The wildlife drinker near these trails would very likely encourage cattle to congregate here and potentially damage either or both trails. This range improvement would better meet Forest ROS and VQO objectives if the closed spring works and piping were buried and lead to a drinker located well away from these trails.

Squaw Spring- the pipeline and water troughs from this improvement would be highly visible to a casual forest observer in Pioneer Pass Recreation Area, from forest road 112, from a long stretch of the Toll Road Trail (200), and from the Una Del Oso Trail (201). The water trough at the Mountain/West Harvey Pasture boundary fence would very likely lead to cattle congregating on these trails and potentially damage either or both trails. This range improvement would better meet Forest ROS and VQO objectives if the pipeline were moved or buried so as to not be visible, and led to a drinker located well away from these trails.

Bear Paw Spring: The drinker at Bear Paw Spring is evident to a casual observer from the East Mountain Trail (214), as new pipeline leading to it would be. Repairing this drinker near this trail may encourage cattle to congregate here and potentially damage this trail. This

range improvement would better meet Forest ROS and VQO objectives if it and the pipeline were moved well out of sight of the East Mountain Trail and forest road 112.

Pioneer Pass (Lower Corral) Improvement: Moving the water trough and storage tank from Toll Road Trailhead would help the Forest meet ROS and VQO objectives if they, and the corral, are placed well out of sight of the Toll Road Trailhead and forest road 112.

Pinal Peak Range Improvement: While this range improvement will have some visual impact, it is mitigated to some extent by being built in an existing barrow pit. If the existing fence surrounding the cabins, electronic sites and recreation areas of Pinal Peak is improved and used as a pasture fence to exclude this area from grazing, this corral and livestock trailing lane will help to keep cattle in grazing pastures, and out of recreation and electronic sites.

Ridge Pipelines: These range improvements will impede the Forest's ability to meet ROS and VQO objectives unless the pipelines are buried near trails and where they cross them, and they and the water troughs are placed in such a manner as to not be visible to a casual forest observer.

Alternative 3 –Increase in Numbers
Environmental consequences of Alternative 3 would be the same as for Alternative 2 with an increase in the likelihood of conflicts between recreational use and livestock use.

Desired Condition

The Tonto NF Plan directs the Forest to manage the Pinal Mountain Recreation Area, Management Area 2D, for a Visual Quality Objective (VQO) of "Retention" and "that in general means that man's activities are not evident to the casual forest observer" (Tonto NF Plan 81, 257).

In addition, the plan instructs the Forest to manage ROS classes according to the existing inventory (Tonto NF Plan 82) The ROS classes for the project area are primarily Roaded Natural (50%), where the "area is characterized by predominantly natural- appearing environments with moderate evidences of sight and sounds of man", and Semi-Primitive Motorized (45%) where the "area is characterized by a predominantly natural or natural-appearing environment" (Tonto NF Plan 245).

Given these directions from the Forest Plan, except where absolutely necessary (for instance fences leading away from cattle guards), range improvements need to be built, and existing ones moved, so that they are not evident to the casual observer. They should be placed out of site of the campsites, roads, and trails. Salt and mineral blocks, and water troughs, should be placed well away from trails and campsites.

The Forest Plan directs that the Pinal Mountain Recreation Area (2D) be managed "for dispersed and developed recreation opportunities" and "for sustained yield of livestock forage" (Tonto NF Plan 81). Conflicts between recreational use, campers and cabin owners,

and livestock use, could be alleviated by the addition of pasture fences (including the existing fence on Pinal Peak) to remove developed recreation areas from grazing allotments. These pasture fences should be placed out of view of recreation areas or constructed of natural materials (wooden split-rail fence for instance) where that is not possible.

Air and Water Quality

Existing Condition Air: Air quality for the analysis area is monitored by Arizona Department of Environmental Quality under direction from the Clean Air Act and Environmental Protection Agency, who provide National Ambient Air Quality Standards (NAAQS). The analysis area is not in a nonattainment area or maintenance area for regulated air pollution and the Proposed Action and alternatives are expected to have a minimal effect on air quality (ADEQ 2011).

