USDA

United States
Department of
Agriculture

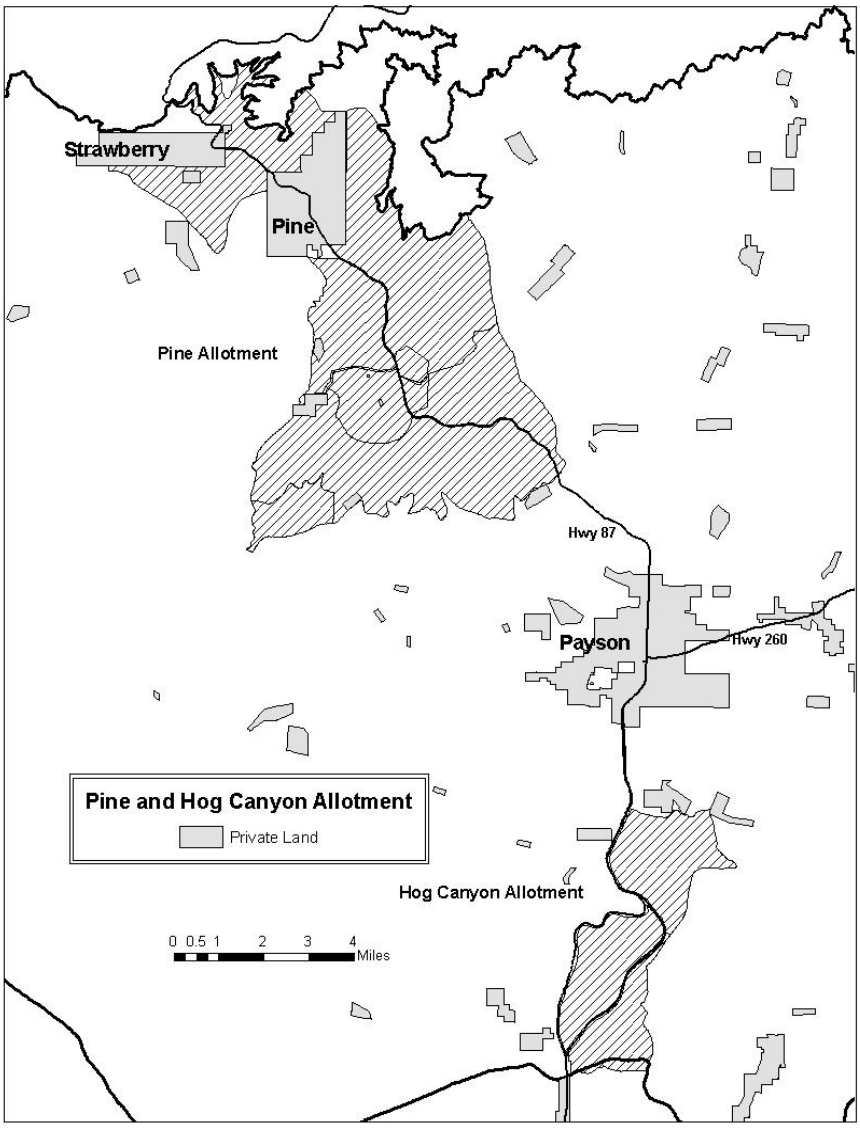
Forest
Service

September 2010

Environmental Assessment

Pine/Hog Canyon Allotments Analysis

Payson Ranger District, Tonto National Forest, Gila County, Arizona



Printed on recycled paper – September 2010

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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 the following sections:

- *Purpose and Need:* The section includes information on 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.
- *Description and Comparison of Alternatives, including the Proposed Action:* This section provides a more detailed description of the agency's proposed action, as well as any alternative methods for achieving the stated purpose. These 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:* This section 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:* This section provides a list of preparers and agencies consulted during the development of the environmental assessment.
- *Appendices:* The appendices provide more detailed information to support the analyses presented in the environmental assessment.

Additional documentation, including more detailed analyses of project area resources, is on file in the project planning record located at the Payson Ranger District Office, 1009 E. Hwy 260, Payson, AZ 85541. Throughout this EA, references to supporting documentation are shown in parentheses. For example, a reference "(PR 21)" would indicate that a specific passage in the EA is linked to information contained in document No. 21 in the project record. Terms are defined in Appendix A.

Purpose and Need for Action

The actions' purpose and need is to reauthorize livestock grazing in a manner that maintains and/or moves the area toward Tonto National Forest Land Management Plan (LMP) objectives and desired conditions.

Background

History and Management

Location and Setting. The combined allotments consist of about 35,820 acres of Forest system lands. The Pine Allotment is at the north end of the Payson Ranger District (Payson RD), bordering both communities of Pine and Strawberry. The Hog Canyon Allotment is

geographically separated and is at the south end of the District bordering the communities of Round Valley and Rye. State Highway 87 (Beeline Highway) crosses both allotments. Elevations range from about 3,200 feet in the Hog Canyon drainage to around 7,000 feet at the top of the Mogollon Rim that serves as the northern boundary of the Pine Allotment. Vegetation adheres to typical elevation regimes; ponderosa pine and mixed conifer are present at the highest elevations, piñyon/juniper woodlands and interior chaparral are present in transition zones, with semi-desert grasslands at the lower elevations. Riparian habitat is found along Pine Creek, Sycamore Creek, and at several reliable springs in Hog Canyon and Sycamore Wash.

Management History. Pine/Hog Canyon allotments have been managed together since about 1977. Prior to this, each was a separate yearlong grazing allotment with separate term permits and pasture rotations. The current term permit authorizes up to 223 adult cow/calf pairs for the period from November 1 through May 31; from June 1 through October 31 cattle numbers vary between 90 cow/calf pairs in even-numbered years and 176 cow/calf pairs in odd years. The variable summer numbers occur because the permittee also holds a term grazing permit on the Coconino National Forest for the summer use period (Baker Lake/Calf Pen allotments). The current Allotment Management Plan (AMP), signed August 26, 1985, only addresses the Pine/Hog Canyon allotments.

There are 8 main pastures and 2 holding pastures on the Pine Allotment (see figure 1), and 3 main pastures on the Hog Canyon Allotment (see figure 2). These have been managed under a deferred rest-rotation grazing strategy. The current winter/spring,November toMay, pastures are White Hills, Round Valley, Gilmore, Hog Canyon and the summer/fall pastures,June toOctober, are Strawberry Mountain, Strawberry Point, Red Hills, Cedar Mesa, Telephone Draw, and Connolly Point. The approved AMP lists Connolly Point as a summer pasture, although in recent years it has been used in winter. Holding pastures are Buckhead North and South, which are typically used in spring or fall for gathering and shipping. Actual use records compiled since 1977, when the allotments were first managed together, show an average stocking rate of 136 adult cattle yearlong (CYL).

Stocking Levels. Actual use records compiled since 1977 show an average stocking of 1,634 Animal-Months from 1977-2009 (PR 4) or136 adult cattle yearlong (CYL). Animal-Months are calculated by multiplying the number of head of livestock by the number of months on the range. It does not take into account forage consumption rates for different classes of livestock and does not represent range capacity. The stocking range between 1977 and 2009 ranges from 0 to 213 CYL. The allotment has been stocked very lightly since 2001. The prolonged drought in 2002 resulted in the allotment being completely destocked. The allotment changed hands twice since the drought, and was stocked briefly between 2004 and 2006 with between 35-55 adult cattle. From 2007 to 2010 the allotment has been in total non-use for resource protection. A 1961 Range Analysis study showed that there was capacity to support 130 adult cattle yearlong and 102 yearlings for 5 months between both allotments. This would be equivalent to 2,070 Animal-Months (173 CYL), or 1,918 Animal Unit Months (AUMs). The proposed upper stocking limit is 185 cow-calf pairs yearlong, which is equivalent to 2,220 Animal-Months. This level of stocking is 7 percent higher than the 1961 range analysis would indicate. This stocking level would only be achievable under the most beneficial climatic conditions. Vegetation management projects such as juniper thinning and prescribed burning activities would also need to be implemented to maximize forage availability to allow for sustained higher stocking levels.

Figure 1: Current Pasture Configuration and Allotment Location for Pine Allotment

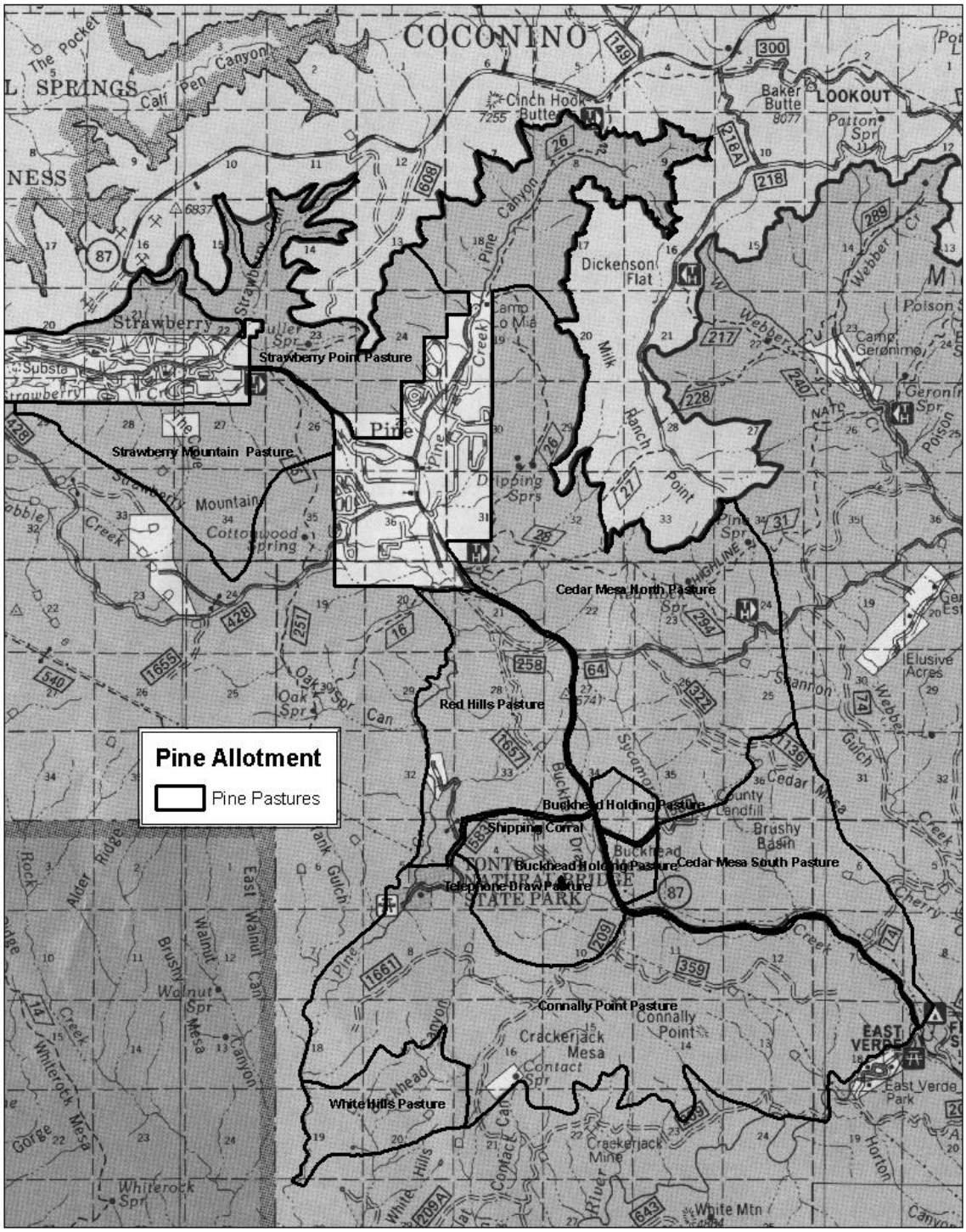
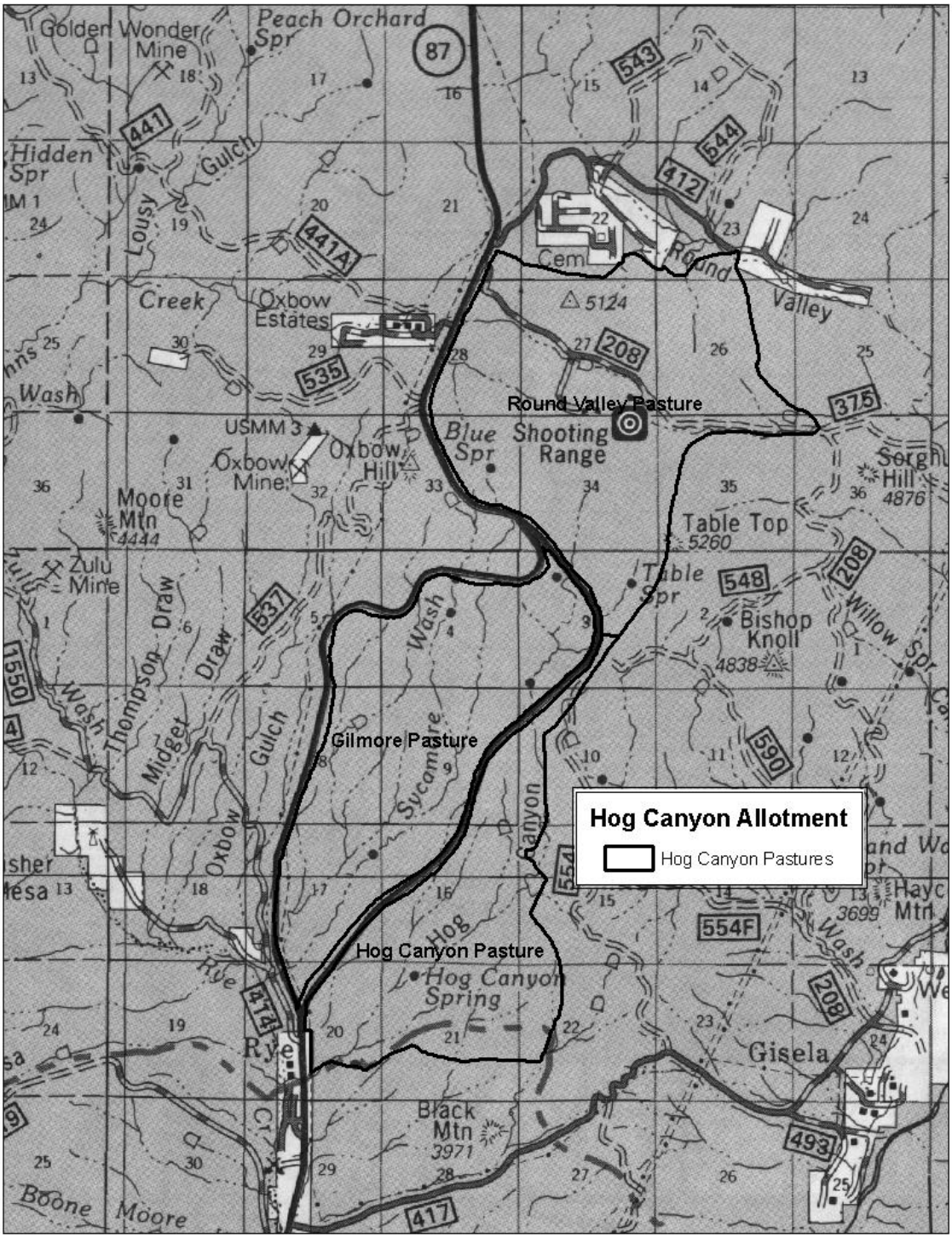


Figure 2: Current Pasture Configuration and Allotment Location for Hog Canyon Allotment



Existing Conditions

Range condition was evaluated at 8 key areas on the Pine Allotment and 7 key areas on the Hog Canyon Allotment between 2003 and 2009 (PR 5). The Parker Three-Step Method (Region 3 FSH 2209.21) for evaluating range condition was employed for either pace transects or permanent fixed transects. Table 1 summarizes range condition.

