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Agriculture

Forest
Service

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Environmental Assessment

Boneyback Grazing Allotment

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

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SUMMARY

A decision from this Environmental Assessment was originally submitted in September 2012. Following the decision, two appeals were received and reviewed by a Forest Service Region 3 appeals review team. The decision was returned to the Tonto National Forest and subsequently reversed by the Forest Supervisor with a request for clarification on the following item: cumulative effects to sensitive wildlife species were not adequately addressed. As a result, this document has been modified to include cumulative effects to sensitive wildlife species. Additional information is provided in Chapter 3 under the wildlife section, pages 35-51 and in Appendix B. Concurrence with determinations for threatened, endangered, and sensitive species was received from US Fish and Wildlife Service on September 4, 2012, prior to the original decision. A letter of concurrence can be found in Appendix B.

The Tonto National Forest proposes to reauthorize permitted livestock grazing on the Boneyback Allotment. The project area is located in the foothills of the Sierra Ancha Mountains and is within the Tonto Basin Ranger District, Tonto National Forest, Arizona. This action is needed to comply with the Rescissions Act (P.L. 104-19, 1995) and because the current management plan does not include the definitive analysis of adaptive management as described in FSH 2209.13, Chapter 90.

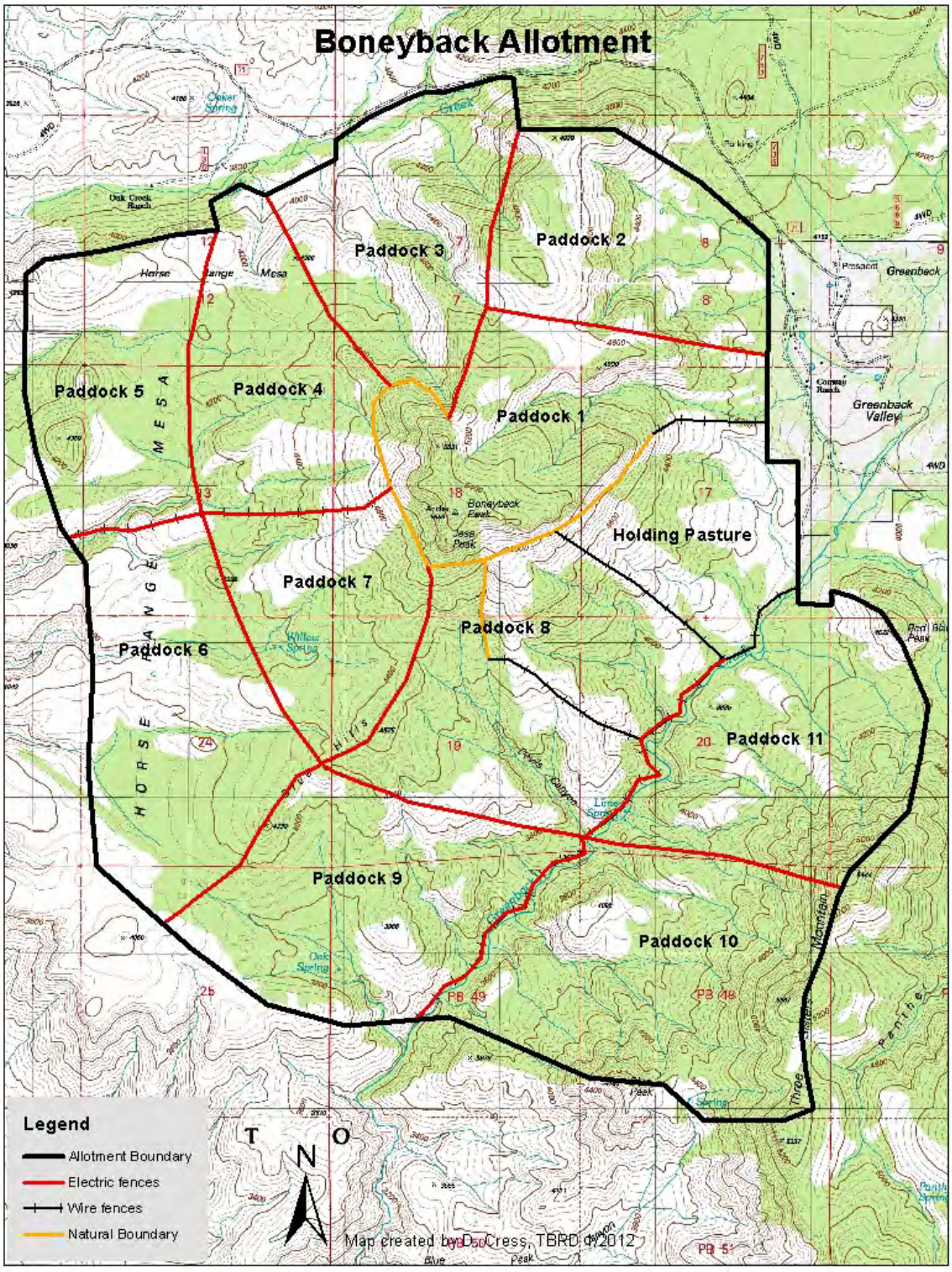
The proposed action continues cattle grazing and associated rangeland management activities on the allotment. Livestock grazing would be managed using an adaptive management strategy as described in this document, with monitoring and mitigation measures designed to maintain satisfactory rangeland conditions and improve less than satisfactory rangeland conditions.

In addition to the proposed action, the Forest Service also evaluated the following alternative:

- *No Grazing*- all rangeland management activities would cease on the allotment and the term grazing permit would be cancelled one year from the date of decision. Structural range improvements would be evaluated for agency maintenance or removal.

Implementation of a decision to continue to authorize livestock grazing would occur through issuance of a new term grazing permit, a new allotment management plan and annual operating instructions. Management actions such as adjustments to authorized numbers, season of use, timing and duration of use, and allowable utilization standards would be specified in those documents.


Tonto Creek
Boneyback Allotment
Roosevelt Lake
Tonto Basin Ranger District


Boneyback Allotment
Paddock 1
Paddock 2
Paddock 3
Paddock 4
Paddock 5
Paddock 6
Paddock 7
Paddock 8
Paddock 9
Paddock 10
Paddock 11
Holding Pasture
HORSE RANGE MESA
Greenback Valley
Boneyback Peak
Jess Peak
Willow Spring
Oak Spring
Lime Spring
Oaker Spring
Oak Creek Ranch
Conway Ranch
Legend
Allotment Boundary
Electric fences
Wire fences
Natural Boundary
T
N
O
Map created by D. Cress, TBRD ©2012

CHAPTER 1: INTRODUCTION

Document Structure

The Forest Service has prepared this Environmental Assessment in compliance with the National Environmental Policy Act (NEPA) and other relevant Federal and State laws and regulations. This Environmental Assessment discloses the direct, indirect, and cumulative environmental impacts that would result from the proposed action and alternatives. The document is organized into four parts:

- *Introduction:* includes information on the history of the project proposal, the purpose of and need for the project, and the agency's proposal for achieving that purpose and need. This section also details how the Forest Service informed the public of the proposal and how the public responded.
- *Comparison of Alternatives, including the Proposed Action:* provides a more detailed description of the agency's proposed action as well as alternative methods for achieving the stated purpose. Alternatives were developed based on significant issues raised by the public and other agencies. This discussion 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.
- *Agencies and Persons Consulted:* provides a list of preparers and agencies consulted during the development of the environmental assessment.
- *Appendices:* provide more detailed information to support the analyses presented in the environmental assessment.

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

Background

Boneyback Allotment is located in Gila County, Arizona and lies 13 miles east of Tonto Basin, Arizona. The allotment is approximately 6,800 acres in size and ranges in elevation from 3,880 feet on the lower slopes of the western edge to 5,558 feet in elevation at the top of Boneyback Peak. The allotment is bordered to the north, south and west by Tonto Basin Allotment. The allotment is bordered to the east by Greenback Allotment along Greenback Valley, Red Blanket Peak and Panther Gulch. This allotment falls within Management Area 6J as described in the 1985 Tonto National Forest Land Management Plan (Forest Plan).

Grazing on Boneyback Allotment has a long and complicated history. Settlement of the area began in the mid 1800s. By the 1890s, a variety of livestock including sheep, cattle, and hogs were fully stocked in the area and significant impacts to resources were occurring (Croxen 1926). Boneyback Allotment was always managed as a separate unit but was

originally part of a larger community of allotments that extended all the way down to Roosevelt Lake and included present day Greenback and Dutchwoman Allotments. This area was stocked year long with little active management. Boneyback Allotment is still identified internally as a management unit within Greenback Allotment but has been permitted as an individual allotment since 1970. Along with the 1982 Boneyback Unit Management Plan (Greenback Allotment), site specific allotment management planning for Boneyback was accomplished through annual operating instructions which contained direction consistent with Tonto NF Forest Plan goals and objectives. This EA and subsequent decision will formally recognize Boneyback as a separate allotment with its own allotment management plan.

The permittee for Boneyback Allotment has held the permit since September 1970. Current permitted numbers are for 101 cattle year long and 70 yearlings from January 1 through May 31 each year. There are 17 adult cattle stocked on this allotment for the 2012 grazing year.

A Holistic Resource Management (HRM) plan was implemented shortly after the current permittee acquired the permit and by the mid 1980's he had created a rotation based on eleven paddocks and a holding pasture built with electric fence, existing barbwire fences and natural boundaries. The plan provided for short duration and high concentration of animals as compared to the typical rest-deferred rotation used in this region. The permittee operated under this plan until cattle were removed from the allotment as part of a forest-wide reduction following severe drought in 2002. When livestock were returned to the allotment in very limited numbers, it became more economically feasible for the permittee to graze several paddocks together in a deferred rotation system since maintenance of infrastructure and personnel required to move cattle frequently under holistic resource management is costly and only profitable with a higher number of livestock than what is currently being grazed.