Desired Condition Air: Projects related to the proposed action and alternatives are subject to NAAQS and should strive to keep particulate matter within those standards during normal operations or special projects.

Effects: Particulate matter (10 microns and smaller) dispersed during activities associated with livestock grazing management can penetrate human and animal lungs. Inhaling particulate matter 2.5 microns and smaller has been linked to increases in death rates, heart attacks, plaque and clotting, respiratory infections, asthma attacks, and cardiopulmonary obstructive disease (ADEQ 2011). Effects can be mitigated through proper site preparation and construction techniques and through site restoration following ground-disturbing activities. These effects could occur during livestock gathering (heavy trailing, increased vehicle movement) and during construction of range improvements. Effects would be minimized under a No Grazing Alternative without livestock gathering and trailing however use of roads in the area would still occur and construction of improvements for wildlife or recreational benefit could still occur on the allotment. Air quality may still be affected by activities on other active grazing allotments in the analysis area and by continued recreation and mining operations in the Globe area.

Existing Condition Water: Water Quality

The Arizona Department of Environmental Quality (ADEQ) evaluates the water quality status of waters within the state in a Nonpoint Source Assessment Report (ADEQ 2006/2008). No streams within the allotments have been monitored by the Arizona Department of Environmental Quality. Designated uses for non-ephemeral, unlisted tributaries above 5000 feet are aquatic and wildlife-cold water fisheries (A&Wc), fish consumption (FC), and full body contact recreation (FBC). Designated uses for non-ephemeral, unlisted tributaries below 5000 feet are aquatic and wildlife-warm water fisheries (A&Ww), FC, and FBC. Designated uses for ephemeral, unlisted tributaries are aquatic and wildlife-ephemeral water fisheries (A&We) and partial body contact recreation (PBC) (A.A.C. R18-11-105).

Desired Condition Water: ADEQ has jurisdiction from the Environmental Protection Agency to implement the Clean Water Act in Arizona. The Southwest Region has a Memorandum of Understanding with ADEQ in which the Forest Service agrees to use Best Management Practices for on-ground projects to continue “Attaining All Uses”.

Effects: Any potential impacts to water quality would be mitigated with Best Management Practices (BMPs).

Supporting documentation for this section can be found in the project record.

Climate

Existing Condition: Climate on these allotments is characterized by a bimodal precipitation pattern with about sixty percent occurring as frontal systems in winter from December to March and about forty percent occurring as monsoons in summer from July to September. Summer storms can be more intense than winter storms but are generally of shorter duration and smaller aerial extent.

The nearest climate gage to the allotments is located in Miami. The period of record for Miami is 1914-present and the average annual precipitation is 17.74 inches (NOAA 2012, WRCC 2012). The data indicates six of the last ten years (1992-2011) have had below normal precipitation, with 2002 being below 50% of normal. At the same gage the years 1999-2005 (the most recent years with sufficient data to evaluate) have all seen warmer than average temperatures (WRCC 2012).

According to the Arizona Drought Monitor Report (ADWR 2010), Arizona remains in a long-term drought, which has likely had an effect on the allotments. According to NOAA National Climatic Data Center data, there has been a marked upward trend in the globally averaged annual mean surface temperature since the mid-1970s (Shein, 2006). Models used by Seager et al. (2007) to predict how climate change will affect the southwestern United States indicate this region has begun the transition to a dryer climate which will continue into the 21st century. However, the models are too broad-scale to predict how climate change might affect monsoons, which contribute 40% of the total annual precipitation received on the Tonto NF (Lenart, 2005).

Desired Condition: USDA Strategic Plan for 2010-2015 sets a departmental goal to "ensure our national forests and private working lands are conserved, restored, and made more resilient to climate change, while enhancing our water resources." As a measure of this goal, all National Forests are to come into compliance with a climate change adaptation and mitigation strategy. The Plan and A Roadmap for Responding to Climate Change has been developed and is available on the agency's national website (http://www.fs.fed.us/climatechange/).