Table 1: Summary of Parker Three-Step Range Condition/Groundcover:

Pine Allotment					
Pasture	**Key Area**	**Vegetation Condition/Trend**	**Soil/Watershed Stability/Trend**	**Effective Groundcover (%)**	**Year Collected**
Buckhead Holding S.	Pace E-W	51, Fair/Stable	45, Fair/Stable	44	2008
Connally Point	C-2 Pace	30, Poor/Down	38, Poor/Down	23	2003
	KA-2 Pace, East Pasture	47, Fair/Stable	73, Good/Stable	54	2009
Red Hills	C-5 pace, South pasture	45, Fair/Down	41, Fair/Down	37	2003
	Pace A, North pasture	34, Poor/Stable	76, Good/Stable	84	2003
Strawberry Mtn.	Pace B, The Cove	27, Poor/Down	63, Good/Stable	78	2003
Telephone Draw	C-6 Pace	46, Fair/Up	44, Fair/Up	38	2008
White Hills	P-1 Pace	26, Poor/Down	48, Fair/Stable	41	2003
Hog Canyon					
Pasture	**Key Area**	**Vegetation Condition/Trend**	**Soil/Watershed Stability/Trend**	**Effective Groundcover (%)**	
Gilmore	C-4, north	37, Poor/Down	39, Poor/Down	10	2007
	P-3 Pace, mid	25, Poor/Stable	35, Poor/Stable	9	2005
Hog Canyon	P-1 Pace, mid	23, Poor/Down	47, Fair/Stable	35	2003
	P-2 Pace, east	17, Very Poor/Stable	35, Poor/Stable	27	2004
	PA Pace, north	44, Fair/Stable	44, Fair/Stable	27	2005
Round Valley	P-5 Pace, north	31, Poor/Stable	39, Poor/Stable	25	2004
	KA-1 Pace, south	56, Fair/Stable	52, Fair/Stable	54	2009

Parker Three-Step method provides an evaluation of vegetation condition as related to the grazing preferences of cattle. The vegetation rating is a combination of scores for species composition, forage plant cover, and plant vigor. Vegetation condition rated as "fair" by this method is characterized by a satisfactory mix of desirable forage species, with adequate cover and vigor to provide quality grassland habitat. Six of the 15 monitoring sites exhibit fair or better condition. The remaining 9 sites that show poor or very poor condition have either a poor mix of desirable forage species or inadequate cover from desirable plants. There is a downward trend at 6 of the sites. When most were evaluated in 2003, there had been severe drought for the previous year. Many perennial grasses had died, which negatively affected forage plant cover and apparent trend of the vegetative resource. It is a management prescription for Management Areas 4D and 4F to maintain or achieve satisfactory range condition; rangeland in less than satisfactory condition will be treated with improved grazing management.

Relative abundance of plant species and ground cover elements as determined by Parker Three-Step monitoring methodology can be compared with the potential vegetation composition as expressed in the description for the Terrestrial Ecosystem Survey (TES) map units from the 1985 North Tonto TES report. The TES map unit description also provides expected ground cover in the categories of percent rock, litter, basal vegetation, and bare soil. For the 15 key areas evaluated, the existing species mix is similar to the expected species mix, but key areas selected to evaluate cattle impacts are generally more grass-dominated than what is expected in the potential plant community for the map units. The actual ground cover percentages for the key areas is generally in agreement with the expected ground cover ratios as shown for the TES map units (PR 6 and District 2210 Files).

Departure of existing conditions from desired conditions provides the basis for developing the purpose and need for the proposed action. It is a desired condition to achieve or maintain satisfactory cover, species composition, and vigor of perennial forage grasses; this is not being met at 9 of the 15 monitoring areas. Key areas at Connally Point C-2, Red Hills Pace A, White Hills P-1, Strawberry Mountain Pasture Pace B, Hog Canyon P-1 and P-2, Gilmore C-4 and P-3, and Round Valley P-5 are not achieving this management objective. The management objective of maintaining a minimum of 30 percent effective groundcover for watershed protection is not being met at 6 key areas. Those within 5 percentage points of achieving this are Round Valley Pasture P-5, Hog Canyon Pasture P-2 and PA. Those needing the most improvement are within Gilmore Pasture (both C-4 and P-3) and Connally Point Pasture C-2.

Terrestrial Ecosystem Units (TEU) for both monitoring sites in Gilmore Pasture is an Aridic Haplustalf (PR 6). The expected amount of bare ground for this specific TEU is 60 percent, while actual bare ground for the Gilmore pasture, C-4 and P-3,is 60 percent. Connally Point C-2 site has an expected bare ground of 50 percent while the actual measured bare ground was 49 percent, in 2003. Generally, TEU should be considered when choosing key areas to monitor progress towards watershed protection goals. These 3 sites are at potential, and likely do not have the ability to achieve 30 percent effective groundcover. There are vegetation treatments approved through several Wildland Urban Interface (WUI) projects that will benefit forage and watershed values. Connally Point C-2, Red Hills Pace A, and Strawberry Mountain Pace B have treatments completed or scheduled since range condition was last evaluated.

Soils. Satisfactory soil condition class covers about 90 percent (32,201 acres) of Pine and Hog Canyon Allotments. These soils are generally found on steep or extremely rocky slopes, under ponderosa pine forests, mixed conifer forests, or chaparral. Nine percent of the soils (3,322 acres)

are impaired soils. These soils tend to occur on flats and low hills. Moderate compaction may occur and litter is normally sparse. Unsatisfactory soil condition class makes up 1 percent (270 acres) in the allotment. Most of the unsatisfactory soils occur in flats within semi-desert grasslands. These soils have high amounts of surface compaction, poor soil porosity and poor root distribution. Unsatisfactory soils on steeper slopes have moderate compaction, but a large amount of sheet and rill erosion. All the sites have very poor diversity, density, and composition of perennial grasses and little litter cover.

Riparian Areas. There are about 46 miles of perennial and intermittent streams named on United Stated Geologic Service (USGS) topographic maps within the Pine and Hog Canyon allotments. In addition to these named streams, there are several miles of unnamed headwaters and tributaries to these in the stream channel network. All of these channels provide important functions relating to water quality, flooding, hydrological connectivity, and wildlife habitat. (Levick, et al., 2007).

Based on existing information, two riparian areas in two pastures were selected as key reaches for the Pine Allotment; Pine Creek in the Red Hills Pasture and Sycamore Creek in the Connally Point Pasture. On the Hog Canyon Allotment, four riparian areas dependent on in-channel springs were identified as key reaches from the 12 miles of stream channels. These are Grapevine Spring (also called Hog Canyon Spring) in Hog Canyon Pasture; Upper Hog Canyon Spring, Unnamed Spring in Section 4 of upper Sycamore Wash, and Grapevine Spring in Gilmore Pasture. Current condition has only been assessed for some of the critical reaches. Pine Creek below the private land is considered impaired; Sycamore Creek in Connally Point Pasture is both impaired and slightly impaired; Grapevine Spring in Gilmore Pasture is stable. Key reaches are selected by the interdisciplinary team for the purpose of describing desired conditions and developing management objectives for riparian areas on the Pine and Hog Canyon allotments.

Climate. Climate on the Pine and Hog Canyon allotments is characterized by a bimodal precipitation pattern with about 60 percent occurring as frontal systems in the winter from December to March and about 40 percent occurring as monsoons in the 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 gages to the allotments are in Payson and Gisela. The period of record for Payson is 1948 – present and the average annual precipitation is 22.07 inches (WRCC, 2009; NOAA, 2009). The data indicate seven of the last ten years (1998-2007) have had below average precipitation, with 2002 being below 50 percent of average. At the same gage, eight of the ten years 1996 – 2005 (the most recent years that have adequate data to analyze) have seen warmer than average temperatures (WRCC, 2009).

Wildlife. The project area provides habitat for a variety of big and small game species including elk, deer, javelina, turkey, and quail. Species and or habitat subject to protective measures under the *Endangered Species Act* that may occur in the project area include Mexican spotted owls and Chiricahua leopard frogs. Recent surveys have not shown presence of either species in the project area. There are several species listed as Forest Service sensitive species as well. A Biological Assessment and Evaluation is prepared to addresses effects to species of concern.

Management Direction

The Tonto National Forest LMP, as amended, identifies the following goals for the range program on the Forest (U.S.F.S., 1985).

Management Prescriptions - All Management Areas

- Maintain a minimum of 30 percent effective ground cover for watershed protection and forage production, especially in primary wildlife forage producing areas. Where less than 30 percent exists, it will be the management goal to obtain a minimum of 30 percent effective ground cover (p. 40-1).

- Forage use by grazing ungulates will be maintained at or above a condition, which ensures recovery and continued existence of threatened and endangered species (p. 42).

- Provide wildlife access and escape on all livestock and wildlife water developments (p. 42).

Management Area 4D – Mogollon Rim area, Payson Ranger District

Emphasis: Manage for a variety of renewable resource outputs with primary emphasis on intensive, sustained yield timber management, timber resource protection, creation of wildlife habitat diversity, and increased population of emphasis harvest species and recreation opportunity. Visual quality is to be emphasized.

Management Area 4F – All other lands on the Payson Ranger District

Vegetation consists of riparian, semi-desert grassland, chaparral/piñyon -juniper and scattered ponderosa pine-juniper.

Emphasis – Manage for a variety of renewable natural resources with primary emphasis on wildlife habitat improvement, livestock forage production, and dispersed recreation. Watershed will be managed to improve them to a satisfactory or better condition. Improve and manage the included riparian areas (as defined by FSM 2526) to benefit riparian depended resources.

Grazing Management for 4D and 4F – Manage suitable rangelands at Level D. Rangeland in less than satisfactory condition will be treated with improved grazing management along with the installation of structural and non-structural improvements. Develop structural improvements in association with AMP to maintain utilization at levels appropriate with management intensity and AMP objectives.

Desired Conditions

Adaptive management decisions are anticipated to outlive the typical 10-year life of previous grazing decisions, so it is reasonable to consider desired conditions that may take a longer period of time to achieve. Based on Tonto National Forest Plan guidance, Forest Service Manual (FSM) direction, and site specific knowledge of this allotment, the following objectives constitute the desired condition for the project area.

Vegetation

- Species composition of forage grasses is a diverse mix of cool and warm season varieties; forage plants are vigorous, with a healthy root system capable of efficient harvest of rainfall.
- Increase cover of native herbaceous species with an ultimate goal of achieving ecosystem potential.
- Increase plant basal area and litter.
- In grasslands, increase the foliar canopy coverage, basal cover, and vigor of grass species that decrease under grazing pressure.
- In chaparral, increase the foliar canopy cover and vigor of shrub species preferred by grazing animals. They include, but are not limited to, desert ceanothus, mountain mahogany, and Wright silktassel. (FSH 2209.21 R-3)

Soils

- Soils in satisfactory condition will be maintained through management practices; soils in less than satisfactory condition will be treated with improved management to move towards satisfactory condition.
- Soils are well-protected by vegetation, litter, or rock and show minimal evidence of current sheet or rill erosion. Soil compaction and disturbance is minimized to maintain resource values and sustain outputs.
- Maintain or be moving toward satisfactory watershed condition (U.S.F.S., 1985, p. 44) and a minimum of 30 percent effective ground cover (U.S.F.S., 1985, p. 40).

Rangeland Management

- Livestock are well-distributed within pastures to allow more uniform conservative utilization of forage resources and diminish concentration areas.
- Structural range improvements necessary to accomplish management are maintained in proper working condition.

Riparian Areas

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 percent (or 5 percent to 25 percent for reaches now at trace to 1 percent);
- Decrease the greenline to greenline width;
- Optimize the establishment of floodplains and streambanks; and
- Improve stream channel function and stability.

Wildlife

- General wildlife resource goals 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 (U.S.F.S., 1985).
- Forage use by grazing ungulates will be maintained at or above a condition, which ensures recovery and continued existence of threatened and endangered species.
- In riparian areas across the allotment, regeneration of vegetation to achieve multiple age classes and complex vegetative structure for fish and wildlife habitat is desired.
- Specific management objectives for big game species are identified in the Tonto National Forest LMP and the Wildlife 2006 Strategic Plan (AZGFD, 2001). Strategic Plan goals for game species (including big and small game) include the following:
    - Maintain, enhance, and restore populations of game wildlife to provide for recreational opportunities, including wildlife viewing;
    - Minimize adverse impacts to wildlife and wildlife resources.
- Stubble height within northern goshawk breeding habitat, and within spotted owl and turkey foraging habitat is not reduced below 3 inches at anytime during the year.
- Sixty percent of key forage species produce seed heads that are carried through winter into the spring.
- Dependable water sources every 1 mile, preferably every ½ mile. Browse species are abundant and robust.

Proposed Action

In compliance with Forest Service policy and Forest Plan objectives, the Payson Ranger District proposes to continue to authorize grazing on the Pine and Hog Canyon allotments. Grazing authorizations would be accomplished through the issuance of new 10-year term grazing permits in accordance with FSH 2209.13. New allotment management plans (AMP's) would be prepared for the allotments and would be included as Part 3 of any new term grazing permits issued. The AMP's will describe:

1) The management objectives for the 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.

Decision Framework

The Payson District Ranger is the responsible official for decisions regarding management of the Pine and Hog Canyon allotments. Based in part on the results of the NEPA analysis, the District Ranger (responsible official) will issue a decision document or documents that include(s) a determination of the significance of the environmental effects and whether an environmental impact statement will be prepared. If the responsible officer determines that there are no significant impacts, the decision will be documented in a Finding of No Significant Impacts (FONSI) /Decision Notice and implemented through the issuance of a new 10-year Term Grazing Permit and an AMP. If there is a FONSI, an environmental impact statement will be prepared. The decision(s) will also include a determination of consistency with the Forest Plan, *National Forest Management Act*, *National Environmental Policy Act* and applicable laws, regulations and executive orders.

If the District Ranger determines it is not necessary to prepare an environmental impact statement, a decision will be made between alternatives analyzed in this environmental assessement. If grazing continues to be authorized, the District Ranger would determine which management actions, mitigation measures and monitoring requirements would be prescribed in the AMP, including permitted number of animals, season(s) of use, allowable utilization standards, and the term of the permit.

Public Involvement

The project to develop an updated AMP for the Pine/Hog Canyon allotments has been listed in the *Schedule of Proposed Actions* since January 2009. The proposed action was presented for public comment in a letter sent on April 17, 2009. The purpose of the document was to describe the proposed action to any interested/affected parties and solicit comments. The scoping document was sent to the following: 21 individuals, 12 private organizations, 18 representatives from local tribes, 10 state/county/town of Payson officials and 2 federal agencies. From these scoping activities, 8 responses were received. The Forest performed a content analysis on the comments received to determine if any significant issues were presented. The content analysis is located in the project record (PR 21).

Issues

The Forest Service separated the 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, Forest 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 for 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.

No significant issues identified by the comments were received.

Chapter 2 - Alternatives, including the Proposed Action

This chapter describes and compares the alternatives considered for the management of the Pine/Hog Canyon Allotment. This section presents the alternatives in comparative form, in order to define the differences between each alternative and provide a clear basis for choice among options by the decision maker and the public. Mitigation and monitoring measures incorporated into the alternatives are also described.

Alternatives Eliminated From Detailed Study

No additional alternatives were eliminated from detailed study, because scoping efforts did not result in identification of issues that could not be addressed through project design or mitigation measures.

Alternatives

Alternative 1 - *No Action*

The term grazing permit for the Pine/Hog Canyon Allotment would be cancelled in accordance with Forest Service Policy. Following the guidance in Forest Service Manual 2231.62, twenty percent of the permitted numbers from the face of each term grazing permit would be removed from the allotment each year until no more grazing is permitted (5 years).

Alternative 2 - *The Proposed Action*

The Payson Ranger District, Tonto National Forest, proposes to continue livestock grazing on the Pine/Hog Canyon Allotment under the following terms:

A. ***Permitted Livestock Numbers***: Initial stocking rate of no more than 50 cow/calf pairs (equivalent to 792 Animal Unit Months) until existing range improvements are maintained to standards in enough pastures to support a pasture rotation. Based on monitoring of forage resources and range improvements, stocking levels will be increased up to the proposed maximum of 185 cow/calf pairs, or 2,930 Animal Unit Months (AUMs). This is not likely achievable until desired conditions for vegetation and soil have been reached in key areas and measures are implemented to improve livestock distribution. Sustained stocking at higher levels will depend on favorable climatic conditions and is likely to depend on implementation of vegetation improvement practices (i.e. thinning, burning).