Cattle are watered at developed springs (Boney Spring, Willow Spring, and Oak Spring) with associated troughs and pipelines, and in Greenback Creek and Oak Creek. Use of pastures containing Greenback Creek has typically been during winter and spring months for short durations, when vegetation is largely dormant, however use at other times of the year has also occurred with less frequency.

Lands on Boneyback Allotment have been evaluated and determined to be suitable for grazing through Forest land management planning consistent with Regional direction. Estimating current grazing capacity and annual stocking rates for the allotment involves multiple resource considerations. While there are capacity recommendations based on percent utilization for grass-dominated ecosystems (Holechek, 1988), little research has been completed to evaluate palatable shrubs, a key food source for cattle on grazing lands in the desert southwest. Cattle will browse new growth, flowers, and beans on jojoba, mesquite, palo verde, catclaw acacia, and mimosa as well as new growth on other desert shrubs to a lesser degree. Cattle also browse new growth on turbinella oak, mountain mahogany, deer brush, skunkbush sumac, and other chaparral species. Annual forbs and grasses can be clipped and weighed to provide an estimate of pounds per acre of production, but this number will fluctuate widely from year to year depending on precipitation and temperature. Smaller

sub-shrubs also provide important forage and are not well researched to evaluate how much they contribute to capacity for grazing animals.

Galt et al (2000) caution that grazing capacity is "part myth and part reality: the average number of livestock a ranch has carried over the previous 5, 10, or 20 years may have little relevance to what it will support in any given year or group of years". They go on to say "(t)he best approach to determining safe stocking rate on rangelands is knowing the numbers of animals actually grazing a ranch or allotment over a period of years together with utilization levels, range trend analyses, and precipitation records." McLeod (1997) points out the following: "An implicit feature of all definitions is the assumption that the system will approach or reach equilibrium, if given enough time. While this may be true for slightly variable environments, it is certainly invalid for highly variable environments where plants and herbivores rarely, if ever, reach equilibrium."

Therefore, when setting permitted numbers (capacity) for Boneyback Allotment, agency personnel considered past livestock numbers, current resource conditions including soil condition and vegetation trend, water availability, other resource needs such as wildlife and recreation, and past monitoring results. Implementing adaptive management strategies will allow annual stocking rates to be adjusted up or down within this permitted number to respond quickly to resource availability and needs.

Purpose and Need for Action

The purpose of this analysis is to authorize livestock grazing consistent with Forest Service policy to make forage from lands suitable for grazing available to qualified livestock operators (FSM 2201). Boneyback Allotment has been identified as containing lands suitable for domestic livestock grazing (Forest Plan 1985). Continued domestic livestock grazing is consistent with goals, objectives, standards and guidelines of the Forest Plan for lands occurring within Management Area 6J.

This action is needed because the Rescissions Act requires each National Forest System unit to establish and adhere to a schedule for the completion of NEPA analysis and decisions on all allotments for which such analysis is needed. This action is also needed to comply with Forest Service policy as described in FSH 2209.12, Chapter 90, Adaptive Management. This action responds to goals and objectives outlined in the Forest Plan, and helps move the project area toward desired conditions described in that plan. There is also a need to formally recognize Boneyback Allotment as separate from Greenback Allotment and to develop a new allotment management plan specific to management of Boneyback Allotment.

Proposed Action

The Forest Service, in collaboration with the grazing permittee, proposes to continue domestic livestock grazing by cattle using a four pasture, deferred rotation grazing system (see map, Figure 1). The proposed action would authorize up to 101 head of adult cattle (bulls, cows, cow/calf pairs) year long and up to 70 yearlings seasonally.

Management Direction/ Forest Objectives

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

- Maintain a minimum of 30% effective ground cover for watershed protection and forage production, especially in primary wildlife forage producing areas. Where less than 30% exists, it will be the management goal to obtain a minimum of 30% effective ground cover (Page 40-1)
- Forage use by grazing ungulates will be maintained at or above a condition which assures recovery and continued existence of threatened and endangered species (Page 42)
- Provide wildlife access and escape ramps on all livestock and wildlife water developments (Page 42)
- Manage riparian areas to the level needed to provide protection and improvement (Page 42-2)
- Manage for a variety of renewable natural resources with primary emphasis on wildlife habitat improvement, livestock forage production, and dispersed recreation. Watersheds will be managed so as to improve them to a satisfactory or better condition. Improve and manage the included riparian areas (as defined by FSM 2526, PR Vol. 1 #1) to benefit riparian dependent resources (Page 193)
- Manage the desert scrub type to emphasize production of javelina, Gambel's quail, and mule deer (Page 195)
- Manage higher ecosystem extensions in the desert scrub type to emphasize cottontail production (Page 195)
- In the pinyon-juniper type, manage toward a goal of 25-50% cover of browse shrubs in key deer areas (Page 195)
- Manage the pinyon-juniper type to emphasize the production of mule deer (Page 195)
- Manage the chaparral type to emphasize the production of whitetail deer (Page 195)
- Manage suitable rangelands at Level D[1] (Page 195)

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

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

[1] Level D is defined in the LMP as "Management seeks to optimize production and utilization of forage allocated for livestock use consistent with maintaining the environment and providing the multiple use of the range."

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

Decision Framework

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

If there is a finding of significant impacts, an environmental impact statement will be prepared. The decision will also include a determination of consistency with the Tonto National Forest Plan, National Forest Management Act, National Environmental Policy Act, and other applicable laws, regulations, and executive orders.

Public Involvement

The proposal was listed in the Schedule of Proposed Actions on May 2, 2011. The proposal was provided to the public and pertinent state and federal agencies for comment during scoping May 2 through June 3, 2011. Using the comments from the public, local permittees, other federal and state agencies, Forest specialists, and tribal liaisons (see *Issues* section), the interdisciplinary team developed a list of issues to address. A draft of this document was released to the public in April 2012 with a 30 day comment period. Comments received from that period were reviewed and addressed, resulting in an updated version of this environmental assessment. Subsequent amendments were made to the wildlife section following a decision and appeals. The document was re-released for public comment in May 2013. Two comment letters were received and addressed before finalizing this document.

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 on Environmental Quality (CEQ) NEPA regulations require this delineation in Sec. 1501.7, “…identify and eliminate from detailed study the issues which are not significant or which have been covered by prior environmental review (Sec. 1506.3)…”

A list of non-significant issues and reasons regarding their categorization as non-significant may be found in the project record. The Forest Service identified livestock grazing impacts to riparian areas as a significant issue for Boneyback Allotment during review of comments received from the public. Livestock use of streams and springs will be addressed through mitigation measures described in Chapter 2 of this document. Effects are discussed in Chapter 3.

CHAPTER 2: ALTERNATIVES INCLUDING THE PROPOSED ACTION

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

Alternatives

Alternatives Considered and Eliminated

Current Management

Maintaining current management of the allotment does not meet Forest objectives or Rescissions Act requirements. Boneyback Allotment is currently operating under prior (1982) analysis completed for Greenback Allotment, where Boneyback was a unit within Greenback Allotment. Specific analysis is needed to correctly interpret effects of the permittee's independent grazing management strategy and display effects of the proposed action.

Alternative 1

No Action/ No Grazing

The term grazing permit for this allotment would be cancelled within one year of the decision. The permittee would be requested to remove all cattle from forest system lands and cease maintenance of range improvements including water developments and fences. The agency, using analysis provided by this document, would determine whether to maintain existing improvements for wildlife, recreational, or other resource benefit and whether any improvements should be removed from the allotment for safety or aesthetic purposes.

Alternative 2

Proposed Action

The proposed action is to continue to authorize livestock grazing on Boneyback Allotment consistent with Forest Plan standards, management prescriptions and monitoring requirements.

The proposed action would authorize up to 101 head of adult cattle (bulls, cows, cow/calf pairs) yearlong and up to 70 yearlings seasonally on Boneyback Allotment, using an adaptive management approach to implement a deferred rotation strategy. Currently, electric fencing divides the allotment into 11 paddocks and a holding pasture (see map at introduction). Since returning livestock to the allotment following drought conditions in early 2000, the

permittee has combined paddocks into general units. His rotation schedule from 2005 to 2012 is shown in the table below, including how multiple paddocks were grouped and grazed together or rested from grazing for each year.

2005	1-2; 3; 4-7; Holding Pasture; 8-11 rested
2006	1-2; 3-7 rested; Holding pasture; 8A; 8-9; 10-11
2007	1-2 rested; 3; 4-7; 8-9 rested; 10-11; Holding Pasture
2008	1-2; 3; 4-6; 7 rested; 8-9; 10-11; Holding Pasture
2009	1-7; Holding Pasture as needed; 8-11 rested
2010	1-2; 3 rested; 4-7; 8; 9 rested; 10-11; Holding Pasture rested
2011	1-2 rested; 3; 4-7; 8 rested; 9; 10-11; Holding Pasture
2012	1-2; 3; 4-7; 8; 9 rested; 10-11; Holding Pasture

Table 1: Paddock combinations for grazing years 2005-2012

The permittee, in cooperation with district range personnel, will remove electric fencing to create three larger pastures. Some barbed wire fencing is already in place but more would need to be added to replace electric fencing as it is removed (see map, Figure 1). Fence replacement needed between Paddocks 4/5 and 6/7 will be completed in 2012. A proposal to convert electric fencing to barbed wire fence north of Greenback Creek would be implemented as funding becomes available through cooperative efforts between the permittee and agency.

As a result of moving pasture boundaries, water developments may need to be added for effective livestock distribution in the larger units. This will be evaluated over time and may result in pipelines, storage tanks, and troughs being added to existing water developments. Appropriate archaeological and biological clearances will be completed as projects sites are identified.