The Roadmap integrates land management, outreach, and sustainable operations accounting. It focuses on three kinds of activities: assessing current risks, vulnerabilities, policies, and gaps in knowledge; engaging partners in seeking solutions and learning from as well as educating the public and employees on climate change issues; and managing for resilience, in ecosystems as well as in human communities, through adaptation, mitigation, and sustainable consumption strategies. To measure agency progress in moving toward this goal, a Performance Scorecard has been implemented.

Effects: Research indicates livestock grazing may affect climate through emissions of methane gas produced by cattle (Gill, Smith and Wilkinson 2010). This effect, along with methane emissions from other ruminant animals, is anticipated to be minor in the analysis

area as cumulative livestock numbers are low and distributed broadly across the landscape for all grazing allotments on Globe RD. It would be difficult to separate effects of livestock emissions from those produced by other human activities, such as passenger vehicles and off-road vehicles traveling on roads in the analysis area, industrial activities such as mining, and outflow from major metropolitan areas such as Phoenix, Arizona, which lies approximately 60 miles west of the analysis area.

Livestock grazing may or may not affect climate by altering the abundance or type of carbon-sequestering vegetation available on the landscape (Brown, Valone, Curtin 1997; Asner et al 2004; SRM 2008). Implementation of Best Management Practices and utilization guidelines is anticipated to mitigate this effect across the analysis area.

Climatic fluctuations, on the other hand, can have a profound effect on livestock grazing. Implementing an adaptive management strategy will be critical for responding to these fluctuations by adjusting stocking rates as needed in periods of below average or above average precipitation to meet desired conditions for all resources.

Removal of livestock from the allotments through selection of a No Grazing Alternative would reduce emissions slightly however it would be difficult to measure this change. Emissions would continue to be generated from neighboring allotments in the analysis area. Eliminating grazing pressure on vegetation may also have a slight benefit for carbon sequestration; again, this would be difficult to measure on such a small scale.

Supporting documentation for this section can be found in the project record.

Socioeconomics

Capitan, Coolidge-Parker, Ranger Station allotments are located primarily in Gila County, where income is derived from a variety of sources including mining, state and federal employers, agriculture, and service and trade jobs.

Gila County, with a population of 51,335 (2000 Census), encompasses approximately 4,752 square miles. Within the county, ownership or administrative control occurs as follows: the US Forest Service -55.5% of the land, Apache Tribe -37%, individuals and corporations -3.7%, US Bureau of Land Management -1.9%and the state of Arizona –less than 1 percent (Arizona Department of Commerce, Gila County Profile). With little private land to assess property taxes, the county is dependent upon funding from the federal government. The US Government makes payments to Gila County under various programs, the two most important being:

1. Payments in Lieu of Taxes (PILT). These payments are made to the local governments based upon the acreage of federal land within the county, population, consumer price index and previous year payments. In 2012, Gila County was to receive approximately $3.271 million from this program.

2. Secure Rural Schools and Community Self Determination Act of 2000 (PL 106-393). Traditionally, the federal government had returned 25 percent of the revenues collected on Forest Service lands from grazing permits, timber sales, etc. to the counties on which these revenues were generated. With decreased timber sales and fees generated from grazing permits, the above Act was designed to "...restore stability and predictability to the annual payments made to States and counties containing National Forest System

lands and public domain lands managed by the Bureau of Land Management for use by the counties for the benefit of public schools, roads and other purposes." Under the legislation, the County would receive a fixed income from the federal government, regardless of the income generated on the federally administered lands. The amount is to be based on the average of the highest three years within a ten-year period. Gila County has elected to be funded under the Act, rather than continue to receive 25 percent of the revenues generated from the Forest Service System lands.

Social Environment

The social environment is perhaps the most diverse and emotionally charged arena in ecosystem management. The social environment for this analysis comprises the people living in and adjacent to the Tonto NF. Forest resources play an important social role for the people of the Southwest. The goods, services, and uses available from the National Forests represent major components in the lives of many residents within the area of the Tonto NF, especially those in rural areas.