B. ***Utilization Levels:*** A management guideline of conservative use (30-40 percent forage utilization as measured at the end of the growing season) over the long term will be employed to maintain or improve rangeland vegetation and long-term soil productivity. Allowable use guideline for desirable browse species is less than 50 percent of current year's growth. Within riparian areas, allowable use guideline is less than 50 percent of terminal leaders browsed on the woody vegetation, and less than 40 percent of total biomass removed for riparian herbaceous species. Grazing intensity may be measured before and during the growing season and can be a tool to manage livestock, so that expectations of end-of-growing season utilization measurements can be achieved.

C. ***Grazing System:*** Ten main pastures will be used in a grazing rotation incorporating rest and deferment as needed to achieve desired resource conditions. Number of pastures used in a given year will depend on herd size. Pasture use periods will be kept flexible to the extent possible. Those pastures at higher elevations have typically been used in spring/summer (May through October) and include: Red Hills, Strawberry Mountain, Strawberry Point, Telephone Draw, Cedar Mesa North and South, and Buckhead holding north and south. Those pastures at lower elevations typically used in fall/winter (November through April) are Connally Point, White Hills, Round Valley, Hog Canyon, and Gilmore. The Strawberry Point Pasture would be limited use only; depending on maintenance of the fence around the towns of Pine and Strawberry. Actual pasture season of use each year will depend on observed resource conditions and herd size. The grazing period within each pasture will be based upon weather/climate conditions, current growing conditions and the need to provide for plant re-growth following grazing. The length of the grazing period within each pasture will also consider and manage for the desired grazing intensity and utilization guidelines.

D. ***Rest/Deferment:*** Generally pastures will be grazed only once during the grazing year. However, if the need arises to provide rest (or deferment) for other pastures, a pasture may be used twice provided there has been sufficient vegetative growth/re-growth and grazing is managed within the intensity and utilization guidelines.

E. ***Improvements:*** These improvements have been identified as possible practices to assist in the achievement of desired conditions, if grazing management alone is not sufficient (also see Figure 3 and 4). Future monitoring may indicate that some of these projects are not necessary, in which case they would not be implemented; however, if some or all improvements are not implemented, the upper limits of permitted livestock numbers may not be achievable.
    - Trap fencing around existing and planned water developments in order to better control livestock distribution, as needed.
    - Water developments by pasture: Strawberry Mountain (1); Red Hills (1); Telephone Draw (1); Connally Point (2); Round Valley (1); Hog Canyon (2)
    - Add 2 new troughs and up to ½ mile of pipeline to existing Buckhead holding pasture water system.
    - Split the Connally Point Pasture into east and west units with approximately 2 miles of new fence.
    - Split the Red Hills Pasture into north and south units with approx. 1-1/2 miles new fence.
    - Riparian exclosures at Hog Canyon Spring and reliable springs in Sycamore Wash, if monitoring shows that riparian allowable use levels cannot be achieved over long-term without fencing.
    - Drift fencing or exclosure to keep cattle from Pine Creek in Red Hills and White Hills pastures, if monitoring shows allowable use levels cannot be achieved over long-term without fencing.

All existing improvements would be maintained to Forest Service standards. This may require major reconstruction for fences, or addition of impermeable liners or bentonite clay for existing earthen stock tanks to make them functional.

Figure 3: Proposed Range Improvement Locations – Pine Allotment

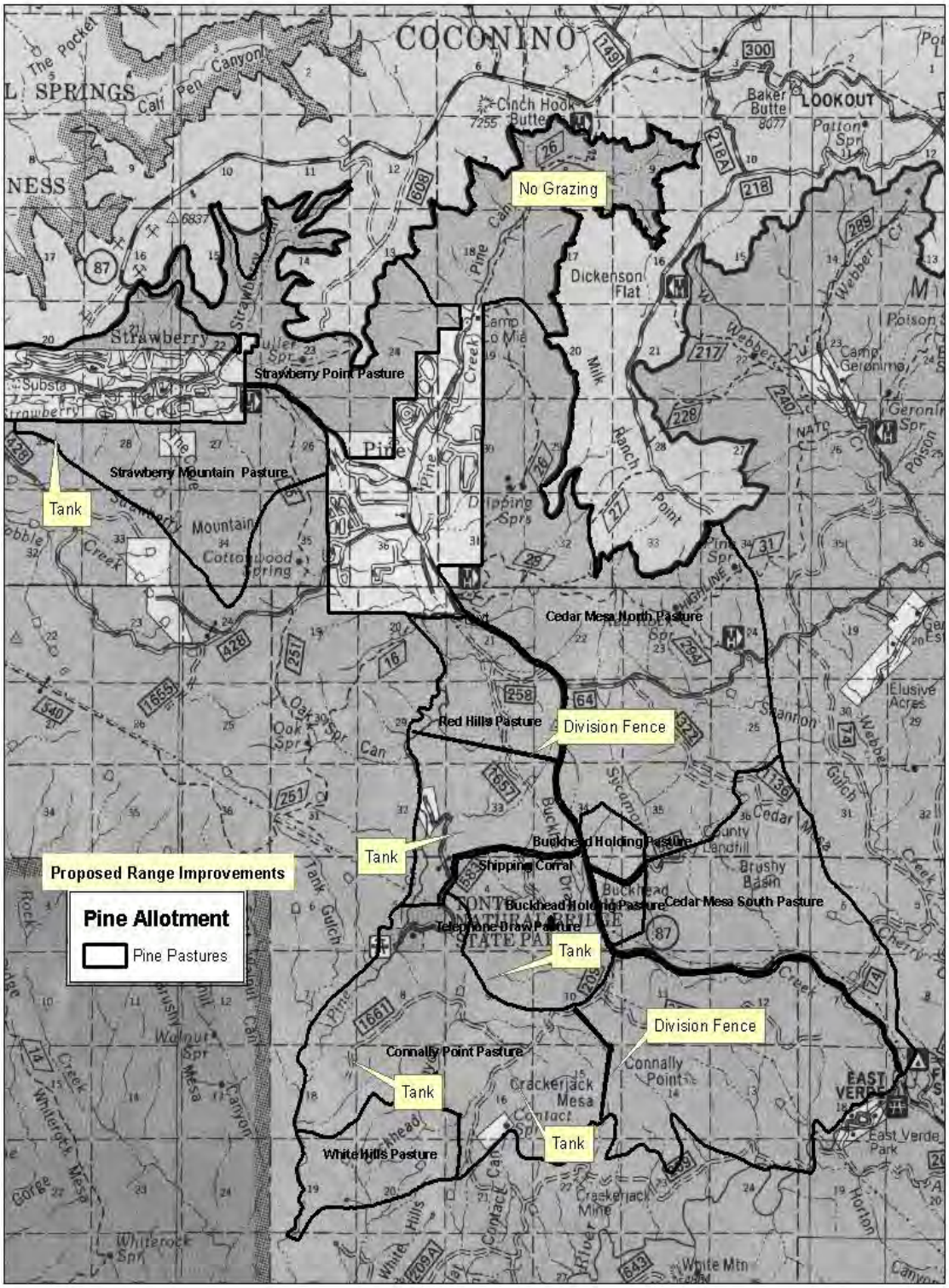
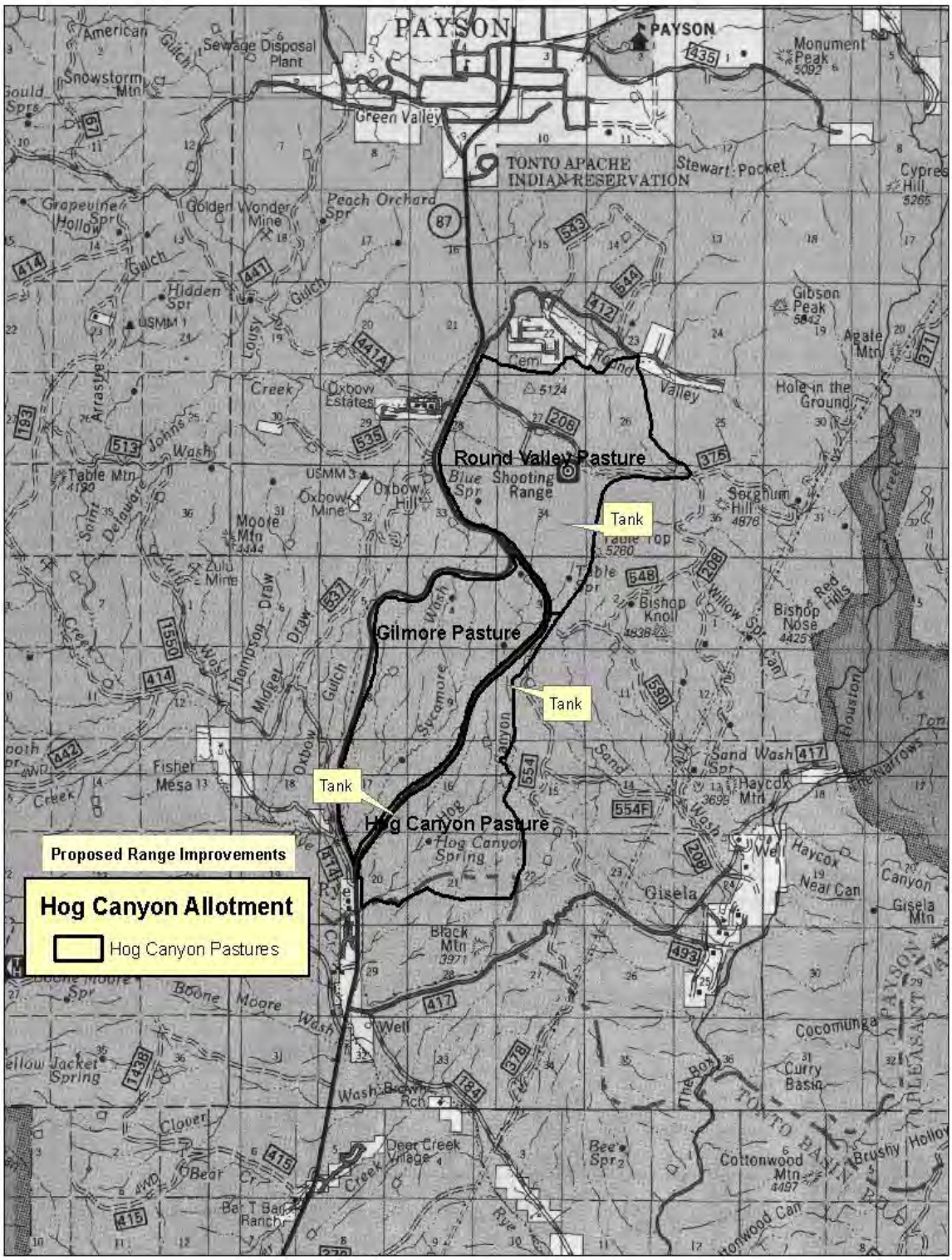


Figure 4: Proposed Range Improvement Locations – Hog Canyon Allotment



Management Practices Common to All Alternatives

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-moderate 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. A utilization guideline of 30-40 percent use of key species in key areas will be used to achieve this objective.

- In riparian areas, allowable use for:
    - Obligate riparian trees species – limit use to < 50 percent of terminal leaders (top 1/3 of plant) on palatable riparian tree species accessible to livestock (usually $\leq$ 6 feet tall);
    - Deergrass – limit use to < 40 percent of plant species biomass.
    - Emergent species (rushes, sedges, cat-tails, horse-tails) – 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, one-quarter 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 of range facilities.

- All water developments will include wildlife access and escape ramps. Waters will be kept available to wildlife year round.

- All reconstructed fencing will be built to Forest Service standards to provide for wildlife passage through the fence. At a minimum, this will be a 4-strand fence with smooth bottom wire 16 inches off of the ground and a total height of 42 inches or less.

- Tonto National Forest will implement guidance contained in the final recovery plan for Chiricahua leopard frog within occupied, historically occupied, or suitable habitat.

- No mechanized equipment on range improvement maintenance and/or construction will occur within Mexican spotted owl protected activity centers (PACs) between the months of February through August (breeding season). Mechanized equipment may be used in areas *at least* ¼-mile distance from PACs during the breeding season.

Heritage Resources

The objective is to protect historic and prehistoric heritage resources 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 if livestock are causing damage to heritage resource sites.

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

Management Objectives

Management objectives are measurable parameters that can be used to describe attainment of desired conditions. Achievement of these objectives is highly dependent upon adequate precipitation levels, implementation of range improvement practices and other planned vegetation management practices. Anticipated timeframe to achieve objectives is 5-10 years, or 3-5 years after thinning or burning activities. If trends are upward towards the stated objective when monitored, then management may be considered effective in moving towards the desired condition. Vegetation or watershed condition may not improve substantially in key areas with moderate-to-thick woody overstory until vegetation management projects, such as thinning or burning, are implemented.

- Maintain or improve range condition to fair or better levels taking into consideration the site potential; or demonstrate an upward trend towards this objective where herbaceous vegetation is predominant.

- Maintain satisfactory watershed condition and/or effective groundcover of at least 30 percent.

Mitigation

Unless specifically listed in the description of the alternative, the following mitigation measures apply to both alternatives.

Riparian/Water Quality

Riparian vegetation utilization, residual vegetation heights, timing of grazing, trailing of livestock, and livestock water development are the key grazing management activities likely to affect riparian area and stream channel condition and recovery. The following mitigation

measures were developed to implement the Tonto National Forest Plan (U.S.F.S., 1985) standards and guidelines and FSH 2509.22 direction that limit annual impacts to riparian vegetation and stream channels.

1. Protecting existing riparian vegetation. Utilization guidelines selected to minimize direct effects of riparian vegetation browsing and grazing, the supporting rationale, and the monitoring protocol were originally presented in (McBride and Grove, 2002). Guidelines for riparian tree species remain the same. Guidelines for deergrass utilization is lowered and a stubble height guideline has been added for emergent species (rushes, bulrushes, and sedges). Key areas will be monitored for these parameters while cattle are in the pasture. When guidelines have been reached, cattle will be moved. Monitoring key areas for these parameters should be measured while cattle are in the pasture and moved either from the riparian area or pasture when these guidelines are met.

- *Obligate riparian tree species* – browsing use will be limited to < 50 percent of the terminal leaders (top 1/3 of plant) on palatable riparian tree species accessible to livestock (usually ≤ 6 feet tall). The guideline is appropriate if the plants do not have a hedged form;
- D*eergrass* - use will be limited to < 40 percent of plant species biomass; and
- *Emergent herbaceous species* (rushes, bulrushes, sedges) - grazing should not reduce stubble height to < 6 – 8 inches of stubble height.

Riparian tree species guideline is an index of browsing intensity chosen as a more practical parameter to measure than the Forest Plan (U.S.F.S., 1985) standard that limits use to 20 percent of tree and shrub annual production by volume. Mathematical relationships between these parameters have been established in previous studies (Stickney 1966, U.S.F.S., 1991).

Herbaceous species guidelines primarily provides residual vegetation for stream channel protection and protection of plant vigor. Clary and Kruse (2003) recommend conservative use of deergrass, especially when the riparian vegetation is in early seral ecological status (Clary and Webster, 1989). Bunchgrass plants are usually more sensitive to grazing than rhizomatous species. For a 30-inch tall deergrass plant, 50 percent utilization reduces the plant to 4 inches of stubble height. This is inadequate residual vegetation, especially when green line herbaceous canopy cover is usually less than 10 percent.

Emergent species are supported by perennial surface or subsurface water, and have high potential for re-growth following grazing. There are few scientific studies linking emergent species stubble height and stream channel protection. Clary and Kruse (2003) recommend leaving 4 – 8 inches of stubble height where there is a dense sod of rhizomatous species. This is usually not the case on the Tonto NF, where canopy cover and density is usually lower, and streambanks are undefined. Therefore, the recommended stubble height is at least 6 to 8 inches during the grazing period.

2. *Providing for riparian vegetation development.* Use guidelines are appropriate only if there is adequate cover or density of riparian vegetation. Generally speaking, riparian areas with perennial surface or subsurface water should support riparian vegetation. Grazing should be deferred on key areas with very low cover or density of riparian vegetation until livestock grazing impacts can be minimized though the application of utilization guidelines.

3. *Establishing riparian tree seedlings.* The riparian tree species guideline applies to established tree seedlings defined as at least one year old. It does not ensure protection to first-year seedlings. Riparian tree species establishment is episodic and opportunistic, generally following moderate flood events with 5 – 10 year return intervals (Mahoney and Rood, 1998). First year seedlings are most likely to suffer negative effects from browsing. Use in riparian areas should be deferred during the first year of significant post-flood regeneration events.