Initial stocking would be seventeen head of cattle (sixteen cows, one bull) and would increase through carryover of calves or purchase of new animals as resource conditions allow and the permittee is able. During each pasture rotation, monitoring to document range conditions, forage use, and permittee compliance would be used to manage timing and duration of livestock use in each pasture to ensure livestock management activities are conforming to management objectives. Overall livestock use would also be documented for each pasture at the end of the grazing period.

Planned use is described as light to conservative, which is 30-40% of current year's growth on herbaceous material and 50% or less on browse material. With this use, about ½ of good and fair forage value plants would show signs of use by livestock, little evidence of concentrated livestock trailing would be seen across the landscape as a whole, and most of the accessible range would show some use. These guidelines are intended to demonstrate proper distribution of livestock across the landscape rather than a concentration in specific areas. Managing for this level of use is expected to result in improved rangeland and watershed conditions and achievement of desired conditions over time. Current conditions on the allotment would continue to be assessed through pasture inspections and monitoring

as is currently being done by district personnel in cooperation with the permittee, who also completes monitoring and pasture inspections.

If monitoring results reveal that grazing activities are resulting in undesirable impacts, then the USFS would amend the management action. The amendment would be based on a modified action adjusting one or more aspects of grazing (intensity, timing, numbers, frequency, duration). Through adaptive management, adjustments would provide sufficient flexibility to adapt to changing circumstances.

Adaptive Management

The proposed action would implement the use of adaptive management as described in FSH 2209.13, Ch. 90. Adaptive management uses monitoring results to continually modify management in order to achieve specific objectives. The proposed action and grazing alternatives will provide sufficient flexibility to adapt management to changing circumstances. If monitoring indicates that desired resource conditions are not being achieved, adaptive management would be used to modify range management strategies. Such changes may include annual administrative decisions to adjust the specific number of livestock, specific dates for grazing, class of animal or pasture rotations. These changes would not exceed the limits for timing, intensity, duration and frequency as 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 capacity 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 policy or whether further analysis under NEPA is required.

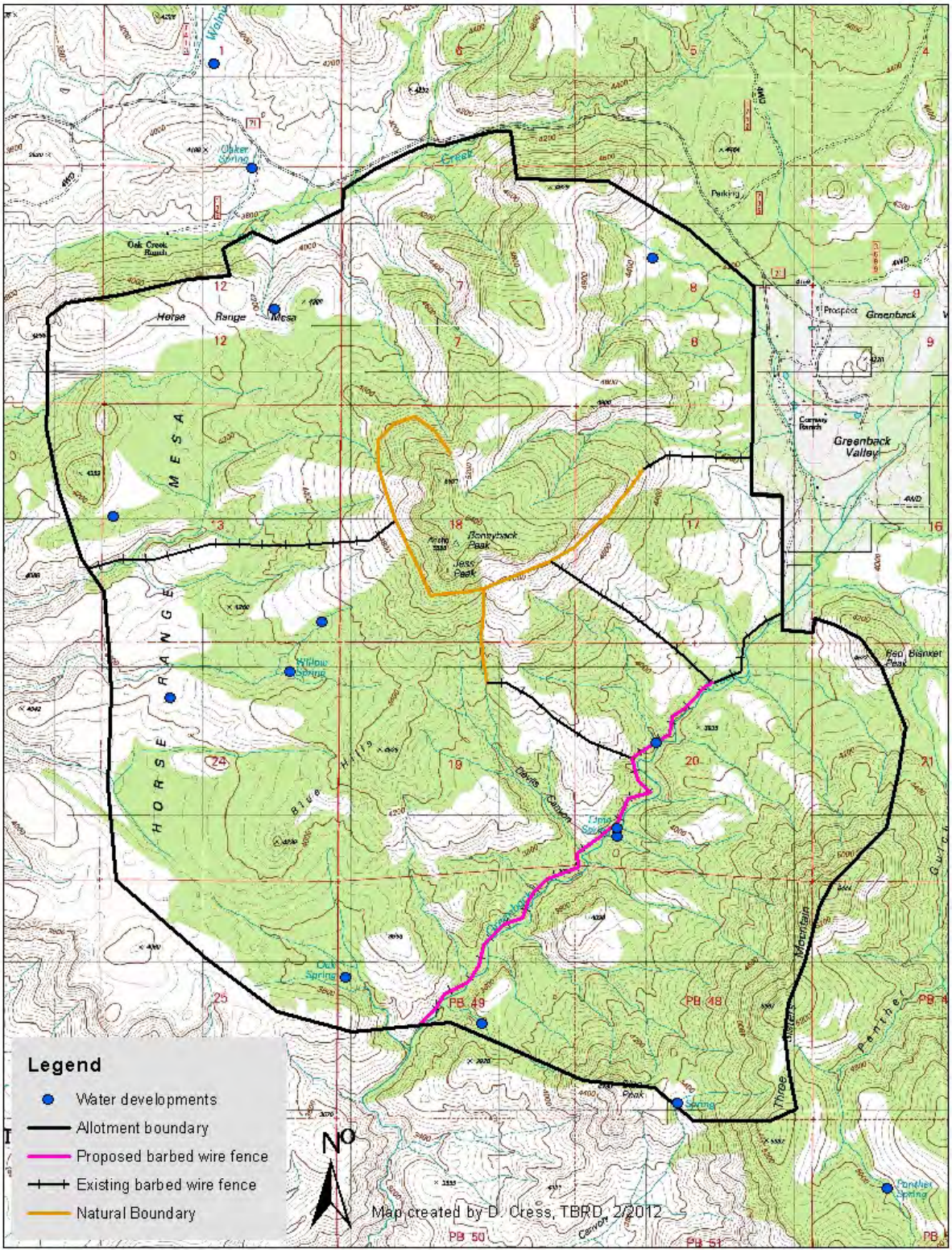


Figure 1. Boneyback Allotment Proposed Action- Range Improvements Necessary for Action

Mitigation Common to All Alternatives

Upland Mitigation and Monitoring

Forage utilization would be managed at a level corresponding to light to conservative intensity. Use of browse species and annuals would be limited to not more than 50% of current annual growth in order to provide for grazed plant recovery, increases in herbage production and retention of herbaceous litter to protect soils (implementation monitoring).

As livestock use each specific pasture, the District will monitor effects of grazing activities in the uplands, such as use on herbaceous and woody vegetation, trailing, and effects on soils and wildlife habitat. This information will be used to help determine when cattle should rotate out of the scheduled unit during the grazing season. If livestock are reaching use limits for current annual production or causing other undesirable effects they would be moved from the pasture to the next scheduled unit. Post grazing monitoring would then document effects and, when combined with actual livestock use information over time, would help determine the carrying capacity of each unit for future livestock use and allotment management. If livestock consistently reach forage use limits before their scheduled move dates, annual authorized numbers would be adjusted in the next year's annual operating instructions. Over time, this information could be used to adjust permitted numbers on the term grazing permit. If catastrophic events such as fire or extreme drought occur, temporary adjustments to stocking rates could occur to allow for recovery of natural resources without additional grazing pressure.

Effectiveness monitoring includes measurements to track condition and trend of upland and riparian vegetation, soil, and watersheds. Monitoring would be implemented following procedures described in the Interagency Technical Reference and the Region 3 Rangeland Analysis and Training Guide. These data are interpreted to determine whether management is achieving desired resource conditions, whether changes in resource condition are related to management, and to determine whether modifications in management are necessary. Effectiveness monitoring would occur at least once over the ten-year term of the grazing authorization, or more frequently if deemed necessary.

Implementation monitoring would occur at any time during the grazing year and would include such things as inspection reports, forage utilization measurements, livestock counts and facilities inspections. Utilization measurements are made following procedures found in the Interagency Technical Reference and with consideration of Principles of Obtaining and Interpreting Utilization Data on Southwest Rangelands.

Key areas are described in "Sampling Vegetation Attributes" (Interagency Technical Reference {ITT}, 1999) as indicator areas that are able to reflect what is happening on a larger area as a result of on-the-ground management actions. A key area should be a representative sample of a large stratum, such as a pasture, grazing allotment, wildlife habitat area, herd management area, watershed area, etc., depending on the management objectives being addressed by the study. Proper selection of key areas requires appropriate stratification.

While monitoring techniques as described above would be conducted in key areas, these would not be the sole locations for gathering information from the grazing allotment to make decisions about the timing, intensity, duration, or frequency of livestock grazing in a given

grazing season. The overall condition of the allotment and such things as distribution patterns or rangeland improvement conditions could be assessed at any given time to help make those decisions.

The term grazing permit would provide for yearlong grazing under the proposed action. If proper use in the management units is reached before the end of the grazing year or season, livestock may have to be removed from the allotment to avoid exceeding utilization guidelines identified in this decision. Better distribution of livestock avoids concentrating effects and provides the best opportunity for livestock to remain on the allotment for the entire grazing season.

Riparian Mitigation and Monitoring

Riparian use guidelines for implementation monitoring will be applied where specialists have identified "key reaches" or "key areas". Key reaches, similar to upland key areas, are those stream channels, springs, or riparian areas that are representative, responsive to changes in management, accessible to livestock, and contain key vegetative species. In early seral or degraded riparian areas, appropriate monitoring cannot take place until riparian vegetation re-establishes. Use will be deferred in reaches identified as being degraded or in early seral condition until sufficient vegetation for monitoring is established. Currently, Greenback Creek is in excellent condition (Appendix D).