Geographically this region has two types of very distinct population centers. There are several small rural communities scattered along and within the boundaries of the Forest. In addition, the Phoenix metropolitan area abuts the Forest along its western boundary. The smaller communities tend to rely at least partially on Forest resources (mining, ranching and timber) for their economic development. This is evidenced by the Gila County Land Use and Resource Policy Plan (LURPP) for public lands, which states, "Federal and state agencies need to recognize and take into account the critical role that public lands in Gila County play in the overall functioning of the County, and in the County's economy and tax base" (LURPP 1997). The Phoenix metropolitan area and Globe/ Miami area have experienced great population growths in recent years. The influx of people in recent decades has also brought about more diverse views and public opinion regarding appropriate uses of the public lands. The demand for recreational type activities on public lands is greatly increasing.

Few generalizations can be made about the communities across the Southwest. They are as diverse as the people who live there and due to the increasing desirability of the Southwest as a living location. The diversity is ever increasing. It should not be expected that all residents have the same or even similar points of view on various issues.

Lifestyles

Ranching and the grazing of domestic livestock have been a part of the Southwest culture for 400 years. Grazing sheep and cattle in the Southwest was introduced by the Spanish in the late 16th century. The tradition of an open range endured for several hundred years before Anglo-Americans arrived in the Southwest, and when they came, the new arrivals expanded the traditional pastoral practices into modem range-cattle and sheep industries. In the Southwest, the National Forests were of equal or greater importance to the people for their range resources as they were significant for timber, watershed or mineral resources (Baker et al. 1988)

Economic Impacts

According to the Arizona Department of Agriculture there are approximately 4,000 cattle and calves in Gila County, and agriculture as a whole brings over $8,000,000 into the economy of

Gila County. Information from the University of Arizona estimates that livestock sales for the county, based on 2002 census information, generated approximately $2,392,000. Livestock grazing in Gila County potentially affects permittees, who contribute a portion of the cost of range improvements, pay grazing fees, and receive economic returns on their investments in livestock grazing. Most permittees on the Globe Ranger District supplement their ranching incomes with other sources of income.

Federal government receipts are calculated based on the 2012 grazing fee of $1.35 per animal (cattle and horses). The USDA Forest Service benefits from the collection of grazing fees and expends those fees along with appropriated tax dollars to construct range improvements and administer grazing permits. Payment to Gila County is 25% of total government receipts. The remaining 75% of fees are returned to the Forest Service.

Federal grazing privileges, specifically permit numbers, are often considered in determining the value of base property associated with an allotment. Banks, lending agencies and local taxing authorities sometimes recognize a value associated with a permit. However, the US Forest Service does not recognize a value associated with term grazing permits and permittees do not hold property rights to grazing allotments. As such, these values will not be discussed in this analysis.

Research is available that discusses the influence stocking rates can have on economic returns. Generally, heavier stocking rates result in the greatest gross economic returns, while moderate stocking rates maximize net economic returns (Holechek 1998). Over time, heavy stocking tends to result in higher death loss, a greater need for supplemental feeding, especially in years of below average precipitation, and lower weaning weight percentages. Under heavy stocking rates, livestock tend to make high gains for a few years, especially when precipitation remains at average or above average levels. However, during drier periods, livestock productivity tends to reduce per animal unit and per unit area. The severity of reduction is related to the stocking density, i.e. heavier stocking rates result in more severe reductions in economic returns than moderate stocking rates, especially in drought years. Under the adaptive management proposal, desirable stocking rates would be moderate over the long-term to achieve desired resource conditions.

A No Grazing alternative will not affect future payments received through PILT or PL 106-393. Globe and Gila County could be affected by a No Grazing alternative due to the amount of money made by permittees and how much is spent in the local economy. This is related to a multiplier effect, or that monies spent in a community are often re-spent. Multipliers in rural communities are generally lower than for large municipal areas as expenditures for large ticket items are usually made outside the local area. Multipliers of 1.25 to 1.75 are common in rural areas associated with adjacent public lands (Loomis, 1993).