4. *Limiting trailing in or adjacent to stream channels.* Trailing cattle through riparian areas, especially in small valley bottoms where cattle must walk in the channel, greenline, and near the floodplain should be avoided.

Heritage Resources

Mitigation of impacts to heritage resources for all alternatives is best accomplished by avoidance of these properties during the placement and construction of all range improvements. It can also be achieved by minimizing opportunities for the localized concentration of animals, improving distribution across the allotment and across each pasture, and by reducing the intensity of grazing for the allotment as a whole. In instances where a proposed improvement will involve any potential for ground disturbance, such as stock tanks and other water developments, a 100 percent archaeological survey will be conducted for areas, which have no previous survey coverage or have out-dated surveys which do not conform to current standards. Other, more specific mitigation requirements may be identified as each of these improvements is developed and a heritage inventory is made of their areas of potential effect. Such protective measures are developed in accordance with the goals of the project, taking into account site vulnerability as well as the methods of project implementation.

All inventoried heritage sites are treated as eligible for the *National Register of Historic Places* with the exception only of those that have been formally determined to be not eligible in consultation with SHPO. Archeological clearance must be approved with all necessary consultation with SHPO and the potentially interested Tribes prior to issuing any decision regarding the construction, modification, or removal of all improvements. This approach, based on long-term consultation with SHPO and on Region 3 policy as embodied in the *First Amended Programmatic Agreement Regarding Historic Property Protection and Responsibilities* between the U.S. Forest Service Region 3, the State Historic Preservation Officers of Arizona, New Mexico, Texas, and Oklahoma, and the Advisory Council on Historic Preservation, signed December 24, 2003, and specifically, Appendix H, the *Standard Consultation Protocol for Rangeland Management* developed pursuant to Stipulation IV.A of the *Programmatic Agreement* is considered to be the "standard operating procedure" for treating potential grazing impacts to heritage resources on the Tonto NF. Protection measures identified under the *Protocol* include:

1. archaeological survey will be conducted for areas proposed for surface disturbance which have no previous survey coverage, or have out-dated surveys, which do not conform to current standards;
2. relocation or redesign of proposed range improvements and ground-disturbing management practices to avoid direct and indirect impacts to historic properties;
3. relocation of existing range improvements and salting locations sufficient to ensure the protection of historic properties being impacted by concentrated grazing use;

4. fencing or exclosure of livestock from individual sensitive historic properties or areas containing multiple sensitive historic properties being impacted by grazing;
5. periodic monitoring to assess site condition and to ensure that protection measures are effective; and
6. other mitigation measures involving data recovery, for example, may be developed and implemented in consultation with the SHPO as the need arises. The appropriate tribes will be consulted, if the mitigation is invasive or if it affects a TCP or other property of concern for them.

These protection measures apply equally to all alternatives except a No Action/No Grazing Alternative, to which only the first two measures apply.

Monitoring

The objective of monitoring is to determine if management is being properly implemented and if the actions are effective at achieving or moving toward desired conditions.

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 Interagency Technical Reference,[1] the Region 3 Rangeland Analysis and Training Guide, and the 1988 R3 Range Analysis and Management Handbook.[2] These data are interpreted to determine if management is achieving desired resource conditions, if changes in resource condition are related to management, and if 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 5-to-10 year intervals. Protocols are described in the Interagency Technical Reference (1996), 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 Interagency Technical Reference[3] and with consideration of the Principles of Obtaining and Interpreting Utilization Data on Southwest Rangelands. Utilization measurements in riparian areas are made following the Interagency Technical Reference (1996), McBride and Grove (2002), and Cowley and Burton (2005) or the most current acceptable method.

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*

[1] Sampling Vegetation Attributes, Interagency Technical Reference. 1996. Cooperative Extension Service, U.S. Forest Service and Natural Resources Conservation Service, and U.S.D.I. Bureau of Land Management.
[2] Rangeland Analysis and Management Training Guide. 1997. Forest Service Handbook 2209.21 Range Analysis and Management Handbook. 1988. U.S. Forest Service, Southwestern Region.
[3] Utilization Studies and Residual Measurements. Interagency Technical Reference. 1996. Cooperative Extension Service, U.S. Forest Service and Natural Resources Conservation Service, and U.S.D.I. Bureau of Land Management. Revised 1999.

Rangelands publication (Smith, et al., 2005). Over time, changes in resource conditions or management may result in changes in livestock use patterns. As livestock use patterns change, new key areas may be established and existing key areas may be modified or abandoned in cooperation with the permittee.

The permittee 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.

Riparian/Water Quality

The implementation monitoring protocols used for measuring compliance with these mitigation measures include, but are not limited to, the Interagency Technical Reference (1996), McBride and Grove (2002), and Burton, Cowley and Smith (2007).

Attainment of standards and guidelines developed with the intent of achieving longer-term riparian vegetation and stream channel desired conditions will be monitored at five to ten year intervals. Effectiveness monitoring protocols include but are not limited to the Interagency (Technical Reference, 1996; Burton, Cowley and Smith, 2007; and Harrelson, et al., 1994).

Implementation and effectiveness monitoring will occur at the following key reaches for this allotment: Pine Creek and Sycamore Creek on the Pine Allotment and at three springs in Hog Canyon and one spring in Sycamore Wash on the Hog Canyon Allotment.

Heritage Resources

In accordance with Appendix H, the *Standard Consultation Protocol for Rangeland Management of* the *First Amended Programmatic Agreement Regarding Historic Property Protection and Responsibilities* between the U.S. Forest Service Region 3, the State Historic Preservation Officers of Arizona, New Mexico, Texas, and Oklahoma, and the Advisory Council on Historic Preservation, signed December 24, 2003, monitoring will be conducted as part of the day-to-day activities of the professional cultural resource specialists and certified para-archaeologists working in the area.

Grazing allotments cover most of any given forest, and when archaeologists are in the field conducting surveys, they are most likely surveying within a grazing allotment. Archaeologists will use these opportunities to observe and report on grazing activities, the effectiveness of the grazing strategy, and potential impacts to heritage resources. Any incidents of damage to historic properties from grazing will be reported, and the archaeologists will draw upon the protection measures outlined in the *Protocol* to ensure that the effects are avoided or minimized.

Adaptive Management

Adaptive management uses the results from monitoring to provide feedback to adjust management actions in order to achieve specific desired conditions over the long-term. Management objectives are chosen that will be used to document if desired conditions are being achieved. Alternatives are designed to provide sufficient flexibility to allow for changes in management, when resource conditions show that changes are needed. Changes in management may include administrative decisions such as the specific number of livestock authorized annually, specific dates for grazing, class of animal or modifications in pasture rotations.

However, such changes would not exceed the limits for timing, intensity, duration, and frequency defined in the term grazing permit. Adaptive management would be implemented through annual operating instructions, which would adjust livestock numbers and the timing of grazing, so that use is consistent with current productivity and is meeting management objectives.

Adaptive management also includes monitoring to determine whether identified structural improvements are necessary or need to be modified. In the case that changing circumstances require physical improvements or management actions not disclosed or analyzed herein, further interdisciplinary review would occur. The review would consider the changed circumstances and site-specific environmental effects of the improvements in the context of the overall project. Based on the results of the interdisciplinary review, the District Ranger would determine whether correction, supplementation, or revision of the EA is necessary in accordance with Forest Service Handbook direction at FSH 1909.15(18) and FSH 2209.13(96.1), or if further analysis under NEPA is required.

Management Actions: Adaptive management uses monitoring data to provide feedback as to whether conditions are moving towards or away from stated desired conditions. Downward trends in vegetation and soil/watershed condition that are observed in any given year are the basis for implementing management actions. Positive trends would be manifested as the absence or opposite of these occurrences.

Indicators of downward trend for vegetation include:

- Desirable and intermediate species decreasing in vigor;
- Lack of young plants from desirable and intermediate species;
- Invasion by undesirable species;
- Hedged and highlined shrubs. Dead branches generally indicating that shrubs are dying back.

Indicators of downward trend in soil stability include:

- Rill marks, which are small but conspicuous water channels around vegetation;
- Active gullies are raw, actively downcutting and may have headcuts, this type of gully may vary from a few inches to several feet in depth;
- Alluvial deposits; soil material transported and laid down as small fans in headwater drainages;
- Soil remnants; original topsoil held in place by vegetation or roots;
- Active terraces, usually caused by hooves of animals, stairstep in appearance on side-slopes;
- Exposed plant crown or roots (pedestalled plants);
- Wind-scoured depressions between plants; and
- Wind deposits.
- Soil may buildup behind plants, logs, and trees on upslope side.

Management actions that may occur in response to monitoring results include:

- Improve livestock distribution using salting, herding, fences, or increased water availability;
- Adjust pasture season of use;
- Adjust livestock numbers up or down in response to forage production;

- Shorten/lengthen use period of pasture;
- Provide more rest and recovery for pasture;
- Defer use until forage plants are dormant or seed is set; and
- Implement thinning projects to increase litter cover and/or encourage herbaceous plant establishment.

Adaptive management also includes monitoring to determine whether identified structural improvements are necessary or need to be modified. In the case that changing circumstances require physical improvements or management actions not disclosed or analyzed herein, further interdisciplinary review would occur. The review would consider the changed circumstances and site-specific environmental effects of the improvements in the context of the overall project. Based on the results of the interdisciplinary review, the Ranger would determine whether correction, supplementation, or revision of the EA is necessary in accordance with Forest Service Handbook direction at FSH 1909.15(18) and FSH 2209.13(96.1), or whether further analysis under NEPA is required.

Future Review of the Decision

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 that management is meeting standards and achieving desired condition, the initial management activities would be allowed to continue. If monitoring demonstrates that 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 table 2 is focused on activities and effects where different levels of effects or outputs can be distinguished quantitatively or qualitatively among alternatives.

Table 2: Comparison of Alternatives

Attribute	Alternative 1	Alternative 2
National Forest Policy and Tonto National Forest Land Management Plan(LRMP) Consistency	Consistent with LRMP. Not consistent with policy (FSM 2202.1, 2203.1).	Consistent with LRMP and policy.
Meets Purpose and Need	• Does not authorize grazing. • Achieves LRMP resource objectives, with possible exception of satisfactory watershed condition, which may not be achievable in areas of dense juniper overstory unless thinning occurs. • Complies with *Rescission Act*. • Adaptive management would be precluded.	• Authorizes grazing. • Achieves LRMP objectives. • Complies with *Rescission Act*. • Provides for adaptive management to respond to changing conditions or to meet management objectives.
Effects on Wildlife and Plants	• No effect to spotted owl. • All available forage and plant cover for wildlife.	• Spotted owl may be affected but not likely. • 60 to 70 percent forage for wildlife. • Surveys for Chiricahua leopard frog (CLF) are ongoing. Adverse effects are unlikely following the mitigation measures set forth in the final recovery plan for CLF.
Effects on soil condition	• Soils in satisfactory condition and expected to remain stable or improve. • Soils in less than satisfactory condition are likely to improve although a few heavily impacted areas may show little improvement for decades.	• Soils in satisfactory condition are likely to remain so. • Most soils in less than satisfactory condition are likely to improve. • Heavily used areas, favored by cattle, may not improve or show delayed improvement.

Attribute	Alternative 1	Alternative 2
Effects on upland vegetation and watershed condition	• Vegetative condition most likely to improve in openings where livestock typically congregate. • Ungulate use from elk will continue. • Much of the project area will not improve because the high density overstory of pine and juniper is suppressing herbaceous layer. • Herbaceous production, cover and plant vigor dependent on precipitation levels.	• Vegetative condition most likely to remain stable or improve slowly. • High density pine/juniper areas will not show improvement in herbaceous cover until 3-5 years after some thinning or prescribed burning treatments are implemented. • Herbaceous production, cover and plant vigor dependent on precipitation levels.
Riparian Areas and Stream Channels	• Condition of riparian areas will continue to improve where livestock grazing has diminished vegetative species diversity, structure, and function. • Improvement of stream channel condition will follow recovery of riparian vegetation.	• Condition of riparian areas and stream channels will continue to improve, but at a slower rate in riparian areas that are grazed.
Heritage Resources	• No effect on Heritage Resources	• Managed grazing is not 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.
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 continued.
Recreation and Special Management Areas	• No conflicts between recreational users and livestock; • Existing range improvements remain in disrepair until FS can arrange for removal. • No new roads constructed.	• Minimal and insignificant effects to the recreational experiences of Forest users. • Existing range improvements maintained by permittee; may provide utility to other Forest users. • No new roads constructed.

CHAPTER 3 – ENVIRONMENTAL CONSEQUENCES

This section summarizes the biological, physical, social, and economic environments of the affected project area and the potential changes to those environments due to implementation of the alternatives. It also presents the scientific and analytical basis for comparison of alternatives presented in the chart above. The section is organized by resource.

Wildlife

Affected Environment

In general, the quality of wildlife habitat is ultimately dependent on the quality of the soil resources, upland watersheds, vegetative conditions, and riparian areas.

Threatened, Endangered and Proposed Species

Although the analysis area provides habitat for the endangered jaguar, it has not been observed on the Forest since the 1960s (Giremendock, 1994) and its presence within the analysis area is highly doubtful due to the amount of fragmented habitat between known populations and the analysis area. At this time habitat and/or occurrence of the following federally listed species has been identified for these allotments: Mexican spotted owl (species and habitat), Chiricahua leopard frog, and proposed northern Mexican garter snake. One Forest Service sensitive species, northern goshawk, has habitat and/or occurrence within the project area. It should be noted that the purpose of this section is to disclose existing conditions. It is not to make a determination of affect for any action; this is done in the Biological Assessment and Evaluation prepared by the Payson Ranger District wildlife biologist. A decision will not be rendered until concurrence with the Biological Assessment is received from U.S. Fish and Wildlife Service.

Based on the following consultations with the U.S. Fish and Wildlife Service, some of the above listed wildlife species and/or their habitat was determined to be present within the project area. Complete wildlife reports including maps are found within Project Record at PR 21, 22, 23.

Mexican Spotted Owl

- Two Mexican spotted owl PACs (Protected Activity Centers) occur entirely within the allotment. The PAC in the upper reaches of Pine Creek is in an area that is mainly excluded from grazing. Monitoring of these PACs has occurred. Results are based on several methods over the years including both formal and informal monitoring protocols developed by the region as well as radio-telemetry studies conducted by non-governmental groups.

- Restricted habitat for Mexican spotted owl exists in the Project Area. Approximately 732.1 acres of mixed conifer and 520 acres of pine/oak are found within the restricted habitat that occurs in the project area.

Chiricahua Leopard Frog

Partial surveys have been conducted to determine occupancy or adequacy of the habitat with negative results at this time; however, the remaining habitat surveys are being conducted at this time and into 2010. The nearest known occupied habitat to the allotment is 14 miles east on the

Payson RD in the vicinity of Ellison Creek and 24 miles southeast on the Pleasant Valley RD. Neither of these populations is within the same watersheds as the project area.

Northern Goshawk

Active surveys for the species on the Tonto NF began in the early 1990s. These inventories resulted in identifying 1 breeding area for this species on the Payson RD, one of which occurs on Pine Allotment. The foraging area is the slopes around Pine Creek north of the community of Pine. Most of the northern goshawk foraging area is in a part of the allotment that is not grazed due to the presence of the key riparian habitat, coupled with the fact that the surrounding area is steep and heavily forested, and not considered full-capacity rangeland. The Hog Canyon allotment does not contain northern goshawk foraging areas.

The following can be considered to the sensitive species analysis found at PR 23. While most of the foraging area is in a non-grazed part of the allotment, there are portions within the Cedar Mesa North and Strawberry Point pastures.

- Stubble height exceeds 3 inches at all times during breeding season within ½ mile of northern goshawk preferred foraging areas (PFA).

    o According to data compiled by Gila County Cooperative Extension Service from 2001 to 2006, blue grama with seedstalk (culmed) averaged 14.8 inches (ranged from 5.5" to 24.0") side-oats grama (culmed) averaged 21.8 inches (ranged 14.7" to 30.5") and hairy grama (culmed) averaged 13.3 inches (ranged 7.2" to 22.2"). Using a utilization gauge and assuming the average ungrazed plant height (culmed) and then using estimated utilization level of 40 percent +/- 10 percent (30-50 percent), the residual stubble heights for the three species are displayed in table 3 below.

    o This stubble height may not be achieved throughout the breeding season, as "seasonal" utilization is not considered- only at the end of the growing season.