Riparian vegetation available in key reaches would be monitored using riparian utilization measurements (implementation monitoring) following ITT, MIM (Burton et al. 2011) or the most current acceptable method. Use guidelines are as follows: *obligate riparian tree species* – limit use to < 50% of terminal leaders (top 1/3 of plant) on palatable riparian tree species accessible to livestock (usually < 6 feet tall); *deergrass* – limit use to < 40% of plant species biomass; *emergent species* (rushes, sedges, cat-tails, horse-tails) – maintain six to eight inches of stubble height during the grazing period; *streambanks* – limit use to < 20% of alterable banks where streambanks are present or forming. Once riparian utilization guidelines are met, cattle would be moved out of the area or to the next scheduled pasture regardless of available forage in the uplands. It may become necessary to minimize or remove access to riparian habitat if grazing pressure becomes a limiting factor in the use of pastures.

Additionally, changes in riparian vegetation and stream channel geomorphology condition and trend will be measured at five to ten year intervals (effectiveness monitoring) using protocols described in ITT, Burton et al. (2011), and Harrelson et al (1994), or the most current acceptable method.

Wildlife Mitigation and Monitoring

Concurrence was received from US Fish and Wildlife Service regarding effects to threatened, endangered, and sensitive species (Appendix B). Conservation measures described in that document will be implemented as part of the decision for this analysis.

Wildlife access and escape ramps will be placed on all livestock and wildlife water developments.

Range fences will be constructed according to agency standards which will provide for wildlife passage and crossing.

Managers will use range, riparian, soil, species and habitat, and terrestrial ecosystem surveys to determine if existing conditions on the allotment are reaching desired conditions.

The Forest Service, Arizona Game and Fish, U. S. Fish and Wildlife Service, Bureau of Reclamation, Christmas Bird Count Participants, and others may also conduct surveys for aquatic and terrestrial species and associated habitats.

Managers may use photo points to establish baseline information and determine trend.

Stream channel cross sections will help to determine change(s) in stream morphology and composition.

Vegetation will be monitored in critical riparian areas and key areas to document and track changes, and determine trend.

Recreation Mitigation and Monitoring

The permittee would continue to access Boneyback Allotment on existing roads and trails as designated by Tonto National Forest maps to avoid creating illegal roads or ATV trails. Permittee access to closed Forest system roads may be authorized by the agency in writing.

Heritage Mitigation and Monitoring

Effects of managed grazing are mitigated through current management and the proposed action as this grazing strategy is designed to match herd size with capacity and distribute livestock as evenly as possible across the allotment in order to avoid localized concentrations of animals and resultant impacts to soils and vegetation associated with intense trampling.

New rangeland improvements not currently analyzed in this decision would be assessed for need on a case by case basis. Any range improvement which would disturb soil would require an archaeological clearance by the Forest Archaeologist or a certified para-archaeologist. New improvements not anticipated by this decision would also require a separate analysis to comply with NEPA regulations. Salting, watering, or supplemental feeding would not be permitted where cultural sites or resources exist.

Mitigation of impacts to heritage resources for all alternatives will be accomplished by avoiding these properties through placement and construction of all range improvements. Minimizing localized concentration of animals, improving livestock distribution across the allotment, and reducing intensity of grazing will also minimize surface disturbance to heritage resources. Where proposed improvements will involve ground disturbance, 100% archaeological survey will be conducted. 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 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 ineligible in consultation with SHPO (State Historic Preservation Officer).

Archaeological clearance must be approved with all necessary consultation with SHPO and potentially interested Tribes prior to issuing any decision regarding the construction, modification, or removal of all improvements. This approach is based on long-term consultation with SHPO and Region 3 policy as embodied in the *First Amended Programmatic Agreement Regarding Historic Property Protection and Responsibilities*

between the USDA Forest Service Region 3, the State Historic Preservation Officers of Arizona, New Mexico, Texas, and Oklahoma, and the Advisory Council on Historic Preservation, signed 12/24/03, and specifically, Appendix H, the *Standard Consultation Protocol for Rangeland Management* (Protocol) 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 National Forest.

Protection measures identified under the Protocol include:

1. Archaeological surveys 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.
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.
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 it affects a TCP or other property of concern for them.

Other specific protection measures may need to be developed on a case by case basis.

In accordance with the Protocol, 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. The 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 archaeologists will draw upon protection measures outlined in the Protocol to ensure that effects are avoided or minimized.

Comparison of Alternatives

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

Resource	Effects- Proposed Action	Effects-Alternative 1- No Grazing
Vegetation	Grazing would temporarily remove herbaceous and woody vegetation in varying amounts across the allotment year long; selection of highly palatable plants may result in reduced plant diversity in areas of concentration (near water developments and salting grounds, etc.); utilization standards and mitigation measures would allow for continued improvement in vegetative cover and diversity, although more slowly than without grazing pressure; meets forest objectives and goals for vegetation.	Plant cover and diversity would continue to improve at a faster rate, dependent upon rainfall; grazing and browsing pressure would continue from wildlife although at very low rates on this allotment; meets forest objectives and goals for vegetation.
Soils	Flatter areas would have a tendency to be used heavily; water developments and fences would improve livestock distribution to varying degrees and may relieve pressure in some areas or increase pressure in others; less than satisfactory soils may not recover or would recover at a slower rate; monitoring and mitigation measures should help recovery; meets forest objectives and goals for soils.	Quickest recovery of less than satisfactory soils; complete rest may not improve conditions rapidly; compacted soils would recover more quickly; meets forest objectives and goals for soils.
Hydrology/ Riparian	Vegetation in early seral condition in Oak Creek is vulnerable to grazing impacts; palatable riparian vegetation would continue to be utilized in all riparian areas; species diversity could be limited due to selection for more palatable species; trailing in riparian areas compromises streambanks and fine soils; mitigation measures such as Best Management Practices and utilization guidelines would allow for continued recovery at slower rates	Recovery rates are considered to be optimal when grazing pressure is eliminated (Clary and Kruse, 2003); potential for recovery depends on available water, seed sources, sediment size, and natural disturbance such as flooding or drought; meets forest objectives and goals for hydrology and riparian resources.

Resource	Effects- Proposed Action	Effects-Alternative 1- No Grazing
	than nonuse; meets forest objectives and goals for hydrology and riparian resources.	
Wildlife	Southwest Willow Flycatcher- no direct effects on migratory flycatchers; possible indirect effects through alteration of riparian habitat; direct effects would be compounded by cumulative effects. Effects are not anticipated to be adverse. Spikedace- direct effects to critical habitat would occur throughout watershed but are not anticipated to be adverse; indirect effects from introduced species (green sunfish) are occurring. Direct effects to primary constituent elements would not occur. Yellow-billed cuckoo- grazing in riparian areas would cause impacts to potential habitat but the action is not anticipated to have an effect on cuckoo populations. Northern Mexican garter snake- nonnative species (green sunfish) pose larger threat than habitat quality. This action is not anticipated to have adverse effects since no records of these snakes occur in the project area. Lowland leopard frog- water storage projects can benefit this species. Effects are not anticipated to be adverse to the frog or its habitat. Gila longfin dace- cattle grazing in riparian areas would cause more impacts to this species. Effects are not anticipated to be adverse to the fish or its habitat. Bald and Golden Eagles- no effects. MIS- habitat occurs for several species and some may be affected by grazing (see Appendix B). Managed grazing	Southwest Willow Flycatcher- beneficial impacts through removal of stressors associated with livestock grazing. Spikedace- beneficial impacts through removal of stressors associated with livestock grazing. Yellow-billed cuckoo- beneficial impacts through removal of stressors associated with livestock grazing. Northern Mexican garter snake- beneficial impacts through removal of stressors associated with livestock grazing. Lowland leopard frog- beneficial impacts through removal of stressors associated with livestock grazing. Gila longfin dace- beneficial impacts through removal of stressors associated with livestock grazing. Bald and Golden Eagles- no effects. MIS- habitat conditions are expected to improve General wildlife- habitat conditions are expected to improve. Removal of water developments may cause temporary declines in some populations.

Resource	Effects- Proposed Action	Effects-Alternative 1- No Grazing
	may promote recovery of habitat at a slower rate than no grazing. General Wildlife- managed grazing may promote recovery of habitat at a slower rate than no grazing.	
Fire and Fuels	Removal of fine fuels (herbaceous vegetation) through grazing can inhibit fire spread and slow the return of natural fire in ecosystems on the allotment; could still meet forest objectives and goals for restoring natural fire processes in all vegetation types on this allotment through use of rest rotation so fine fuels could build in rested areas.	Removal of grazing pressure would allow fine fuels (herbaceous vegetation) to increase, dependent upon precipitation levels; more fine fuels could accelerate the return of natural fire spread in ecosystems on the allotment; natural fire progression would be limited by grazing practices on adjacent allotments; meets forest objectives and goals for fire and fuels.
Heritage	Concentrated grazing on flat areas and near water developments creates potential for damage to sites; trailing also creates potential for damage to sites; mitigation measures for salting and range improvement development would minimize potential for damage; meets forest objectives and goals for heritage resources through mitigation measures.	Would remove the potential for site damage from concentrated grazing, trailing, and range improvement development ; sites would continue to be vulnerable to damage from motorized vehicles or vandalism; helps meet forest objectives and goals for heritage resources.
Recreation	Recreationists would continue to pass through fences and gates or across cattleguards to access lands on the allotment; areas favored for camping and recreating could have cattle or cattle sign present at any time of the year, creating potential for conflicts; meets forest objectives and goals for recreation.	Interior gates, fencing and cattleguards could be removed; visual quality would improve somewhat; external fences, gates, and cattleguards would remain in place to prevent livestock access from adjacent allotments; potential removal of water developments could cause undesirable effects for some recreationists; meets forest objectives and goals for recreation.
Air and Water Quality	Any potential impacts to air and water quality would be mitigated through Best management practices; meets	Livestock impacts to air and water quality would be limited to cumulative effects from adjacent

Resource	Effects- Proposed Action	Effects-Alternative 1- No Grazing
	state and forest goals for air and water quality.	grazing allotments; meets state and forest goals for air and water quality.
Climate	Small water sources may dry, forcing concentration of use to wetter sites; water development of more reliable sites moves water away from riparian areas to artificial sites, reducing water available for riparian vegetation; Best management practices would mitigate impacts; meets forest objectives and goals for climate.	Small water sources may dry, forcing concentration of wildlife use to wetter sites; riparian vegetation would have a higher chance of survival when water is left at the source instead of being moved or artificially contained for livestock use; meets forest objectives and goals for climate.
Socioeconomics	Data has not been provided for economic returns from ranching operations or expenses incurred for maintenance of range improvements; permittee would continue to live in Gila County and contribute to the local economy; ranching heritage and lifestyle would be preserved; Forest objectives and goals for multiple use of forest lands to include livestock grazing could be met through continued livestock grazing on adjacent allotments.	Data has not been provided for economic returns from ranching operations or expenses incurred for maintenance of range improvements; a No Grazing alternative would not affect future payments received through PILT or PL 106-393; Tonto Basin and Gila County could be affected by a No Grazing alternative due to the amount of money made by the permittee and how much is spent in the local economy; could result in loss of culture and lifestyle tied to ranching; could intensify feelings of mistrust, loss of personal control, and threaten lifestyles, resulting in negative attitudes towards the Forest Service and other federal agencies in general; individuals who perceive grazing to be an unsuitable use of federal lands may feel increased trust and increased positive attitude towards the Forest Service and other federal agencies in general; other active allotments in the area would continue to meet forest objectives and goals for multiple use of forest lands.