Social Impacts

Ranching and the grazing of domestic livestock have been a part of the Southwest culture for 400 years. Grazing sheep and cattle in the Southwest was introduced by the Spanish in the late 16th century. The tradition of an open range endured for several hundred years before Anglo-Americans arrived in the Southwest, and when they came, the new arrivals expanded the traditional pastoral practices into modern range-cattle and sheep industries. In the Southwest, the national forests were of equal or greater importance to the people for their range resources, as they were significant for timber, watershed, or mineral resources (Baker, 1988).

Effects to lifestyle, personal values, and attitudes are hard to quantify and explain. Effects to individuals will vary greatly depending on each individual's personal operation and values. The effect of change on any individual permittee would vary depending on the size of loss or gain, the financial condition of the operation, the price of the product at market, operating costs, and dependency on federal lands for their operation, diversity of their household income, and desire to remain in the ranching business. These factors are very individualistic, and as such, are hard to specifically quantify. Additionally, much of this information is of a personal nature and not readily shared with others in a public domain. As a result, this analysis can only generalize the social effects of the alternatives considered.

Removal of livestock from the allotments could result in loss of some of the culture and lifestyle tied to ranching. Implementing the No Grazing alternative could intensify feelings of mistrust, loss of personal control, and threaten lifestyles, resulting in negative attitudes towards the Forest Service and other federal agencies in general. Conversely, those individuals who perceive grazing to be an unsuitable use of federal lands may feel increased trust and increased positive attitude towards the Forest Service and other federal agencies in general. These individuals may perceive an increased social benefit from livestock removal.

Personal characteristics such as self-sufficiency, independence, hard work, and other traits associated with the ranching lifestyle would most likely be protected under the Proposed Action and Alternative 3. Continuation of the ranching operation in a sustainable manner will provide for continuation of the culture and lifestyle tied to ranching in this area.

Conversely, those individuals who perceive grazing to be an unsuitable use of federal lands may feel decreased trust and increased negative attitude towards the Forest Service, and other federal agencies in general. These individuals may perceive a decreased social benefit from continuing grazing.

Supporting documentation for this section can be found in the project record.

Environmental Justice

Environmental justice (EJ) is the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Toward attaining EJ for all communities and persons in the United States, Executive Order 12898 (February 11, 1994) directed all Federal agencies to evaluate their proposed actions to determine the potential for disproportionate adverse impacts to minority and low-income populations.

In the memorandum to heads of departments and agencies that accompanied Executive Order 12898, the President specifically recognized the importance of procedures under NEPA for identifying and addressing environmental justice concerns. The memorandum states that “each Federal agency shall analyze the environmental effects, including human health, economic and social effects, of Federal actions, including effects on minority communities and low-income communities, when such analysis is required by [NEPA].”

Implementation of the Proposed Action, No Grazing Alternative, or Alternative Three as evaluated in this EA would not cause adverse impacts to environmental justice concerns.

CONSULTATION AND COORDINATION

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

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FEDERAL, STATE, AND LOCAL AGENCIES:

Arizona Department of Environmental Quality
City of Globe
Southern Gila County Economic Development Corporation
John McCain
Arizona Game and Fish Department
Globe Chamber of Commerce
Gila County Supervisors
US Fish and Wildlife Service
Gila County Extension Service
John Kyl

TRIBES:

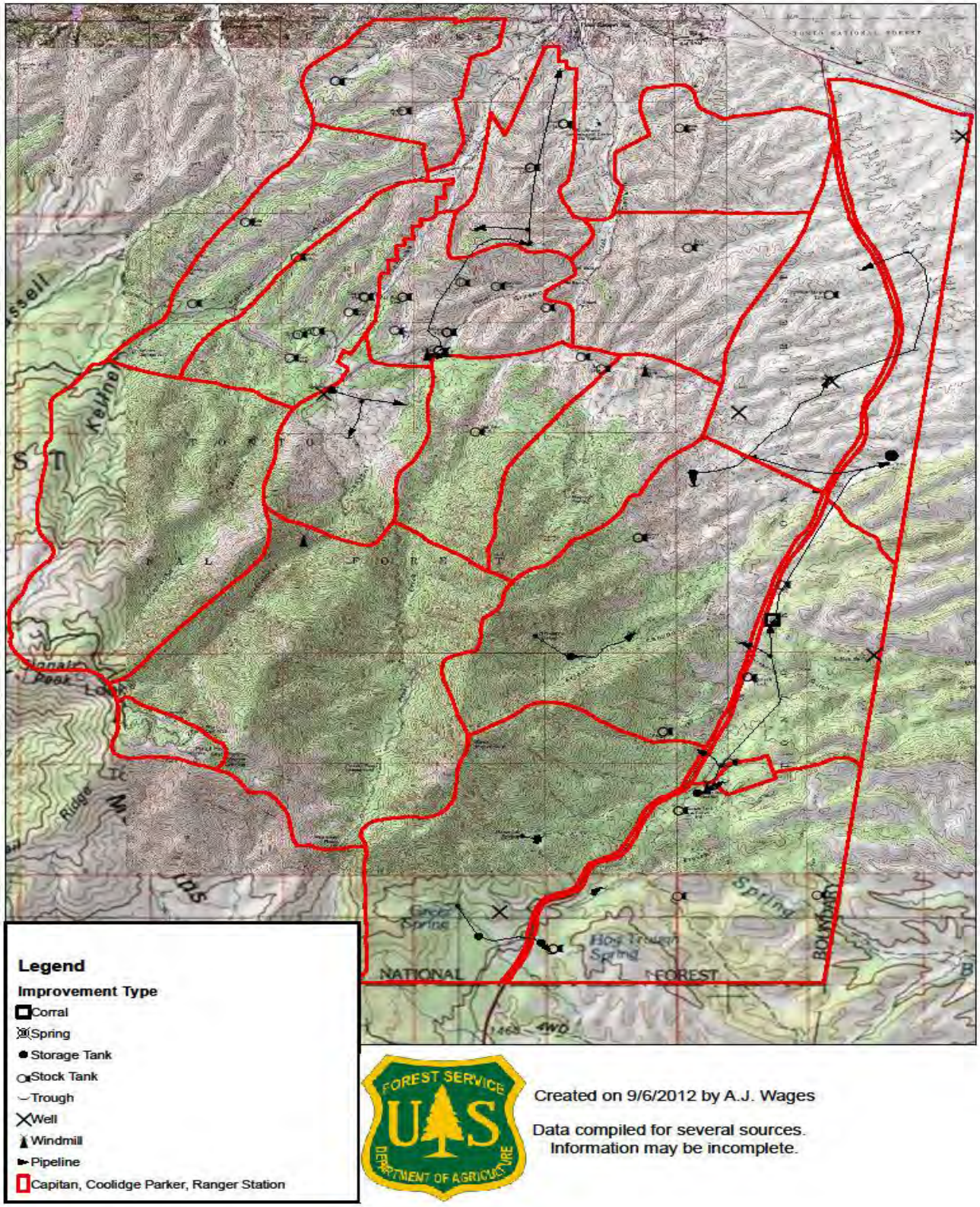
Yavapai Apache Nation
White Mountain Apache Tribe
Salt River- Pima-Maricopa Indian Community
The Hopi Tribe
Yavapai Prescott Tribe
Tonto Apache Tribe
Pueblo of Zuni
Fort McDowell Yavapai Nation
San Carlo Apache Tribe

OTHERS:

Center for Biological Diversity
Forest Conservation Council
Forest Guardians
Sierra Club
Arizona Wildlife Federation
Audubon Society
Western Watersheds Project

APPENDIX A- RANGE IMPROVEMENT MAPS

Capitan, Coolidge Parker, Ranger Station Existing Improvements



Created on 9/6/2012 by A.J. Wages

Data compiled for several sources. Information may be incomplete.

Capitan, Coolidge Parker, Ranger Station Proposed Improvements