Table 3: Conservative Utilization and Residual Stubble Heights

Species	No Grazing		Proposed Grazing	
	Low	High	Low Stubble Height (50 percent use)	High Stubble Height (30 percent use)
Blue Grama	5.5	24.0	1.6	3.3
Side-oats Grama	14.7	30.5	4.0	6.75
Hairy Grama	7.2	22.2	2.9	5.5

Elk

Arizona Game and Fish Department surveys conducted in 2008 and 2009 indicate that approximately 2,570 to 2,100 elk, respectively, occupy Game Unit 22. By dividing the acreage for Game Unit 22 by the total project area, it is estimated that from 127 to 196 Rocky Mountain Elk utilize the allotments depending upon water availability. Their diet is comprised of approximately 80 percent herbaceous forage during the summer months and about 60 percent herbaceous forage during the winter months (Brown, 1990; Leege, 1984; Rowland, et al., 1983;

Severson and Medina, 1983; and Wallace, 1984). Competition between cattle and elk for herbaceous forage is evident and will continue with the current elk herd numbers.

Management Indicator Species

Thirty separate management indicator species (PR 22) and eight threatened or endangered species or their habitat occur within the boundaries of the analysis area, or within close proximity (PR 21). Management indicator species were selected as part of the development of the Tonto NF's Plan. They were selected to adequately monitor the effects of implementation of the Plan's proposed action on wildlife habitat and species diversity. The Tonto NF completed a status report for all management indicator species assigned in the Forest Plan. That document is incorporated into this document by reference.

Appendix G of the Tonto National Forest Plan (pp. 249-250) describes the MIS species selected for each forest cover type and specifically what attribute of this cover type they represent. At the time this list was developed the emphasis was on indicators of overstory manipulation of vegetation. Habitat trends for the Tonto NF's MIS species are shown in table 4 below.

Summary of Effects for Habitat Type and Selected MIS

The Tonto forestwide MIS analysis (Richards, 2005) contains the population trends for the above species. The predicted change in habitat for either alternative is not significant enough to cause a change in population status for any of these species (PR 22).

Table 4. Habitat Trend

Vegetation Type/Species	Indicator or Key Habitat Condition	Indicator or KHC Trend (acres)			Total Acres
		Upward	Downward	Stable	
Ponderosa Pine/Mixed Conifer					
Elk	*General forest conditions*			**11,658**	**11,658**
Turkey	Vertical diversity, forest mix			**11,658**	**11,658**
Pygmy nuthatch	Old-growth ponderosa pine			**11,658**	**11,658**
Violet-green swallow	Cavity nesting habitat			**11,658**	**11,658**
Western bluebird	Forest openings			**11,658**	**11,658**
Hairy woodpecker	Snags			**11,658**	**11,658**
Northern goshawk	Vertical diversity			**11,658**	**11,658**
Abert's squirrel	Successional stages of ponderosa			**11,658**	**11,658**

Piñyon-Juniper Woodland					
Ash-throated flycatcher	Ground cover			**12,253**	**12,253**
Gray vireo	Tree density			**12,253**	**12,253**
Townsend's solitaire	Juniper berry production			**12,253**	**12,253**
Plain titmouse	General woodland conditions			**12,253**	**12,253**
Common flicker	Snags			**12,253**	**12,253**
Spotted towhee	Successional stages of p/j			**12,253**	**12,253**
Chaparral					
Spotted towhee	Shrub density			**6,974**	**6,974**
Black-chinned sparrow	Shrub diversity			**6,974**	**6,974**
Desert Grassland					
Savannah sparrow	Grass species diversity	**3,924**			**3,924**
Horned lark	Vegetative aspect	**3,924**			**3,924**
Desertscrub					
Black-throated sparrow	Shrub diversity				**0**
Canyon towhee	Ground cover				**0**
Riparian low elevation (0500′- 3,500′)					
Bald eagle	General riparian			**10**	**10**
Bell's vireo	Well-developed understory			**10**	**10**
Summer tanager	Tall, mature trees			**10**	**10**
Hooded oriole	Medium-sized trees			**10**	**10**
Riparian high elevation (above 3,500′)					
Hairy woodpecker	Snags, cavities			**389**	**389**
Arizona gray squirrel	General riparian			**389**	**389**
Warbling vireo	Tall overstory			**389**	**389**
Western wood-pewee	Medium overstory			**389**	**389**
Common black-hawk	Riparian streamside			**389**	**389**
Aquatic					
Macroinvertebrates	Water quality, fisheries habitat				

Migratory Birds

On January 10, 2001, *Executive Order 13186* was signed placing emphasis on conservation of migratory birds. At the time of this report, no Forest Service Regional or Forest policies have been developed to provide guidance on how to incorporate migratory birds into NEPA analysis. Advice from the Regional Office is to analyze effects in the following manner: 1) Effects to "Species of Concern" listed by Partners in Flight; 2) Effects to Important Bird Areas (IBAs); 3) Effects to important over-wintering areas.

Pine Creek and its tributaries serve as corridors for migration of birds within and through the Tonto NF. Although relatively small watersheds, migratory birds use the riparian areas for habitat needs while migrating to different latitudes depending on the time of year. Upland riparian vegetation associated with water along these drainages provides a diversity of habitats that support shorebirds, waterfowl and neo-tropical birds. Impacts to riparian were discussed previously.

Habitat types identified by the Arizona Partners in Flight Plan (Latta, et al., 1999) suggest that six main vegetation types are represented on the allotment (see table 5). Not all species are expected to occur in the analysis area, but elements of their habitat may.

Table 5. Habitat Types within the Analysis Area

Habitat Type	Species	Habitat/Disturbance Effects
Pine Habitat	Northern goshawk, olive sided flycatcher, Cordilleran flycatcher, purple martin	Conservative use should minimize deleterious impacts to herbaceous component. Cattle use expected to be low due to steep slopes.
Piñyon - Juniper	Gray flycatcher, piñyon jay, gray vireo, black throated gray warbler, juniper titmouse	Conservative use should minimize deleterious impacts to herbaceous component. Cattle use expected to be low on steeper slopes. Conservative use levels should reduce adverse impacts on gentler terrain.
Madrean Pine-Oak	Buff breasted flycatcher, Mexican spotted owl, Eastern bluebird, Mearn's quail, band-tailed pigeon, thick billed parrot	Conservative use should minimize deleterious impacts to herbaceous component. Cattle use expected to be low on steeper slopes. Conservative use levels should reduce adverse impacts on gentler terrain.
Chaparral	Black chinned sparrow, Virginia's warbler	Little herbaceous component in many areas due to fire suppression. Conservative use should negate adverse impacts.
Low Elevation Riparian	Common black hawk, western yellow billed cuckoo, Southwestern willow flycatcher, Lucy's warbler	Yearlong grazing has contributed to declines in diversity and composition. Where potential still exists, enforcement of standards and guidelines may improve some parameters.
High Elevation Riparian	Common black hawk, elegant trogan, Southwestern willow flycatcher, MacGillivray's warbler, red faced warbler	Yearlong grazing has contributed to declines in diversity and composition. Where potential still exists, enforcement of standards and guidelines may improve some parameters.

Important Bird Areas (IBA)

There are no designated IBAs within or affected by the project. The nearest IBA is the Salt-Verde Ecosystem (Saguaro Lake north through the Mazatzal Wilderness), located more than 12 miles to the west of the project area. There is no association or important link between the bird communities on the Pine/Hog Canyon allotments and the Salt-Verde Ecosystem IBA; therefore, no IBAs are affected by the project.

Over-wintering Areas

The project area may provide wintering habitat for a variety of raptors and upland song birds; however, this area is not recognized as an important over wintering area because significant concentrations of birds do not occur nor is there a unique assemblage or a high diversity of birds that winter here.

Environmental Consequences

With the wide variety of wildlife species present in these allotments, which cover six major vegetative habitat types (table 6), it is not practicable to provide a summary of each possible wildlife species and the probable effect of each alternative. However, one common factor that seems to affect wildlife, and that is, available forage. Available forage is not only affected by cattle but also by Rocky Mountain elk. Forage utilization as specified in the proposed action does not differentiate between the use by cattle and that used by other ungulates.

Table 6. Effects to Wildlife Habitat for the Pine/Hog Canyon Allotments

Habitat Type	Alternative 1 (No Grazing)	Alternative 2 (Proposed Action)
Ponderosa Pine	Conditions for this habitat type would mostly remain static. In areas of future improved herbaceous cover, small mammal densities may increase. Soil conditions may improve faster under this alternative.	Wildlife habitat changes from implementing Alternative 2 are generally low. Livestock herbivory on overstory is negligible. Some disturbance of nesting/roosting birds could result, if roundup times occur in those areas.
P/J, Madrean Pine-Oak & Chaparral	Piñyon and juniper components would remain comparable to other Alternatives. Inter-specific competition from cattle would be eliminated and browse composition could become more abundant. Soil conditions on flatter terrain would likely improve faster under this alternative.	Wildlife habitat would likely remain similar to existing conditions. The stocking rates and animal months would have minor effect on these habitat types. Impaired soil may improve over time. Rest-rotation grazing should minimize effects to habitat and wildlife species distribution.

P/J, Chaparral	Overall primary diversity and productivity would increase. Habitat selection by native wildlife would improve with normal precipitation patterns. Fawning, hiding, and thermal cover would improve with improved survival rates for big game, upland game, and MIS and TES species. Soil conditions would likely improve faster under this alternative.	Under this Alternative, with proper monitoring, site herbaceous productivity and soil conditions may improve. If primary productivity improves, those wildlife species associated with this habitat guild may respond positively, although not as much as Alternative 1. Cover and forage values for Merriam's turkey may be impacted depending upon season of use.
High & Low Riparian	Tonto NF Standards and Guidelines may be achieved/maintained the quickest. Degraded riparian areas with water may improve more quickly. Some will recover slowly or remain impaired. This Alternative would most likely support improved wildlife species diversity over time. General wildlife habitat, edge effect, and corridor maintenance would be improved. Aquatic parameters may benefit more quickly and improve habitat conditions for many aquatic species.	Tonto NF Standards and Guidelines will likely be achieved/maintained through use of Adaptive Management. Recruitment and establishment of riparian dependent trees and shrubs should improve more slowly than Alternative 1. Improvement of floodplains may indirectly improve wildlife habitat parameters. Aquatic parameters will likely remain similar to current conditions.

Alternative 1 would have the least impact; however, it is unpredictable how much forage use by elk would occur.

Alternative 2 would utilize 30 – 40 percent of the available forage in key areas (less in others) on the Pine Allotment and 30 – 40 percent in key areas on the Hog Canyon Allotment. It is expected that herbaceous forage will have an upward trend to the benefit of forage dependent wildlife.

Riparian Areas/Water Quality_____

Affected Environment

Pine Allotment is northwest of Payson and extends from the Mogollon Rim south to the East Verde River. The majority of the allotment lies within the East Verde River 5th code watershed with the northwest portion, around the town of Strawberry, within the Fossil Creek-Lower Verde River 5th code watershed. Tributaries to the East Verde River within the allotment include Pine Creek, Sycamore Creek, Buckhead Canyon, Contact Canyon and several ephemeral drainages. Strawberry Creek is a tributary to the Verde River.

Hog Canyon Allotment, located south of Payson, is long and narrow extending from Round Valley south to the district boundary. It is bisected by Highway 87 from north to south. The allotment lies within the Rye Creek-Tonto Creek 5th code watershed. Major tributaries within the allotment include St. Johns Creek, Sycamore Wash, and Hog Canyon.

There are about 46 miles of perennial and intermittent streams named on USGS topographic maps within the Pine and Hog Canyon allotments. In addition to these named streams, there are miles of unnamed headwaters and tributaries to these in the stream channel network. All of these channels provide important functions relating to water quality, flooding, hydrological connectivity, and wildlife habitat. (Levick, et al., 2007).

Key Reaches

Discussion of existing and desired conditions is limited to stream channels and riparian areas that have the potential to improve within a relatively short period (10 years). These areas are called key reaches. Similar to upland key areas (Interagency Technical Team, 1996), key reaches 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 (DMAs) defined by Burton, Cowley and Smith (2007) as the location where implementation and effectiveness monitoring occurs.

Based on existing information, two riparian areas in two pastures (table 9) were selected as key reaches for the Pine Allotment from the 34+ miles of stream channels. On the Hog Canyon Allotment, four riparian areas dependent on in-channel springs were identified as key reaches (table) from the 12 miles of stream channels. Key reaches are selected by the interdisciplinary team for the purpose of describing desired conditions and developing management objectives for riparian areas on the Pine and Hog Canyon allotments.

Table 9. List of key reaches by pasture within the Pine and Hog Canyon Allotments.

Pasture – Pine Allotment	Key Reaches
Red Hills	Pine Creek
Connally Point	Sycamore Creek
Pasture – Hog Canyon Allotment	
Hog Canyon	Grapevine Spring (in lower Hog Canyon)
Gilmore	unnamed spring (in upper Sycamore Wash)
	Upper Hog Canyon Spring (in Hog Canyon)
	Grapevine Spring (in Hog Canyon)

Existing Condition

Existing and desired conditions of key reaches listed in table 9 are described below. Existing condition of other stream reaches on the Pine and Hog Canyon allotments not selected as key reaches are described in Appendix B.

Pine Allotment

Pine Creek, Red Hills Pasture

Pine Creek is the largest stream on the Pine Allotment and a major tributary to the East Verde River. It originates above the Mogollon Rim on the north side of Milk Ranch Point, flows through the town of Pine and then approximately eight miles along the western boundary of the allotment. Just south of the town of Pine, the creek enters a narrow canyon, known as “The

Narrows," in the Red Hills Pasture. After leaving "The Narrows," the creek also leaves the allotment for about a half a mile. It re-enters the allotment into a wider valley bottom for about one-half mile, with a quarter of a mile on private property.

The valley, including the terraces, riparian areas on the floodplain, and stream channel is accessible to cattle grazing. In the upper valley, the channel has incised, leaving mature sycamore trees on the former floodplain. This "F" type stream channel is currently widening laterally, eroding the edges of its former floodplain. The channel is dominated by boulder and cobble. Downstream, below the private property, the valley begins to narrow. The channel has cut down to bedrock with boulders and cobbles protecting the banks. There is little fine sediment for vegetation to become established. Terraces support small grasslands and forested stands of ponderosa pine, piñyon pine, alligator juniper, Arizona cypress, Emory and white oak with an understory of chaparral species. There are no old stands of sycamores along the terraces; however, young, riparian vegetation is establishing along the edge of the channel. Riparian plants include velvet ash, Gooding's willow, narrow leaf and Fremont cottonwood, sycamore, false indigo, deergrass, rushes, and a variety of forbs.

Sycamore Creek, Connally Point Pasture

Sycamore Creek is an intermittent stream that originates below the Mogollon Rim and flows about 8 miles through the allotment to its confluence with the East Verde River. Three reaches of Sycamore Creek were evaluated in the field, all in the lower 1.5 miles of the Connally Pasture. Reaches above and just below the Forest Road (FR) 209 crossing are transitioning from an F-type stream (Rosgen, 1996) to a B-type stream. The channel incised or cut down to a bedrock layer. The stream eroded laterally leaving a wide, shallow F-type channel. Sediment is a mixture of cobbles and gravel with some boulders. Large sediment helps stabilize the channel, but there are few fine sediments, important for riparian vegetation establishment. There is little remnant riparian vegetation. Riparian vegetation is beginning to re-establish along the channel. In some areas, a B-type floodplain is re-establishing. Riparian trees include narrow leaf and Fremont cottonwood, velvet ash, red willow, and sycamore. Shrubs include false indigo, seep willow, coyote willow, and salt cedar. Deergrass, some rushes, sedges, and a variety of forbs – monkeyflower, columbine, and speedwell, are present with low cover.

The lower mile of Sycamore Creek is perennial in the vicinity of Boy Scout Spring. With increasing water availability and riparian vegetation, the floodplain is more fully developed, and the channel is a B-type stream. Riparian vegetation is structurally and compositionally diverse dominated by a young, dense, multi-storied stand of seedling, sapling and pole size trees (ash, cottonwoods, willow, and sycamore) and shrubs. The understory also has high species diversity, supporting obligate riparian grasses, sedges, rushes, horsetails, and forbs. There are long sections of dense graminoid vegetation overlying overhanging banks. Boy Scout Spring and adjacent stream channel are fenced for a short distance, but are accessible to cattle above and below the exclosure. The downstream fence across the channel was down on the May 21, 2009 field visit.