Table 2: Comparison of Alternatives

CHAPTER 3: ENVIRONMENTAL CONSEQUENCES

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

Vegetation

Existing Condition: The allotment contains semi-desert grasslands at the lowest elevations grading into open juniper savannahs with a grassy understory at mid elevations. Higher elevations contain pinyon-juniper-oak woodlands and some chaparral. Riparian vegetation occurs in dense stands along Oak Creek and Greenback Creek, and in small patches around springs. Key upland forage species include curly mesquite (*Hilaria belangeri*), side oats grama (*Bouteloua curtipendula*), hairy grama (*Bouteloua hirsuta*), vine mesquite (*Panicum obtusum*), shrubby buckwheat (*Eriogonum wrightii*), false mesquite (*Calliandra eriophylla*), buckbrush (*Ceanothus spp.*), and mountain mahogany (*Cercocarpus spp.*).

Areas exhibiting the most obvious historic impacts are semi-desert grassland flats. These areas tend to have compacted soils and low ground cover, however, appear to be improving based on an increased cover of vine mesquite and in some cases curly mesquite. Open juniper woodlands also seem to be improving. Most of these areas have a good cover of black grama and sometimes side oats grama. The permittee initiated an upland vegetation photo-point monitoring study in 2005. His photo points indicate annual trends for upland species are variable from year to year based on timing and intensity of precipitation received (Appendix A). During HRM grazing, a data summary indicated little change in ground cover based on high intensity short duration grazing versus no grazing or deferred rotation grazing (USFS, 1995). At that time, it appeared rainfall amounts were an overriding factor for vegetation production.

Pasture inspections conducted since livestock were returned to the allotment have not detected overuse of palatable vegetation. Use on perennial grasses remains light across the allotment. Trailing is light across most of the allotment and occasionally moderate near water sources.

Cover of curly mesquite has been observed during recent inspections to be greater in grazed areas outside an existing exclosure than inside the exclosure on Boneyback Allotment (Ambos, personal communication, 2012). Canfield (1957) reported that longevity of curly mesquite averaged less than nine years when grazed and less than five years when ungrazed.

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

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

Effects: grazing by domestic livestock can impact vegetation by changing the mix of species in the plant community being grazed (species composition), by changing the density and frequency of perennial herbaceous plants (plant frequency), and by changing the vigor of grazed plants. The combined effects of composition, density and plant vigor are used to measure the condition and trend of rangeland plant communities.

A review of the best available scientific information from the field of rangeland management supports the concept that conservative or moderate livestock use yields results in plant vigor and diversity that are similar to an absence of livestock grazing. These studies do not specify whether soils influenced by livestock grazing pressure were in satisfactory condition or some form of impaired condition (i.e. compacted) when the studies began. Climatic fluctuations such as precipitation rates continue to play a significant role in this concept as well. Stocking rates must be assessed frequently on this grazing allotment, regardless of the alternative chosen, due to bimodal, localized precipitation patterns and frequent regional drought events.

Predicted climatic changes over the next several years indicate warmer and drier conditions will develop in the southwest. A recent summary of scientific information provided in *Rangelands* (Archer and Predick, 2008) notes that these projections will likely affect vegetation composition, diversity, and rate of growth in desert ecosystems, reduce water availability, and trigger soil erosion losses through a reduction in stability as soil moisture content decreases and the intensity of rainfall events increases. Adaptive management strategies will become increasingly important if this occurs.

Direct and Indirect Effects: Livestock grazing on vegetation directly impacts plants by removing current year's growth. Warm season perennial grasses such as curly mesquite and three-awns are opportunistic and will become productive following not only summer monsoonal moisture but spring moisture as well. Grama species should receive very light grazing pressure during periods of rapid growth, which typically follow summer monsoon rain events. They can then be grazed more aggressively following seed set in the fall and winter months with little negative effect. Curly mesquite should be protected from use during key growth periods to facilitate seed set and stolon production, which can help stabilize loose soils.

The flowers and beans of catclaw (*Acacia*), mesquite (*Prosopis*), and mimosa are palatable and desirable to livestock when being produced in late spring and early summer following adequate winter precipitation. In years of low precipitation or during hot summer months, these plants often become dormant and retain only a minimum cover of leaves.

False mesquite produces good quality browse in early spring following adequate winter precipitation and is often available before the onset of perennial grasses. It has a tendency to become dormant in early summer when precipitation is scarce but will become productive again following adequate moisture from summer monsoon rains. False mesquite can withstand aggressive grazing pressure and often becomes the dominant forage plant on the landscape when perennial grasses have been removed.

Cumulative Effects: Boneyback Allotment is adjacent to two other active livestock grazing allotments within the same watersheds, Cumulative watershed effects for these allotments being grazed under conservative use guidelines and adaptive management techniques are anticipated to be minimal in contrast to the size and complexity of the watersheds themselves.

Historic grazing on this allotment also contributed to cumulative effects. Stocking rates were disproportionately high during the first half of the 20th century. Impaired soils and vegetation observed today are likely a result of those early impacts followed by stocking rates of several hundred animals each year throughout the remainder of that century.

Recent pasture inspections indicate that livestock distribution is satisfactory on the allotment. Continued attention by the permittee to proper distribution of livestock on the allotment is essential to reaching desired conditions. Even with improved water developments and properly maintained pasture divisions, livestock will still tend to concentrate on flatter terrain and near surface water. Some of these areas already exhibit impaired soil and vegetation conditions and proper use levels may be met quickly with concentrated use. Changes in management will be necessary if herding, fencing, water developments, and salting are not effective in distributing animals across the landscape.

Supporting documentation for this section can be found at Project Record # 25 and # 48.

Soils

Existing Condition: About 73% of the allotment is composed of nearly level to moderately steep slopes ranging from zero to forty percent. Various field inspections have determined in general that flatter soils tend to be in unsatisfactory condition largely due to compaction and limited ground cover. Data collected for Terrestrial Ecosystem Unit Inventory (TEUI) have noted rills and gullies on some diabase soils. Soils in chaparral and pinyon-juniper communities generally have sufficient ground cover to control erosion.

Satisfactory soil condition class generally occurs in the higher elevations under chaparral and pinyon-juniper woodlands and also on steeper slopes at lower elevations. Generally, these soils have not been heavily impacted or they have high effective vegetative ground cover. Plant species density and diversity are high. About 68% of soils on the allotment are estimated to be in satisfactory condition.

Impaired soils tend to occur on flat, open woodlands where moderate compaction has occur or on moderately steep slopes in woodlands where soils are sensitive to erosion and current soil erosion rates may be excessive. It is estimated that about 22% of the allotment contains impaired soils. Many of these occur on soils derived from diabase. These soils tend to be subject to erosion when vegetative cover is removed. Many diabase soils appear to have an upward trend as indicated by increasing coverage of black grama.

Unsatisfactory soils tend to occur in the flat more accessible areas: semi-desert grasslands and chaparral woodlands. Unsatisfactory grassland soils have high amounts of surface compaction, poor soil porosity and poor root distribution. Soils in chaparral woodlands tend to be erosive and have little groundcover in the interspaces between shrubs resulting in moderate to high amounts of sheet, rill and some gully erosion. There is very poor diversity, density, and composition of perennial grasses, forbs, and half-shrubs with little litter cover. It is estimated that about 10% of the allotment contains unsatisfactory soils. Many unsatisfactory soils on clay flats appear to be improving as evidenced by increased cover of vine mesquite.

Desired Condition: Tonto Forest Plan articulates the following desired conditions for soils:

- Manage vegetation to achieve satisfactory or better watershed conditions.

Forest Service Manual 2550 provides the following direction:

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

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

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

Effects: Livestock grazing can affect soil quality in several ways. Pressure exerted on the soil surface by large animals can cause compaction. Heavy grazing can reduce vegetation and litter cover. These factors can lead to decreased rainfall infiltration, increased runoff, increased erosion, and reduced soil organic matter and root growth. Changes in soil quality can also affect productivity and composition of plant communities (USDA NRCS 2001).

Hoof action of cattle can directly impact soils through compaction. Risk for compaction is greatest when soils are wet (USDA NRCS 1996). Compaction decreases water infiltration,

restricts rooting depth, and increases the hazard of water erosion (USDA NRCS 2001). Trailing by cattle on steeper slopes can physically displace soils, leading to erosion. Cattle tend to concentrate on flatter areas especially if they are fairly open. Holechek and Pieper (1992) reports that cattle tend to use 10 to 30% slopes thirty percent less often than 0 to 10% slopes and 30 to 60% slopes sixty percent less often than flats. Slopes over 60% are seldom used. Because of the tendency of cattle to use flatter slopes, areas of impacted soils are more likely to be found on gentler slopes. Building new fences and developing waters, as mentioned in the proposed action, would have extremely small, localized direct impacts to soils.

Cattle indirectly impact soils by removing vegetation resulting in a loss of protective cover including litter. Loss of vegetation and litter reduces infiltration and exposes the soils to raindrop impact and overland flow, thus leading to soil crusting and increased erosion. Reduced cover can also result in a loss of soil organic matter and a reduction in soil microbes which play a significant role in nutrient cycling. Soils that are lower in organic matter have poorer structure which can also affect infiltration and root growth. Building fences and developing waters will indirectly affect soils by improving distribution of cattle resulting in a net positive effect.

Cumulative Effects:

- Past grazing actions have resulted in soil erosion and compaction while current management has, in some cases, prevented or slowed recovery where livestock tend to concentrate.
- The 2005 Salome Fire burned 469 acres in the northeast corner of the allotment. Most of the area burned at low severity. A Burned Area Emergency Response team evaluated the area and recommended "No Treatment" (USFS Tonto NF 2005).
- Unauthorized cross country travel can cause undesirable effects to soils and vegetation through direct impacts on soils and removal or degradation of herbaceous or woody vegetation. Travel Management Rule (TMR) is intended to analyze alternate motorized routes in order to provide access and a recreation experience sufficient so vehicle operators no longer feel compelled to travel off established roads or trails. Enforcement of TMR is imperative to assure compliance. Improperly maintained roads can cause soil erosion where runoff from roads is allowed to concentrate. Road maintenance that includes Best Management Practices should reduce sedimentation into the streams and be beneficial to the watershed. Roads can be a source of concentrated runoff which may lead to localized soil erosion down slope from roads. Road maintenance that includes best management practices should reduce erosion and be beneficial to the watershed.
- Recent and ongoing drought and possible future climatic changes may also contribute to cumulative effects.
- Boneyback Allotment is adjacent to two other active livestock grazing allotments within the same watersheds, Cumulative watershed effects for these allotments being grazed under conservative use guidelines and adaptive management techniques are anticipated to be minimal in contrast to the size and complexity of the watersheds themselves.

Environmental Consequences by Alternatives

Alternatives are contrasted based on the likelihood of upland vegetation and soils attaining short and long-term desired conditions described above. The likelihood of attaining desired conditions will depend largely on the type of grazing management and stocking rates. Meeting short term utilization goals will limit annual impacts of livestock grazing.

On Boneyback Allotment, soils in less than satisfactory condition are generally on gentler slopes. Even with good management, flatter areas will still have a tendency to receive heavy use since these areas are favored by livestock. Key areas, established to monitor cattle use, are normally on flatter, more open areas. If monitoring of grazing intensity of these areas shows acceptable use, other parts of a pasture can be expected to have acceptable levels of impacts.

Alternative 1: No Grazing

Direct and Indirect Effects: Hoof action of cattle can cause direct impacts by compacting soils (as described above). Therefore, the quickest and most likely recovery from past grazing activities would normally occur with complete protection from grazing. The amount of time required for complete recovery after degradation can vary from several years to decades depending on the severity of impacts and nature of the ecosystem. Although soil conditions that are currently less than satisfactory are largely attributable to the cumulative effects of historic grazing, continued grazing could slow or prevent recovery in some areas. Even with complete rest, areas with impaired and unsatisfactory soil conditions will not improve rapidly.

Cumulative Effects: direct and indirect effects of this alternative, when combined with other past, present or reasonably foreseeable actions (cumulative effects) as listed above, will be generally beneficial to soils and vegetation. Lack of grazing would allow compacted soils to recover.

Alternative 2: Proposed Action

Direct and Indirect Effects: Success of meeting short and long-term desired conditions will depend on timely monitoring and cattle management. About twenty-five percent of the allotment occurs on slopes greater than 40 percent, slopes that tend to get little use. About thirty-two percent of the allotment contains soils that are in less than satisfactory condition. Most of these occur on slopes of less than 40 percent and most of these occur in juniper grasslands/savannas or juniper woodlands. Forage production on these areas is normally low. There will be a tendency for flatter areas (including areas in unsatisfactory condition) to be overused. These areas need to be closely monitored so that the use of adaptive management techniques will, over time, allow these areas to recover. Developing new or improved water sources will be a positive indirect effect that improves cattle distribution. Building new fences will have very minor direct effect on soils but the indirect effect should be positive by improving distribution.

Cumulative Effects: Direct and indirect effects when combined with other past, present or reasonably foreseeable actions (cumulative effects discussed above), should result in most areas moving toward desired conditions. Compacted soil may recover more slowly than under the No Grazing Alternative because of continued hoof action of cattle.

Supporting documentation for this section can be found at Project Record #25 and #60.

Hydrology/ Riparian

Existing Condition: Boneyback Allotment lies within the Gun Creek-Tonto Creek fifth code watershed. Main tributaries to Tonto Creek on the allotment include Greenback Creek, crossing the southeastern portion of the allotment, and Oak Creek, which follows the northwestern boundary of the allotment. Several intermittent and ephemeral channels drain from Boneyback Peak in the center of the allotment. There are approximately six miles of named streams on the USGS 1:24,000 topographic quadrangles within the Boneyback Allotment. There appear to be more miles of unnamed streams delineated as blue lines on the USGS topographic quadrangles. These unnamed streams are ephemeral and intermittent tributaries to named streams. Channels are primarily headwater channels dominated by upland vegetation, or ephemeral washes. They provide important functions relating to water quantity, water quality, the flood regime, hydrological connectivity, riparian vegetation and wildlife habitat (Meyer et al. 2003, Levick et al. 2007) within the watershed.

Presently, of the six miles of named stream channels, there are approximately 4.2 miles of stream channels that support obligate riparian vegetation. Based on the 2210 Forest Service reports, this extent of riparian vegetation has been reduced from historic conditions. Riparian areas and springs have been relied upon as the primary source of livestock water for many years causing stream channels and adjacent riparian areas to receive concentrated grazing pressure. Potential to restore and increase the acreage of riparian vegetation is unknown, but likely.

Stream channels are dynamic ecosystems that are constantly being changed by water and sediment flowing through the system. These changes obey natural forces of gravity, friction and fluid cohesion (Janicke 2000). A stable (Mason and Johnson 1999), or properly functioning (Barrett et al. 1993), stream channel is dependent on its ability to resist forces of erosion (Janicke 2000) and will maintain its dimensions (width/depth ratio, gradient, sinuosity) over time without excessive erosion or deposition (Rosgen 1996). A healthy riparian ecosystem contributes to channel stability by increasing resistance, thereby reducing flood peaks, trapping sediment and increasing groundwater recharge (Briggs 1996). Modifications that cause removal of vegetation will lower the channel's resistance to erosion and lead to an increased frequency and magnitude of flood impacts (Trimble and Mendel 1995, Rosgen 1996, Janicke 2000).

Streams that lack sufficient riparian vegetation to protect the banks and floodplain are less able to resist erosive forces of flood waters and will begin to erode with smaller events with lower water velocities (Janicke 2000). When large events with high water velocities occur, channels experience heavy loss of riparian vegetation and severe erosion and/or aggradation of soil, gravel, and rock.

Existing condition of watersheds, stream channels and riparian areas has been affected by many factors, both natural disturbances and human activities. Natural disturbances, drought,

fire and floods, have likely been exacerbated by human activities. Historic over-grazing has had the most extensive effect on watersheds, stream channels and riparian areas.

Based on a long history of grazing in Tonto Basin, and associated changes in both upland and riparian vegetation, it seems likely that prior to the 1870's, there were more miles of perennial stream reaches and acres of riparian vegetation than currently exist (Croxen 1926, Haskett 1935, Heffernan 2008).

Dominant species include sycamore (*Platanus wrightii*), cottonwood (*Populus fremonti*i), red willow (*Salix laevigata*), Goodding's willow (*Salix gooddingii*), cattail (*Typha spp.*), sedges (*Carex spp.*), rushes (*Juncus spp.*), deergrass (*Muhlenbergia rigens*), water cress (*Nasturtium officinale*), and monkey flower (*Mimulus spp.*). Non-native species include Bermuda grass (*Cynodon dactylon*), salt cedar (*Tamarix spp.*), and Osage orange (*Maclura pomifera*). Oak Creek is drier with fewer obligate riparian species. These include alder (*Alnus oblongifolia*), cottonwood, sycamore, and deergrass.

Appendix D contains a table summarizing field visits to collect riparian data on Boneyback Allotment.

Key Reaches

The four riparian areas identified in Table 3 below have the potential to improve within a relatively short time period (10 years), and have been identified as key reaches for this analysis. Key reaches, similar to upland key areas (ITT 1999), are stream channels/ springs/ riparian areas that are representative, responsive to changes in management, accessible to livestock, and contain key species. Key reaches are synonymous with designated monitoring areas (DMA's) defined by Burton et al. (2011) as the location where monitoring occurs.

Table 3: List of key reaches within each pasture

Pasture	Key Reach
Paddock 3	Oak Creek
Paddock 9	Oak Spring
Paddock 10	Greenback Creek
Paddock 11	Greenback Creek

Oak Creek: Oak Creek is an intermittent stream that originates south of Bear Head Mountain and flows southwest to its confluence with Tonto Creek. The majority of the creek lies on the Tonto Basin Allotment, only a ¾ mile reach of Oak Creek occurs on this allotment.