Hog Canyon Allotment

Grapevine Spring and Upper Hog Canyon Spring, Hog Canyon, Gilmore Pasture

Hog Canyon is an intermittent stream that originates west of Table Top in the Round Valley Pasture and flows south. The entire creek lies on the Hog Canyon Allotment except for the lower quarter mile, which flows through the town of Rye to its confluence with Rye Creek. It flows 1.3

miles through the east side of the Gilmore Pasture. The reach of Hog Canyon below Grapevine Spring was surveyed in December 1999 after a diesel fuel spill in the canyon on December 11, 1999. The spill was cleaned up over the following months. This reach of channel is narrow and fairly steep (2-4 percent). It is a B-type (Rosgen, 1996) stream with step/pool features.

Grapevine Spring, located at the north end of the pasture, was inventoried May 16, 2009. The spring supports cottonwood, willow, seep willow, and grape. The channel is filled with sand-sized sediment. There was water present during the site visit, which may indicate perennial water since there was little precipitation (0.59 inches) in March and April (NOAA, 2009).

Upper Hog Canyon Spring, located on the lower reach of Hog Canyon in this pasture, was visited May 16, 2009. Water was present and emerges from two spots on the channel. The channel is narrow; the riparian area consists of willow, cottonwood, seep willow, and deergrass.

Unnamed Spring, Sycamore Wash, Gilmore Pasture

Unnamed spring is located on the upper reach of Sycamore Wash in this pasture. It was visited on May 16, 2009. The wash in this reach is steep and rocky. The riparian area consists of cottonwood, willow, grape, deergrass, cattail, and bullrush. There were signs of wildlife use.

Grapevine Spring, Hog Canyon, Hog Canyon Pasture

Hog Canyon flows approximately three miles through the Hog Canyon Pasture. Grapevine Spring, labeled as Hog Canyon Spring on the U.S.G.S. map, is located in the lower reach of Hog Canyon in this pasture. It was visited on August 11, 2006. At the time, the spring supported lush riparian vegetation including cottonwood, desert willow, seep willow, and deergrass. The area showed high recreation use, including ATVs. Since then, a road has become established through this reach and much of the riparian vegetation has been eradicated.

Water Quality

No streams within the Pine or Hog Canyon allotments have been monitored by Arizona Department of Environmental Quality. Designated uses for non-ephemeral, unlisted tributaries above 5,000 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 5,000 feet are aquatic and wildlife-warm water fisheries (A&Ww), fish consumption (FC), and full body contact recreation (FBC) (ADEQ, 2008).

Though the East Verde River does not occur on the allotment, much of the Pine Allotment lies within the East Verde River 5th code watershed. A reach of the East Verde River that is adjacent to the allotment is "impaired" for selenium for the use A&Ww. A Total Maximum Daily Load Analyses to determine the source of the exceedance is scheduled to begin in 2009 (ADEQ, 2008).

Environmental effects of grazing in the southwestern United States

Riparian areas have ecological importance beyond their small percentage of land area. This percentage of riparian land area is even smaller in the arid southwestern United States, and inversely, increases the importance of riparian area. Although volumes of literature have been written on riparian systems in the southwest, little actual research has been accomplished (Clary and Kruse, 2003; Milchunas, 2006). Southwestern riparian plant communities are more likely than adjacent upland plant communities to be used preferentially by livestock, and more likely to experience reductions in plant species diversity, than plant communities that evolved with

ungulate grazing (Milchunas, 2006). Riparian areas are generally regarded as having high inherent potential for recovery from disturbance (Milchunas, 2006). Stream channel and riparian area recovery are considered optimal when the direct effects of livestock grazing are eliminated (Clary and Kruse, 2003). The amount of time required for riparian recovery after severe degradation can vary from several years to decades (Clary and Kruse, 2003). Recovery is dependent on existing condition of the watershed, stream channel, and riparian area (flow regime, channel gradient, dominant channel substrate, watershed area, type and extent of riparian vegetation) and future management, climate, and natural disturbances (Kindschy, 1987, 1994).

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, trampling and trailing 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 the effects of cattle grazing on adjacent uplands within the watershed. Decreases in upland vegetative cover have generally been associated with increased surface runoff, decreased soil infiltration, decreased soil moisture capacity and increased soil erosion. These hydrological changes may indirectly affect riparian areas, aquatic habitats, and stream channel function by increasing the frequency and intensity of floods and promoting sediment deposition (Gori and Backer, 2005). Stream channels and riparian areas can also be indirectly affected by unstable or degraded channels and riparian areas that may occur upstream or downstream.

Environmental Consequences

Southwestern Region of the Forest Service Soil and Water Conservation Practices Handbook (FSH 2509.22) also includes direction to mitigate effects of livestock grazing. It acknowledges that allowable use is set to meet the objectives of the Forest Land Management Plan and that the amount of livestock use is determined primarily through measurement of riparian utilization (FSH 2509.22.1). It advises "Assessment of streambanks to assure[(sic)] banks are not being degraded and contributing sediment to water courses" (FSH 2509.22.11.1e).

Criteria used to evaluate alternatives. The criteria used to evaluate and contrast the alternatives are based on the likelihood that the mitigation measures would be implemented, and as a result, project-specific desired conditions for riparian vegetation and stream channels would be achieved.

Alternative 1, No Grazing.

Direct Effects. The No Grazing Alternative would eliminate the direct effects of cattle grazing to recovering stream channels and riparian areas in the Pine and Hog Canyon allotments. Both allotments have been in light or non-use since 2001. Vegetative recovery observed in the key reaches during this time frame is expected to continue, except in the Grapevine Spring area of Hog Canyon, where off-highway vehicles are adversely affecting both the riparian vegetation and stream channels.

Indirect Effects. Watershed and soil conditions within these allotments are mostly in satisfactory condition. Under this alternative, watershed condition of the pastures where key reaches are located, would be maintained or improved, minimizing any negative indirect effects to stream channels and riparian vegetation.

Consistency with the Tonto National Forest Plan. This alternative is consistent with the goals, objectives and guidelines of the Forest Plan for streams and riparian areas.

Alternative 2, Proposed Action.

Direct Effects. Most of the water available to livestock on the Hog Canyon Allotment is located primarily in springs and riparian areas. Pine Allotment has more developed upland waters, but water is also available in the key reaches. Improved riparian vegetation was observed in key reaches since 2001 should be maintained if mitigation measures are implemented. Continued improvement is possible, but likely at a slower rate than under the No Grazing Alternative. Implementing the riparian vegetation utilization guidelines will be more difficult between May and the end of October.

Riparian utilization guidelines apply to Sycamore Creek in the Connally Point Pasture and spring areas located in Hog Canyon and Sycamore Wash on the Hog Canyon Allotment. Use guidelines are less applicable in Pine Creek in the Red Hills Pasture, because of low densities of riparian tree seedlings and key herbaceous species. Deferred or light grazing use could result in re-establishment of these riparian vegetation components.

As in the No Grazing Alternative, the impacts associated with off-highway vehicles will likely continue to adversely affect both the riparian vegetation and stream channels.

Indirect Effects. Under this alternative, watershed condition of the pastures where key reaches are located, would be maintained or improved, although perhaps more slowly than under the No Grazing Alternative, minimizing any negative indirect effects to stream channels and riparian vegetation.

Consistency with the Tonto National Forest Plan. This alternative is consistent with the goals, objectives and guidelines of the Forest Plan for streams and riparian areas.

Recreation, Lands, Special Uses

Affected Environment

Recreation

Pine and Hog Canyon allotments analysis area encompasses three major trailheads, several dispersed recreation sites, plus five system hiking trails, including the Highline Trail, a National Recreation Trail. Portions of the Highline Trail included in this analysis are designated as part of the Arizona Trail. It stem is a network of trails that crosses the entire state from north to south. All the trailheads and system trails are found on the Pine Allotment. The Hog Canyon portion does not contain any of these features.

The project is within Management Areas 4D and 4F of the Tonto National Forest Land Management Plan (LMP), (U.S.F.S., 1985). Direction for these areas is to manage for a variety of renewable resource outputs including recreational opportunities and dispersed recreation. Tonto National Forest LMP describes the predominant recreation opportunity spectrum (ROS) classes for management area 4D to be semi-primitive motorized (55 percent), and roaded natural (38 percent) with the remaining small percentage urban (4 percent), rural (2 percent), and semi-primitive non-motorized (1 percent). For Management Area 4F, ROS classes are semi-primitive motorized (46 percent), roaded natural (26 percent), semi-primitive non-motorized (24 percent), rural (2 percent), and urban (2 percent). Management area 4D includes the face of the Mogollon Rim, which has limited motorized access due to steep topography. The Visual Quality Objective (VQO) for the face of the Mogollon Rim is retention. No new range developments are proposed on the face of the Mogollon Rim. Further direction is given to ensure that no human-related activities impact the Highline Trail and its ancillary trails. The Highline Trail and land north of the Highline Trail are closed to Off-Road Vehicles (ORVs) per the Tonto NF Plan. For management area 4D, partial retention is the primary VQO for 80 percent of the area, followed by retention (15 percent), modification (4 percent), and maximum modification (1 percent). For management area 4F, maximum modification is the primary VQO for 52 percent of the area, followed by partial retention (24 percent), modification (14 percent), and retention (10 percent).

There are no developed campgrounds within the project area. Dispersed camping is mainly focused along the Control Road, FR 64. Tonto Natural Bridge State Park is within the analysis area and is accessed along FR 583, with some dispersed camping may occur related to proximity to this feature. Pine, Pine-Strawberry, and Red Rock Spring Trailheads are found within the project area. Throw down camping may occur within proximity of these trailheads. There are no federally designated wilderness areas within the analysis area. There are no inventoried roadless areas within the allotments.

Special Uses/Lands

The analysis area contains several tracts of private land, including the townships of Pine and Strawberry, the community of Arrowhead Estates, and private in-holdings at the “the Cove” south of Strawberry. Several of these have right-of-ways access across National Forest Land. Control Road, Forest Road 64, is a major access road within the Pine Allotment that is under a County easement. Tonto Natural Bridge Road, Forest Road 58, is another main access point that is under easement to Arizona State Parks; this is a fenced easement. Forest Road 208 is a major access point to the north end of the Hog Canyon Allotment, and is maintained by Gila County to the Jim

Jones Shooting Range, but remains a Forest system road. Arizona State Highway 87 is within both the Pine and Hog Canyon allotments. State of Arizona holds a right-of-way (ROW) easement, which is fenced to prohibit cattle entry into the ROW. There are no active mining claims within the analysis area.

Special-Uses include a major utility corridor from Payson to Pine and Strawberry that is operated under permit to Arizona Public Service (APS). There are plans to replace power poles along the stretch from Payson to Pine. Poles along the section from Pine to Strawberry have already been replaced by APS. Routine maintenance activities for vegetation management may occur along the utility corridors. Gila County operates a landfill at Buckhead Mesa that serves the communities in northern Gila County. The county has a well at the landfill site, and also a material pit. Gravel from this pit is used by the county on Forest System roads when needed. As part of the operating plan for the landfill, the county agrees to provide water from the well to fill a large storage tank within the Buckhead holding pasture. Water from this storage tank is the primary cattle watering source for the holding pastures and shipping pens on Buckhead Mesa. Gila County Board of Supervisors holds a Special Use Permit for the Jim Jones Shooting Range found within the Hog Canyon Allotment. This facility is 80 acres that is fenced separately from the grazing allotment. The Tonto Rim Sports Club is the entity that provides operational oversight of this yearlong facility for Gila County.

Environmental Consequences

Neither alternative proposes to change existing roads or road management, nor do they propose to construct any new roads. Livestock grazing has been a public use of the project area since the first settlers arrived in the late 1800s. Presence or absence of livestock grazing does not preclude or prevent other recreational opportunities in the project area. Range developments such as stock tanks and watering troughs that are maintained by the grazing permittees can be beneficial to user groups such as equestrians and hunters. Public perceptions of cattle grazing may affect an individual's recreational experience within the project area, but this is difficult to assess due to the wide range of public opinion on public land grazing. Continuation of livestock grazing within the project area will have minimal effect on the recreational experiences of Forest users. Alternative 1, the No Grazing Alternative has the least effect on recreational experiences, while Alternative 2, the Proposed Action, has minimal and insignificant effects to the recreational experiences of Forest users.

Heritage Resources

Affected Environment

Pine and Hog Canyon allotments contain more than 100 known and hundreds, if not thousands, of undocumented prehistoric archaeological sites. These sites represent the occupation and agricultural modification and use of this area by people related to the Hohokam, Salado, and Central Arizona archaeological traditions over a period of 8,000 to 10,000 years and are likely to contain historic Apache sites. Several historic sites, within the analysis area, reflect occupation and use by Anglo and Hispanic ranchers, stockmen, miners and prospectors, the Civilian Conservation Corps, and the U.S. Forest Service.

A few locations have been surveyed with emphasis in Pine allotment. Density of prehistoric sites within the few surveyed areas is moderate to very high; however, much of the area remains un-surveyed. Known heritage properties include a variety of features, ranging from historic cabin sites and mining sites to simple artifact scatters to large prehistoric habitation sites. A great majority of these features, however, are prehistoric and consists of collapsed stone masonry structures, various water control devices such as check dams, and terraces, and roasting pits for the processing of agave. There are a large number of features associated with a long history of cattle ranching and a few reflecting sporadic attempts at small-scale mining and ore processing. Many other prehistoric and historic archaeological sites are represented by a scatter of artifacts on the ground surface.

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

From the 1870s to the early 1920s, grazing on and near Pine and Hog Canyon 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 the allotment and implementation of grazing management, the known heritage resources inventoried have stabilized and in many cases improved in condition as vegetative cover has returned.

Environmental Consequences

Impacts to heritage resources, especially archaeological sites, can be 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 that are considered eligible for inclusion in the *National Register of Historic Places*, this can also include alterations of a property's setting or context. In the case of 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 generally considered to be those resulting from concentrated livestock trampling or construction. Indirect impacts can 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 archaeological and historic sites – any portion of them that has been damaged or removed, diminishes their cultural and scientific value permanently.

Effects Common To all alternatives

Based on observation and consultation with the State Historic Preservation Officer (SHPO), managed grazing is not considered to constitute an effect on heritage resources. Adverse effects can be foreseen, if a proposed grazing strategy were to introduce livestock into an area not known to have been historically grazed. This could result in either direct or indirect adverse effects depending on the degree of trampling from livestock concentration, presence absence of heritage resources, the nature of the resource and its resistance to such impacts, and the distance to other

heritage sites. 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. 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.

Socio-Economics

Affected Environment

Payson, Arizona, is a small town (population approximately 13,620 from Census 2000), 93 miles north of Phoenix with an approximate population of 28,000. The town is completely surrounded by the Tonto National Forest. Payson was founded as Union Park in 1882. People in the area called it Green Valley, until the post office was established. Then the postmaster, Frank C. Hise, named it for Senator Louis Edward Payson, who as congressional chairman of Post Office and Post Roads was responsible for the town receiving a post office. At present the town is primarily a retirement and second home community, with the median age of the population being 48.9 years. The local economy is dominated by tourism, retirement, and construction industries, with a growing emphasis on manufacturing and service firms.

Gila County, with a population of approximately 51,335 (Census 2000), encompasses approximately 4,752 square miles. Within the county, ownership or administrative control occurs as follows: the U.S. Forest Service -55.5 percent of the land, Apache Tribe -37 percent, individuals and corporations -3.7 percent, U.S. Bureau of Land Management -1.9 percent 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 the funding from the federal government. The U.S. 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 2001, Gila County was to receive approximately $1,498,572 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. For this analysis, the social environment is comprised of the people living in and adjacent to the Tonto National Forest. 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 National Forest, 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 borders the Forest along its south and western boundaries. Smaller rural 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* 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" (Gila County, 1997). Phoenix metropolitan and town of Payson have experienced great population growth in recent years. Influx of people in recent decades has also brought about more diverse views and public opinion regarding appropriate uses of the public lands. 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 desirability of the Southwest as a living location. 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. Tradition of an open range endured for several hundred years before Anglo-Americans arrived in the Southwest. 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, et al., 1988).