From 1983 to 1989 the Greenback Holistic Resource Management (HRM) Unit was established as a test on Boneyback Allotment. Vegetation and streambanks were monitored on Oak and Greenback Creeks since they occurred in the management area (Ross and Myers 1991). The conclusion for Oak Creek was that HRM was suppressing riparian vegetation (Ross and Myers 1991).

Before the flood of fall 2010, Oak Creek, within the allotment, was a narrow channel with banks supporting deergrass. A visit in October 2011 showed a much different stream, though in places the channel is still a narrow B type and the deergrass is recovering. Where the valley bottom widens, the channel is a wide F type consisting of cobbles and boulders, with

large cobble bars. Most of the reach supports mature cottonwoods, sycamores, alder, and a few willows. There are lots of sycamore seedlings in the channel. Currently, there may not be enough available, palatable vegetation to conduct annual use monitoring.

Greenback Creek: Greenback Creek originates in Malicious Gap in the Sierra Ancha's and flows southwest to its confluence with Tonto Creek. It flows through three allotments plus private property before reaching Boneyback Allotment. Monitoring completed on Greenback Creek for the HRM test concluded that management did not significantly improve riparian area condition (Ross and Myers 1991). In 1990 the permittee changed to spring grazing for the pastures containing Greenback Creek (Ross and Myers 1991).

Field trips to these pastures in 1993 and 2000 revealed a wide, braided stream, riparian vegetation consisting mainly of non-palatable species and high use. Concerns were discussed with the permittee. He instituted winter grazing for a time and continues with more intense management of the creek. Photo points and visits in 2004, 2009 and 2011 show a dramatic increase in cover and diversity of riparian vegetation and a decrease in channel width, due to trapping of sediment by vegetation. Tree species include mature cottonwood, red and Goodding's willow, sycamore, and ash in the overstory and a variety of seedlings and saplings. Herbaceous vegetation includes sedges, rushes, spikerush, cattail, Bermuda grass, deergrass and forbs. The channel and riparian vegetation are considered to be in stable condition. Recent flood events had little impact on the creek due to stabilizing effects of vegetation. In a few places Bermuda grass was rolled up like sod, but the majority of the creek is an example of how sufficient vegetation can cause a channel to be resilient during large flood events.

Oak Spring: Oak Spring is located on a tributary to Greenback Creek. The National Wetland Inventory (NWI) map indicates that there is riparian vegetation associated with the spring. On a site visit to Greenback Creek in 2011, the confluence of the Oak Spring channel was dry and there was no riparian vegetation. Field data from February 2012 indicates a limited presence of riparian vegetation and potential at the spring so this would not be considered a key reach.

There are no designated or potential wild and scenic rivers on Boneyback Allotment.

Desired Condition: Conditions limiting proper functioning condition of Oak Creek are high width-depth ratios, excessive erosion or deposition, and lack of riparian vegetation. Restoration and recovery of stream channel stability and proper functioning condition and/or continued stability is dependent upon restoration, recovery and protection of riparian vegetation.

Forest Service Manual (USDA 2004) provides direction for managing all Forest Service lands. Objectives and policy for riparian areas (FSM 2526.02 and 2526.03) include:

- Protect, manage, and improve riparian areas while implementing land and resource management activities
- Manage riparian areas in the context of the environment in which they are located, recognizing their unique values

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

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

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

Key standards and guidelines from the Forest Plan include:

- Coordinate with range to achieve utilization in the riparian areas that will not exceed 20% of current annual growth by volume of woody species
- Coordinate with range to achieve at least 80% of the potential riparian overstory crown coverage
- Coordinate with range to achieve at least 50% of the cottonwood-willow and mixed broadleaf acres in structural Type I (tall trees with well-developed understory) by 2030
- Rehabilitate at least 80% of the potential shrub cover in riparian areas through the use of appropriate grazing systems and methods
- Rehabilitate and maintain, through improved management practices, mixed broadleaf riparian to achieve 80% of the potential overstory crown coverage. Natural regeneration is anticipated to achieve most of this goal. Artificial regeneration may be necessary in some areas
- Re-establish riparian vegetation in severely degraded but potentially productive riparian areas. Natural regeneration is anticipated to achieve this goal, but artificial regeneration may be necessary in some areas
- Rehabilitate cottonwood-willow Type II (tall trees with little or no understory) to achieve conversion to Type I by the year 2030. Natural regeneration is anticipated to achieve most of this goal, but artificial regeneration may be necessary in some areas

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

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

The most important long-term desired conditions are:

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

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

Direct Effects: Riparian areas, with their high species diversity and structural complexity, provide critical terrestrial and aquatic habitat to wildlife species from adjacent upland and riparian area environments. Cattle tend to congregate in many riparian areas. They favor riparian forage and water availability, shade in warm months and gentle topography. 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. Development of these features is critical to channel restoration processes (Clary and Kruse 2003). One of the most important factors influencing riparian conditions is utilization (Mosley et al 1999, Clary and Kruse 2003).

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

Cumulative Effects Common to All Alternatives

Existing condition of streams and riparian areas on the Boneyback Allotment is the result of the cumulative effects of historic and recent management, natural disturbances, and the interaction between these two agents of change. This discussion includes the Gun Creek-Tonto Creek 5th code watershed and begins with settlement of lands in the vicinity of Greenback Creek in the 1870s.

This area was considered settled and fully stocked with cattle by 1890 (Croxen 1926). There have been many accounts of historic overgrazing and subsequent drought and flood events that occurred throughout central and southeastern Arizona (Wagoner 1952). Forest Service Range Management files (File Code 2210) document concentrated use at water sources including springs and riparian areas.

Other activities and management actions that have occurred within the Gun Creek-Tonto Creek watershed include road development, lack of road maintenance, off-road vehicle use, mining, fire suppression, juniper treatments, prescribed fire, and wildfires.

Boneyback Allotment is adjacent to two other active livestock grazing allotments within the same watersheds, Cumulative watershed effects for these allotments being grazed under conservative use guidelines and adaptive management techniques are anticipated to be minimal in contrast to the size and complexity of the watersheds themselves.

Climate change presents additional considerations. According to the Arizona Drought Monitor Report (ADWR 2012), the long-term drought status for Gila County is “abnormally dry” as of January 2012, which has likely had an effect on the Boneyback Allotment. According to NOAA National Climatic Data Center data, there has been a marked upward

trend in the globally averaged annual mean surface temperature since the mid-1970s (Shein 2006). Models used by Seager et al. (2007) to predict how climate change will affect the southwestern United States indicate this region has begun the transition to a dryer climate which will continue into the 21st century. However, the models are too broad-scale to predict how climate change might affect monsoons, which contribute 40% of the total annual precipitation received on the Tonto National Forest (Lenart 2005).

Alternative 1 - No Grazing:

Direct Effects: Stream channel and riparian area recovery are considered optimal when direct effects of livestock grazing are eliminated (Clary and Kruse 2003). Potential for and rate of recovery are variable and difficult to predict. Most rapid recovery can be expected in small watersheds with perennial surface or subsurface flow, an existing source of native riparian herbaceous and woody vegetation, and availability of fine sediments. Recovery of larger watersheds and stream channels usually requires a much longer time frame.

Indirect Effects: Soils within the allotment are mostly in satisfactory condition (see soils section). For areas with soils in impaired and unsatisfactory condition, the No Grazing Alternative usually provides the most rapid increase of upland vegetative cover, shifts in species diversity, and improvement of soil condition.

Cumulative Effects: Direct and indirect effects of this alternative, when combined with other past, present or reasonably foreseeable actions (cumulative effects) as listed above, should result in reaching desired conditions at the fastest rate. However, as stated in direct effects, potential for recovery and rate of recovery will vary by key reach. Where there is potential for recovery of riparian vegetation, eliminating direct and indirect effects of livestock grazing should allow the most rapid rates of recovery. Where riparian vegetation is meeting desired conditions, as in Greenback Creek, this alternative would provide the most protection for maintaining those conditions.

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

Alternative 2 –Proposed Action: This alternative proposes to continue grazing yearlong using an adaptive management approach to implement a deferred rotation strategy. Water developments may need to be added for effective livestock distribution in the larger units.

Direct Effects: The proposed action recommends mitigating direct effects of livestock grazing in key reaches by using riparian utilization measurements (implementation monitoring) (ITT 1999). This mitigation measure will be effective for Greenback Creek. Because riparian vegetation on Oak Creek is in early seral condition riparian utilization measurements may not effectively identify the threshold of unacceptable impact that would trigger moving cattle from the riparian area or pasture, or use levels may be reached quickly.

Oak Spring will be inspected and a decision will be made as to whether it should be kept as a key reach and if it supports enough available, palatable vegetation to effectively identify the threshold of unacceptable impact that would trigger moving cattle from the riparian area or pasture.

Indirect Effects: Soils within the allotment are mostly in satisfactory condition (see soils section). Grazing of uplands with impaired and unsatisfactory condition soils may slow the rates of upland recovery, indirectly slowing the rate of riparian area and stream channel recovery. If management prescriptions are followed and cattle are moved when use guidelines are met, undesirable, indirect effects of grazing will be minimized.

Effects of New Developments: Effects of any new water developments will be minimized or eliminated by use of the groundwater policy and Best Management Practices (BMPs). Indirect effects would include better cattle distribution by offering alternative water sources.

Cumulative Effects: The direct and indirect effects of this alternative, when combined with other past, present or reasonably foreseeable actions (cumulative effects discussed above), are likely to result in attainment of desired conditions for the riparian areas on this allotment but at a slower rate than the No Grazing alternative.

Consistency with the Riparian Area Management Direction: This alternative will meet the intent of Forest Plan direction to protect, manage, and restore riparian areas if described mitigation measures are successful. Mitigation measures have a high probability of success for key reaches in Boneyback Allotment.

Effects from climate change: With continued drought and higher temperatures, small water sources may dry up leaving less water for cattle and wildlife. Piping water away from riparian areas for use by cattle may reduce water available for riparian vegetation. Any water developments would be implemented with BMPs to mitigate impacts to riparian vegetation.