Environmental Consequences

Economic Impacts

Other than reported actual livestock numbers on the Pine/Hog Canyon allotments, data does not exist regarding economic returns from these ranching operations or the expenses incurred for maintenance of range improvements. Rent stocking rates have been quite variable on both allotments due to fluctuating resource conditions, recurrent drought, and economic considerations.

Research is available that discusses the influence stocking rates can have on economic returns. Generally, heavier stocking rates result in greatest gross economic returns, while moderate

stocking rates maximize net economic returns (Holechek, 1998). Over time, heavy stocking may result in higher death rate, 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; heavier rates result in more severe reductions than moderate rates, epscially in drought years. Under the adaptive management proposal, desirable stocking rates would be moderate over the long term to achieve desired resource conditions.

Neither alternative will affect future payments received through PILT or PL 106-393. Payson and Gila County could be affected by the alternatives due to the amount of money made by the livestock permittee 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

Removal of livestock may result in increased trust and positive attitude of individuals opposed to livestock grazing. These individuals may have an increased social and recreational benefit from livestock removal. Conversely, livestock removal may result in a loss of the ranching culture and lifestyle, increased feelings of mistrust and negative attitudes toward the Forest Service and other federal agencies.

Adaptive management may result in a decreased trust and positive attitude toward the Forest Service from the public opposed to livestock grazing. A decreased interest in social and recreational benefit from the Tonto National Forest may occur from these individuals. Alternative Two will likely protect characteristics of self sufficiency, independence, hard work, associated with the ranching.

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 either of the alternatives evaluated in this EA would not result in adverse impacts to environmental resources and socioeconomic conditions.

Cumulative Effects

Cumulative effects are the past, present, and reasonably foreseeable future actions that add to the direct and indirect effects considered in this EA. These activities and occurrences have contributed incrementally to changes in ecological conditions in the project area and may continue to influence conditions in the project area over the term of the project. Foreseeable future actions are those for which a proposed action has been approved or those proposed for NEPA analysis in the future. The following list of past, present, and foreseeable future actions have been identified as potentially contributing to the effects analyzed herein.

Wildland Urban Interface (WUI) Fuel Reduction Projects

There are three Wildland Urban Interface (WUI) Projects that have been approved within the last several years that affect the Project Area. These are the Pine/Strawberry WUI, Verde WUI, and the Payson WUI. There have been approximately 3,000 acres of tree and brush thinning and fuelbreak construction treatments completed within the project area as of September 2009 (PR 43). Thinning treatments usually yield piled vegetative debris that is later burned by Forest Service personnel.

Past Timber Sales

Two timber sales, the Ashmo and Woofidd Sales, have been completed for over 12 years. They covered a total of about 2,300 acres. Most of the harvest was either a thinning or sanitation and did not change the character of the timber stands. To some degree harvesting of trees have the potential to increase forage for ungulates. Any watershed effects have been mitigated by re-growth of herbaceous vegetation.

Highway Construction

Recent projects affecting the area are the reconstruction of several sections of State Highway 87 (Beeline Highway). There was a widening project in the vicinity of Oxbow Hill on the Hog Canyon Allotment completed in the summer of 2009. Paved shoulders were added to the existing road prism, but these additions were within the fenced right-of-way, so project actions had no effect on the amount of pasture area grazed by cattle. One mile north of Payson and one-mile south of Pine on Highway 87 are being widened to accommodate extra lanes of traffic. Only the section one mile south of Pine will impact the project area on the Pine Allotment. The amount of widening is expected to be within or close to the existing fenced right-of-way, so the action will have negligible effects on forage availability or pasture size. This project was completed in summer 2010.

Elk

Competition between cattle and elk is for herbaceous forage will continue to be with the current elk herd numbers. Based on estimates for Game Unit 22 provided by Arizona Game and Fish, from 127 to 196, Rocky Mountain elk utilize the allotments depending upon water availability (PR 44). Elk have the potential to be somewhere on these three allotments year-long. High densities of elk may cause negative effects on the availability of forage for cattle, but on the other hand, elk show an aversion to the presence of cattle and tend to move to other areas when cattle

are introduced. (Wisdom and Thomas, 1995). Elk use changes from year to year depending upon available forage and water. Allowable use by cattle will include use caused by elk.

Christopher Mountain/Ellinwood, 13 Ranch, and Little Green Valley Complex Allotment Management Plans

In 2005, the Little Green Valley Complex Decision was signed by the Payson District Ranger. A new ten-year permit was issued to the current permittee for up to 380 head of adult livestock, 300 in the summer months and no more than 380 in the winter. Several pastures were designated for primary summer and winter grazing. The 13 Ranch was issued a summer seasonal permit with 63 head of cattleChristopher Mountain/Ellinwood, signed in 2008, was issued a yearlong permit of 200 head of adult cattle. Many improvements were selected to improve rangeland condition. Grazing, on both allotments, in some pastures were limited in their grazing season due to Mexican spotted owl PACs. The decision also addressed thinning to improve watershed conditions.

Wildlife

Alternative 1, No Action

Cumulative effects include the direct and indirect effects of eliminating grazing when added to WUI projects, past wood sales, and nearby allotment management plans will not provide foreseeable negative effects. Eliminating grazing may result in more available forage for wildlife, specifically elk. Highway projects may see more elk encounters.

Alternative 2, Proposed Action

Cumulative effects include the direct and indirect effects of reauthorizing grazing when added to all past, present, and reasonably foreseeable future actions will not provide foreseeable negative effects.

Soils

Common to all alternatives

Cumulative effects include the direct and indirect effects of the proposed action and alternatives when added to all past, present, and reasonably foreseeable future actions. Past grazing actions have resulted in soil erosion and compaction, while current management has, in some cases, prevented or slowed recovery. Other actions occurring in the project area that can impact soils and vegetation include recreation, roads, OHV use, wildlife grazing, fuels reduction projects, and wildfire.

Alternative 1, No Action

Direct, indirect, and cumulative effects of eliminating grazing impacts will generally be beneficial and provide the best potential for attaining desired conditions.

Alternative 2, Proposed Action

Direct and indirect effects of grazing in the uplands when combined with other past, present, or reasonably foreseeable actions may slow or prevent recovery of those ecosystems in poor condition. In other areas, where ecosystems are in better condition, effects will be small.

Vegetation and Watershed

Common to all alternatives

Other uses within the project area having the potential to negatively impact herbaceous vegetation cover, density, and plant vigor include OHV use, erosion from existing roads/trails, wildfire, prescribed fire treatments, mechanical disturbance from thinning treatments, and dispersed camping. Overstory thinning of brush and tree species that has occurred in the project area generally has a beneficial effect on herbaceous plant cover and density within 1-2 years of thinning treatments.

Alternative 1, No Action

Other actions in the project area that affect vegetation and soil will continue, as well as continued herbivory from wildlife. There have been instances of high localized utilization, especially around water sources, that occurs solely from elk use (District 2210 range inspection reports).

Alternative 2, Proposed Action

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

Riparian and Water Quality

Common to all alternatives

Many of the stream channels and riparian areas on the Pine and Hog Canyon allotments are in impaired condition (Mason and Johnson, 1999), although riparian vegetation appears to be recovering. Historic grazing likely had the most extensive effects on riparian areas and stream channels within the allotments, although pre-grazing conditions are not known. Pine and Hog Canyon allotments have been grazed for over 100 years. The district range files document poor distribution, high use in riparian areas, and lack of developed, off-channel waters.

More recent grazing management activities have also affected riparian areas and stream channels, but to a lesser degree than historical grazing because of improved management practices such as reduced numbers, increased number of pastures, deferred and rest-rotation schedules, active herding, and improved water distribution.

Roads, lack of road maintenance, off-road vehicle use, and highway construction occurring within or near the allotment has impacted streams and riparian areas. Hog Canyon allotment is easily accessed from the town of Rye and off-road vehicle use and the resulting impacts have increased.

Pine/Strawberry Wildland Urban Interface Project utilized several forest treatments, including thinning and burning, to create a defensible space around the towns to protect them from wild fire. The work began in 2005 and is ongoing. Best Management Practices are being used to protect stream channels from the effects of the project.

There were two wildfires on the Pine Allotment, occurring in 2002 and 2009, each burning less than 50 acres. Both were mainly in ponderosa pine type where there is little cattle use.

In addition to the above management activities, a current statewide drought that began in the late 1990s (ADWR, 2009) has likely had an effect on the Pine and Hog Canyon 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 that the current drought will intensify and continue for years to decades. However, the models are too broad-scale to predict how climate change might affect the monsoons, which contribute 40 percent of the total annual precipitation received on the Tonto NF (Lenart, 2005). It is difficult to predict how global warming might affect the Pine and Hog Canyon allotments specifically, but they are likely to become warmer and dryer.

Alternative 1, No Action

The direct and indirect effects of this alternative, when combined with other past, present or reasonably foreseeable actions as listed above, should result in the continuation of improving riparian area and stream channel conditions.

Alternative 2, Proposed Action

If riparian mitigation measures are successfully implemented on an annual basis, the direct and indirect effects of this alternative, when combined with other past, present or reasonably foreseeable actions as listed above, should result in reaching desired conditions, although more slowly than under the No Grazing Alternative.

Recreation, Lands, Special Uses

Alternative 1, No Action

When this alternative is combined with past, present and foreseeable actions listed above, should result in no effects.

Alternative 2, Proposed Action

When this alternative is combined with past, present and foreseeable actions listed above, should result in no effects.

Heritage Resources

Any impact to heritage resources results in the removal, displacement, or damage to cultural materials. Following proper procedures, highway widening would only lose a few sites. Thinning projects will avoid sites. Elk continue to be a concern, since they graze and congregate allowing for incremental deterioration. Livestock damage to cultural areas is historic. Cattle will continue to degrade sites.

Alternative 1, No Action

The direct and indirect effects, when associated with the above mentioned actions would slightly decrease pressure on heritage resources.

Alternative 2, Proposed Action

When the proposed action is associated with practices mentioned above, there would be a continued negative pressure on the cultural resources.

Socioeconomics

Alternative 1, No Action

Direct and indirect effects of this alternative when combined with Highway projects and recent AMPs should result in minimal to no effect to socio-economics. WUI and wood sale projects in relation to the No Action alternative, will most likely promote the growth of herbaceous plants. These fine fuels may increase likelihood of fire. This would affect residents that live near and border the Pine/Hog Canyon allotments.

Alternative 2, Proposed Action

Direct and indirect effects of this alternative when combined with all past, present, and foreseeable future projects should provide no effects to reaching desirable conditions.

Consequences Related to Significant Elements

In 1978 the *Council on Environmental Quality* (CEQ) promulgated regulations for implementing the *National Environmental Policy Act* (NEPA). The regulations (40 CFR 1500-1508) include a definition of "significantly," as used in NEPA. The elements of this definition are critical to reducing paperwork through the finding of no significant impact, when an action will not have a significant impact on the human environment and is, therefore, exempt from the requirement to prepare an environmental impact statement.

Context and intensity of impacts.

Context is defined as "The significance of an action must be analyzed in several contexts such as society as a whole (human, national), the affected region, the affected interests, and the locality. Significance varies with the setting (…) in the case of a site-specific action, significance would usually depend upon the effects in the locale rather than in the world as a whole. Both short- and long-term effects are relevant." Intensity is the "… the severity of impact…."

Context of this proposal is limited primarily to the allotment and the immediate vicinity. In that localized context, this proposal would not pose any significant short- or long-term effects. The relatively small scale of this proposal's effects on the land and resources, particularly compared to the effects of other activities on the allotment, limit the proposal's effects to a minor level. Mitigations included in the proposal minimize and avoid adverse impacts to the extent that such impacts are nearly undetectable and not measurable even at the allotment level.

Beneficial and adverse impacts.

There are beneficial and adverse impacts from the proposed action, but adverse impacts are minimal. Minor adverse impacts include removal of plant biomass and localized soil disturbance at range developments. These impacts are insignificant; the intensity of impacts will use adaptive grazing management to maintain conservative utilization levels on forage plants, and localized range developments occupy a small fraction of the entire allotment acreage.

Affects on public health or safety.

There will likely be no significant effects on public health and safety because rangeland management activities would be conducted in a safe manner. Public health and safety was not identified as an issue during scoping. The project does not involve national defense or security.

Unique characteristics of the geographic area.

The selected alternative does not propose any new road construction or changes to existing travel management. There are no inventoried roadless areas, congressionally-designated wilderness areas, or Wild and Scenic Rivers in the project area. The project area is near but not contained in any portion of the Matazal and Hellsgate inventoried roadless area and is outside of the Hellsgate and Matazal Wilderness and does not propose any new road construction within this area, or elsewhere in the project area.

The project area is known to contain cultural resources of both prehistoric and historic periods. The action will not have an adverse effect on heritage resources.

Effects are likely to be highly controversial (scientifically).

This Environmental Analysis is tiered to the Tonto National Forest LMP Environmental Impact Statement. Forest-wide effects of the LMP's standards were disclosed in that EIS. The adaptive management alternative with the identified mitigation considered in the EA meet these standards. In addition, extensive scoping was completed during the analysis in order to identify areas of potential controversy. There has been no information presented that would demonstrate that the action would cause adverse impacts.

Effects are highly uncertain or involve unique or unknown risks.

This action is similar to many past decisions, both in this analysis area, and adjacent areas. Livestock grazing and fence construction have occurred on the Tonto NF for over 100 years. An interdisciplinary team conducted the analysis, used the results of past actions as a frame of reference, and combined professional judgment with scientifically accepted analytical techniques and best available information to estimate effects of the proposal. There are no unique or unusual

characteristics about the area, not previously encountered, that would constitute an unknown risk upon the human environment.

May establish a precedent for future, similar actions.

Similar actions have occurred in the watershed. Effects of this project are minor and short term in nature. Major follow-up actions will not be necessary. This action does not establish precedence for future actions with unknown risks to the environment.

Related to other actions that are individually insignificant, but cumulatively significant.

Combined effects of the project with other past, present, and reasonably foreseeable future actions and information identified during public review concludes there are no significant, cumulative impacts.

Effects on historical/cultural resources.

There are no known sites or structures within the project area that are currently listed or eligible for placement on the *National Register of Historic Places*. Consultation with the State Historic Preservation Officer (SHPO) under Section 106 of the *National Historic Preservation Act* has been completed for grazing and proposed improvements and the SHPO has concurred with the no adverse effect.

Effects on T & E species and their habitats.

Based on conclusions documented in the Biological Assessment (PR 48) and the wildlife effects analysis, there will be no adverse effects to species or will their habitat be determined critical under the *Endangered Species Act* (ESA).

Compliance with Federal, State, local laws.

Analysis for this project does not threaten or violate any Federal, State, or local law imposed for the protection of the environment. This project is fully consistent with the Tonto LMP and the *National Forest Management Act* (NFMA), *Clean Water Act*, and the *Federal Land Policy Management Act of 1976*.

CHAPTER 4 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:

Consultation with Others

The Tonto National Forest contacted 47 separate parties believed to be interested in or affected by the proposed action, when it initiated a scoping letter sent on April 17, 2009. The scoping letter was sent to the following: 7 individuals, 11 private organizations, 20 representatives from local tribes, 6 representatives from state/county/local government, and 3 federal agencies. From these scoping activities, 9 parties commented or otherwise expressed an interest in the proposal. The first two chapters of this EA, entitled *Proposed Action for the Pine/Hog Canyon Allotment Analysis*, were sent to interested parties on July 17, 2009, and a Legal Notice for Comment was published on that date in the *Payson Roundup* newspaper. There were 6 comment letters received as a result of comment solicitation for the draft proposed action. The project has been listed in the Tonto Forest's *Schedule of Proposed Actions* on the worldwide web since April 2009.

Federal Agencies

Natural Resource Conservation Service
U.S. Forest Service, Coconino National Forest
U.S. Fish and Wildlife Service

State/County/Local Government

Arizona Department of Environmental Quality
Gila County Board of Supervisors
Town of Payson
Arizona Game and Fish Department
Gila County Extension Service

Tribes

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

Individuals/Organizations

Mogollon Sporting Assoc.
Terence Wheeler
WildEarth Guardians
Center for Biological Diversity
Maricopa Audubon Society
Arrowhead Estates
Sierra Club, Grand Canyon Chapter
Pine Public Library
Arizona Trail Assoc.
Bill & Lori Brown
Dave Cook, Gila County Cattle Growers
Jeff Burgess
Art Sanders, Willow Ranches, LLC
Erik Ryberg, Western Watersheds Project
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KMOG radio station
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Rick Erman, The Friends of Anderson Mesa

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References

Arizona Department of Environmental Quality. 2008. 2006/2008 Intergrated 305(b) Assessment and 303(d) Listing Report http://www.azdeq.gov/environ/water/assessment/assess.html

Baker, Robert D. 1988. Timeless heritage: a history of the forest service in the southwest. USDA Forest Service. Washington D.C.

Brown, R.L. 1990. Effects of a Savory grazing method on big game: A final report. Ariz. Game and Fish Dept., Research Branch Tech. Rept. No. 3.

Burton, Timothy A., Ervin R. Cowley and Steven J. Smith. 2007. Monitoring Stream Channels and Riparian Vegetation-Multiple Indicators (Version 3.0). Idaho Technical Bulletin 2007-01. USDI Bureau of Land Management, Idaho State Office. 47p and appendices.

Castellano, M.J. and T.J. Valone. 2007. Livestock, soil compaction and water infiltration rate: Evaluating a potential desertification recovery mechanism. Journal of Arid Environments. 71:97-108.

Census (2009). Retrieved from Arizona Department of Commerce (Gila County).

Clary, Warren P. and William H. Kruse. 2003. Livestock grazing in riparian areas: environmental impacts, management practices and management implications. [In]: Riparian areas of the southwestern United States. Eds: M.B. Baker, Jr., P.F. Folliott, L.F. DeBano, and D.G. Neary. Lewis Publishers, CRC Press Co. pp. 237 – 258.

Clary, W.P. and B.F. Webster. 1989. Managing grazing of riparian areas in the Intermountain Region. Gen Tech. Rep. INT-263. Ogden, UT:USDA Forest Service, Intermountain Research Station. 11p.

Cowley, E.R. and T. Burton. 2002. Monitoring the current year streambank alteration (unpublished). Bureau of Land Management, Idaho State Office. Boise, ID.

Cowley, Eric R. and Timothy A. Burton. 2005**.** Monitoring Streambanks and Riparian Vegetation---Multiple Indicators. Tech. Bull. No. 2005-2.USDI, Bureau of Land Management, Idaho State Office, Boise, ID. 29 pp. and appendices.

Galt, Dee; Greg Mendez; Jerry Holecheck; and James Joseph. 1999. Heavy Winter Grazing Reduces Forage production; An Obervation. Rangelands. 21 (4):18-21.

Gila County Board of Supervisors. 1997. Gila county land use and resource policy plan for public lands (LURPP). ppg. 9, 14.

Girmendock, A.L. 1994. Ocelot, jaguar, and jaguarundi sighting reports: Arizona and Sonora, Mexico. Nongame and Endangered Wildlife Program Tech. Rept. 35. Arizona Game and Fish Dept., Phoenix. 15pp.

Gori, David and Dana Backer. 2005. Watershed improvement using prescribed burns as a way to restore aquatic habitat for native fish. USDA Forest Service Proceedings RMRS-P-36.

Harrelson, C.C., J.P. Potyondy, C.L. Rawlins 1994. Stream Channel Reference Sites; An illustrated Guide to Field Technique. Gen. Tech. report RM-245. Fort Collins, CO: USDA Forest Srvice.

Holecheck, J.L., H. Gomez, F. Molinar, and D. Galt. 1999. Grazing Studies: What We've Learned. Rangelands 21(2):12-16.

Holecheck, J.L., T.T. Baker and J.C. Boren. 2004. Impacts of controlled grazing verses exclusion: What we have learned. Range Improvement Task Force Report #57. New Mexico State University. Las Cruces, NM.

Holechek, J.L.; R.D. Pieper, C.H. Herbel. 1998. Range Management Principles and Practices. 3rd ed. Printice Hall. Upper Saddle River NJ. Pg. 198 – 202

Interagency Technical Team (ITT): 1996. Sampling Vegetation Attributes, Interagency Technical Reference, Report No. BLM/RS/ST-96/002+1730. Denver, CO: U.S. Department of the Interior,
Bureau of Land Management – National Applied Resources Science Center. http://www.blm.gov/nstc/library/pdf/samplveg.pdf.

Kindschy, Robert R. 1987. Riparian reminiscences. Rangelands 9(2). P 71-74.

Kindschy, Robert R. 1994. Riparian restoration and management. [In]: Interior Columbia Basin Ecosystem Management Project Science Integration Team Terrestrial Staff Range Task Group. Scientific Contract Report: 43-OEOO-4-9182, 58 p.

Klein, E., M. Gilbert, S. Lisius, R. Richards, M. Ross, C. Woods, B. Calamusso, D. Pollock and J. Spencer. 2002. Tonto National Forest Land and Resource Management Plan Management Indicator Species Status Report Version 1.0. Upbl. Rept., Tonto National Forest, Supervisors Office, Phoenix, Az.

Latta, M.J., C.J. Beardmore, and T.E. Corman. 1999. Arizona Partners in flight bird conservation plan. Version 1.0. Nongame and Endangered Wildl. Prgm. Tech. Rept. 142. Arizona Game and Fish Dept., Phoenix.

Laycock, W. A. 1991. Stable states and thresholds of range conditions on North American rangelands: A viewpoint. J. Range Manage. 44(5):427-433.

Leege, T.A. 1984. Guidelines for evaluating and managing summer elk habitat in Northern Idaho. Idaho Dept. Fish& Game, Wildlife Bull. No. 11.

Lenart, Melanie. 2005. Monsoon Could Strengthen as Climate Warms. IN: Southwest Climate Outlook. June 2005.

Levick, Lainie, David Goodrich, Mariano Hernandez, Darius Semmens, Juliet Stromberg, Rob Leidy, Melissa Apodaca, D. Philip Guertin, Melanie Tluczek, William Kepner. 2007. Hydrology and Ecology of Intermittent Stream and Dry Wash Ecosystems. Southwest Region Threatened, Endangered, and At-Risk Species Workshop: Managing Within Highly Variable Environments. Oct. 22, Tucson, AZ. EPA/600/R-07/142, ARS/218464. 20 p.

Loeser, M.R.R., T.D. Sisk, and T.E. Crews. 2007. Impact of Grazing Intensity during drought in an Arizona Grassland. Conservation Biology 21(1):87-97.

Loomis, J. 1993. Integrated public land management, Columbia University Press, New York. Pp 177-178.

Mahoney, J.M. and S.B. rood. 1998. Streamflow requirements for cottonwood seedling recruitment; an intergrative model. Wetlands, 18, 634-645.

Mason, Lynette W. and Janet L. Johnson. 1999. Tonto National Forest Stream Assessment Method. In: AWRA Symposium Proceedings on Wildland Hydrology June 30-July 2, Bozeman, MT. American Water Resources Association, pp. 255-257.

McBride, Kristen and Janet Johnson Grove. 2002. Riparian Area Management Utilization Guidelines (revised). Unpublished, on file at Tonto National Forest, Phoenix, Az. 25 pp.

Milchunas, Daniel G. 2006. Responses of plant communities to grazing in the southwestern United States. Gen. Tech. Rep. RMRS-GTR–169. Ft. Collins, CO: US Department of Agriculture, Forest Service, Rocky Mountain Research Station. 126 p.

Mosley, J.C., P.S. Cook, A.J. Griffis and J. O'Laughlin. 1999. Guidelines for managing cattle grazing in riparian areas to protect water quality; Review of research and best management practices policy. Moscow, ID: university of Idaho: 1997: v. 67p. no. 15.

Navarro, J.M., D. Galt, J. Holecheck, J. McCormick, and F. Molinar. 2002. Long-term Impacts of livestock grazing on Chihuahuan Desert rangelands. J. Range Manage. 55(4):400-405.

Pfankuch, D. J. 1975. Stream reach inventory and channel stability evaluation. USDA Forest Service, R1-75-002. GPO #696-260/200, Washington, D.C. 26 p.

NOAA, 2009. National Weather Service Forecast Office, Phoenix, AZ http://www.wrh.noaa.gov/psr/droughtget.php?station=Payson

Richards, R. 2005. Version 2, revision of Klein, E., M. Gilbert, S. Lisius, R. Richards, M. Ross, C. Woods, B. Calamusso, D. Pollock and J. Spencer. 2002. Tonto National Forest Land and Resource Management Plan Management Indicator Species Status Report Version 1.0. Upbl. Rept., Tonto National Forest, Supervisors Office, Phoenix, Az.

Rosgen, Dave. 1996. *Applied River Morphology*. Wildland Hydrology. Pagosa Springs, CO.

Rowland, M.M., A.W. Alldredge, J.E. Ellis, B.J. Weber and G.C. White. 1983. Comparative winter diets of elk in New Mexico. J. Wildl. Manage. 47(4):924-932.

Seager, R., et al. 2007. Model Projections of an Imminent Transition to a more arid climate in Southwestern North America. Science, V.316, No. 5828. April 5, 2007. p1181-1184.

Severson, K.E. and A.L. Medina. 1983. Deer and elk habitat management in the Southwest. J. Range Manage. Mon. No. 2. 138 pp.

Shein, K.A., ed., 2006. State of the Climate in 2005. Bulletin of the American Meteorological Society. 87, S1-S102.

Smith, Lamar, George Ruyle, Jim Maynard, Steve Barker, Walt Meyer, Dave Stewart, Bill Coulloudon, Stephen Williams, Judith Dyess. 2005. Principles of Obtaining and Interpreting Utilization Data on Southwest Rangelands. The University of Arizona Cooperative Extension Service publication 10/2005, 11 pp.

Soeth, J.R. and G.J. Gottfried. 1999. Adaptive Management in piñyon -Juniper Woodlands of Central Arizona. Proc. Soc. of Amer. Foresters 1999 Natl. Convention, Portland, Ore. Sept. 11-15, 1999, pp. 505-508.

Stickney, P.F. 1966. Browse utilization on percentage of twig numbers browsed. Journal of Wildlife Management. 30(1):240-206.

Thompson, William H., Robert C. Ehrhart, Paul L. Hansen, Thomas G. Parker, and William C. Haglan. 1998. Assessing Health of a Riparian Site. In: Proceedings AWRA Speciality Conference on Rangeland Management and Water Resources May 27-29, Reno, NV. American Water Resources Association, pp. 3-12

Trimble, S.W. and A.C. Medel. 1995. The cow as a geomorphic- A critical review. Geomorphology. 13:235-253.

USDA Forest Service. 1985, as amended. Tonto National Forest Plan. On file at Tonto National Forest Supervisors Office, Phoenix, AZ.

USDA Natural Resources Conservation Service. 1996. Soil Quality Information Sheet-Soil Quality Resource Concerns: Compaction.

USDA Natural Resources Conservation Service. 2001. Rangeland Soil Quality Information Sheet, Rangeland Soil Quality-Compaction.

USDA Natural Resources Conservation Service. 2001. Rangeland Soil Quality Information Sheets.

Wallace, M.C. 1984. Habitat use by elk, mule deer and cattle in Arizona. MS Thesis. Univ. Arizona, Tucson.

Westoby, M., B. Walker, and I. Noy-Meir. 1989. Opportunistic management for rangelands not at equilibrium. J. Range Manage. 42(4):266-274.

Wisdom, M.J. and J. W. Thomas. 1995. Elk. Pages 157-181. in P.R. Krausman, ed. Rangeland Wildlife. The Soc. Range Management, Denver, Colorado.

Appendix A – Definitions

Animal Unit Month (AUM): The amount of forage required by an animal unit for one month, often calculated as 26 lbs. of forage per day by dry weight. The term is an expression of grazing impact and is related to forage removed. When estimating stocking rates for grazing allotments, express the amount of forage available in AUMs of forage. This gives an idea of how many animals of a certain class or kind can graze. A cow/calf pair requires an average of 1.32 AUMs of forage for one month, a dry cow (no calf) 1 AUM, a yearling steer or heifer is .7 AUM. An AUM is the proper basis for documenting estimated grazing capacities and estimating and describing grazing impacts.

Conservative Use: Forage utilization is maintained between 30-40 percent of annual forage production by weight in pasture key areas. Qualitative indicators of conservative use can be described by the following; forage plants have abundant seed stalks; areas more than a mile from water show little use; about one-third to one-half primary forage plants show grazing on key areas (Holechek and Galt, 1999).

Deferred Rest-Rotation Grazing Strategy: A grazing system in which the same pasture is not grazed at the same time during the growing season in consecutive years (deferment), with a rest period also added in which the pasture is not grazed at all during the growing season. A typical 3-pasture scenario using this system would have pasture A grazed May-July in year 1, August-October in year 2, and rested in year 3. The schedule then repeats.

Effective Ground Cover is a measure of the percentage of ground area covered by live basal vegetation or persistent litter. These serve to protect the soil surface from accelerated erosion. It is a Tonto NF Plan guideline to "maintain a minimum of 30 percent effective groundcover for watershed protection and forage production."

Key Areas: A relatively small portion of a range selected because of its location, use or grazing value as a monitoring point for grazing. Key areas should be located within a single ecological site or plant community, be responsive to management actions and be indicative of the ecological site or plant community they are intended to represent (Society for Range Management, 1998). Key areas will normally be ¼ to 1 mile from water, located on productive soils with level-to-intermediate slopes, and be readily accessible for grazing. Size of key forage monitoring areas may be 20-500 acres. In some situations, such as high mountain meadows with perennial streams, key areas may be closer than ¼-mile from water and less than 20 acres (Tonto NF Plan, p. 42-1).

Level D: 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.

Light to Moderate Grazing Intensity: Based on review of numerous grazing intensity studies, Holechek (1999, 2004) identifies light-to-moderate grazing as 32-43 percent average use of primary forage species. These averages are based on pasture-wide utilization averaged over time. The Forest Service monitors utilization based on the use of key forage species in key areas. Key

areas are selected to be representative of management effectiveness over the entire pasture. For the purposes of monitoring, an annual use guideline of 30 - 40 percent of key species in key areas would be used to monitor use in all pastures, which combined with growing season rest or deferment, should ensure pasture-wide average use of less than 40 percent. Grazing intensity can be measured before and during the growing season. Grazing intensity can be utilized to manage livestock, so that expectations of end of growing season utilization measurements will not be exceeded.

Parker Three-Step Method is a method for determining range condition used by Region 3 of the Forest Service. The method is outlined in R3 Forest Service Handbook 2209.21. The vegetative rating shown by this method is a commodity rating based on the value of the land for cattle grazing. The more plant species present that cattle prefer to graze, the higher the vegetation condition portion of the score. It is not a measure of ecological status or similarity with site potential.

Range Condition is a subjective expression of the status or health of the vegetation and soil relative to their combined potential to produce a sound and stable biotic community. Soundness and stability are evaluated relative to a standard that encompasses the composition, density and vigor of the vegetation, and physical characteristics of the soil. Condition classes may be classified as excellent, good, fair, poor, and very poor (pg. 42-1 Tonto NF Plan).

Satisfactory Range Condition: By the Parker Three-Step Method, attainment of vegetation and soil stability rating that is fair or better (score over 41) with a stable or upward trend is considered satisfactory range. Ratings less than fair with an upward trend are moving towards this objective (R3 Rangeland Analysis and Management Training Guide, 1997).

Satisfactory Watershed Condition can be evaluated using the Parker Three-Step soil stability rating, which includes an erosion hazard component and a subjective evaluation of current erosion. A soil stability score that rates fair or better (score over 41) is considered satisfactory, or an upward trend towards a fair rating. Satisfactory watershed condition can be visualized as an area with minimal sheet erosion, good groundcover from live vegetation and litter, and bare spaces generally small and not coalescing, or without distinguishable runoff pattern (R3 Forest Service Handbook 2209.21, Ch. 40, 1988).

Soil condition is an evaluation of soil quality based on an interpretation of factors which affect vital soil functions. These functions are: the ability of the soil to hold and release water (hydrologic function), the ability of the soil to resist erosion and degradation (soil stability), and the ability of the soil to accept, hold, and release nutrients (nutrient cycling). Categories of soil condition are satisfactory, impaired, and unsatisfactory.

Watershed Condition is a measure of the ability of a watershed to provide a sustained and orderly flow of water, while maintaining soil productivity (Tonto NF Plan, p. 234).