Supporting documentation for this section can be found at Project Record #44 and #58.

Wildlife

Existing Condition: Current drought conditions have stressed vegetation and wildlife populations in the area. Big game species present within the allotment include: black bear, elk, javelina, mountain lion, Coues white-tailed deer, and mule deer. Small game species present on the allotment include tree squirrel, cottontail rabbits, and some waterfowl (occasionally using dirt stock tanks). Small game population numbers are highly dependent on rainfall and available water. Upland game birds on the allotment include quail and dove.

A query of the Arizona Game and Fish Department (AZGFD) Heritage Data Management System (HDMS) indicated the occurrence of critical habitat for spikedace and suitable habitat for two candidate species (yellow-billed cuckoo and northern Mexican garter snake), along with two special status species (bald eagle and lowland leopard frog) immediately adjacent to

the allotment. Those species that have been observed within the allotment or have habitat on the allotment can be found in Appendix B.

There are no known southwestern willow flycatcher breeding areas on the allotment; however potential habitat does exist along a short stretch of Greenback Creek below the private property. Other riparian areas on the allotment are unlikely to develop into flycatcher habitat because of their small size. There have been no observations of yellow-billed cuckoo on the allotment. However, potential habitat does exist in Greenback Creek. Northern Mexican garter snakes have not been found within the allotment; however there is potential habitat for them in Greenback Creek and in Oak Creek. A list of Management Indicator Species (MIS) can be found in Appendix B.

Neotropical Migratory Birds and Important Bird Areas: Executive Order 13186 (January 10, 2001) directs Federal agencies to support migratory bird conservation and to "ensure environmental review processes evaluate the effects of actions and agency plans on migratory birds, with emphasis on species of concern". No designated Important Bird Areas occur within the action area.

Riparian areas serve as corridors for migration of birds within and through the Tonto National Forest. 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.

Presence of wildlife on Boneyback Allotment is dependent on the quality of existing habitat. Varieties of species occur or are likely to occur in the analysis area including both game and non-game species.

Direct observation as information in soils and riparian specialists' reports and district allotment files indicates this area has been heavily impacted by livestock in the past. Some riparian areas on the allotment are lacking variable age structure components that would improve wildlife usage of the area. Mesa tops have limited perennial grass cover that would provide forage and hiding cover for wildlife. Data for game species in the general area indicate a downward trend over the last decade, even with greatly reduced livestock numbers. Specialist observation of current upland and riparian condition on this allotment indicates that sensitive and indicator species are stable at this point. Increasing cattle numbers within permitted levels may cause a downward trend for these species on this allotment and effects at the landscape level could be locally significant. Since the allotment is a small area in relation to overall species needs there likely won't be a significant change in populations as a whole.

Desired Condition: General wildlife resource goals for the Tonto National Forest are outlined on page 20 of the Forest Plan and include providing for species diversity, maintaining viable populations of existing species, improving habitat for selected species, and managing to increase population levels of threatened and endangered species.

Standards and guidelines that apply to this analysis:

- Maintain a minimum of 40% effective ground cover for watershed protection and forage production, especially in primary wildlife forage producing areas. Where less than 30% exists, it will be the management goal to obtain a minimum of 40% effective ground cover.
- Coordinate with range to achieve utilization in the riparian areas that will not exceed 20% of the current annual growth by volume of woody species.
- Coordinate with range to achieve at least 80% of the potential riparian overstory crown coverage.
- Coordinate with range to achieve at least 50% of the cottonwood-willow and mixed broadleaf acres in structural type 1 by 2030.
- Rehabilitate at least 80% of the potential shrub cover in riparian areas through the use of appropriate grazing systems and methods.
- Allow for forage to maximize threatened and endangered species, management indicator species, and emphasis harvest species.
- Forage use by grazing ungulates will be maintained at or above a condition which assures recovery and continued existence of threatened and endangered species.

Management emphasis for area 6J is on wildlife habitat improvement, livestock forage production, and dispersed recreation. Objectives for this area are to improve livestock forage production and wildlife habitat diversity, as well as to achieve the desired resource condition, a mosaic within the total type, which provides for a mix of successional stages.

Standards and guidelines for area 6J that relate to this analysis:

- Manage the desert scrub type to emphasize production of javelina, Gambel's quail, and mule deer.
- Manage higher ecosystem extensions in the desert scrub type to emphasize cottontail production.
- In the pinyon-juniper type, manage toward a goal of 25-50% cover of browse shrubs in key deer areas.
- Manage the pinyon-juniper type to emphasize the production of whitetail deer.
- Continue periodic inspections and maintenance of existing wildlife exclosures and restoration projects, and improve the level of protection and maintenance.
- Locate and analyze peregrine falcon habitat, and document and correct disturbances to habitat.

Arizona Game and Fish Department goals and objectives identified in their Wildlife Strategic Plan are as follows:

- For big and small game: 1) Maintain, enhance, and restore populations of game wildlife to provide for recreational opportunities, including wildlife viewing. 2) Minimize adverse impacts to wildlife and wildlife resources
- Maintain big game populations at levels that provide diverse recreation opportunities.
- Goals for tree squirrels include maintaining or enhancing habitat and to continue to allow for recreational and aesthetic uses
- Goals for cottontail rabbits are to maintain or enhance hunting opportunities by enhancing habitat and improving access to habitat

- Increase waterfowl production and wintering populations within Arizona through habitat development, and to provide recreational opportunities for as many individuals as possible
- Goals for quail and dove include maintaining or enhancing hunting opportunities by enhancing habitat and improving access to habitat
- The mission of the AZGFD non-game wildlife program is to conserve, enhance and restore non-game and endangered wildlife as part of the natural diversity of Arizona, and provide opportunities for the public to enjoy these resources through uses compatible with their protection

The riparian specialist report gives specific desired conditions for each riparian reach on the allotment, and states that in general it is reasonable to expect continued establishment and recovery or riparian vegetation, providing this would also benefit game and non-game wildlife that use the area.

- Provide at least 40% ground cover around the springs and riparian areas for wildlife hiding cover. Continue to provide access to water for game and non-game species on the allotment. Wildlife escape ramps and access ramps will be provided and maintained on all cattle troughs on the allotment. In riparian areas across the allotment provide for regeneration of vegetation to achieve multiple age classes and complex vegetative structure for wildlife habitat.

To provide for the needs of special status species, desired conditions for the next 10 years are to:

- Maintain conservative use in upland areas to minimize impacts on riparian habitat in the watershed to provide for the southwestern willow flycatcher, and yellow billed cuckoo.
- Allow for continued recovery and development of riparian areas in Greenback Creek for spikedace, southwestern willow flycatcher, northern Mexican garter snake, and yellow billed cuckoo.

Effects: Managed livestock grazing can have these general direct impacts on wildlife and habitat quality:

- Removal of vegetation through management activities such as herding, fencing, branding activities, bedding, congregation at water developments and salting grounds.
- Reduce vegetative growth and litter cover
- Selectively impacting plant species that are palatable
- Introduction and dispersal of non-native plants
- Direct accidental mortality/injury of wildlife species through trampling
- Predator and rodent control
- Reduction of targeted non-native species (i.e. red brome)
- Reduction of competitors (native grazers and browsers)
- Localized soil compaction at new and existing water developments, salting grounds, and holding pastures
- Removal of old electric fence from past management activities

Feeding on plants by various herbivores, especially livestock and big game but also by rodents, lagomorphs, insects and even some birds and reptiles, can alter vegetative communities as habitat for birds. Species composition of plants, density of stands, vigor, seed and insect production, and growth form of plants often change due to grazing. Removal of vegetative cover as well as trampling may expose soils to increased wind and water erosion.

Grazing may also affect vegetation communities by selectively impacting plant species that are palatable to livestock or those species that are less able to withstand grazing. Often these are the same species palatable to wildlife browsers such as deer. Riparian plants are especially palatable. Riparian and wetland communities represent a small percentage of the landscape in the Southwest but support high plant and animal diversity and productivity (Milchunas 2006). These areas provide water, forage, and cover to wildlife associated with adjacent upland communities, including livestock, as well as riparian obligate species for all or part of their life cycles.

Congregation of livestock (herding, stock tank areas, trailering, loading/unloading, maintenance of livestock facilities, branding) have indirect effects to wildlife or associated habitat when considering grazing alternatives. Effects may include removal of vegetation, dust accumulation, noise, and avoidance of areas by wildlife, soil compaction (localized), and watershed effects. Impacts may vary depending upon circumstances associated with the indirect effects. For the most part, effects associated with congregation of livestock are primarily within riparian areas, stock tanks and troughs, and salting areas.

Upland areas and associated habitats are directly affected by grazing and associated activities through livestock consuming plants, bedding, congregating at water developments, herding, off-loading livestock, and branding activities. Upland vegetation density and composition are reduced if livestock grazing and associated activities are not managed to reduce or minimize such affects.

Livestock grazing can directly affect fisheries and wildlife by altering riparian and upland soils and vegetation composition, density and structure, water quality, quantity, temperature and flow patterns, shape and form of the stream channel, and aquatic and terrestrial faunal assemblage composition (A. Belsky 1999). One of the most important factors influencing riparian conditions is utilization (Sowell 1999).

Predator and rodent control, reduction of competitors, and accidental mortality are direct effects suffered due to livestock production. Classic examples are the wolf, prairie dog, and desert tortoise and, indirectly, the black-footed ferret, willow flycatcher, and California condor (Krausman 1996). Within the analysis area, predators controlled for livestock grazing are mountain lion and coyote.

Indirect Effects:

Managed livestock grazing can have these general indirect impacts on wildlife and habitat quality:

- Alter the composition of the plant community,
- Increase the productivity of selected species,

- Alter the natural fire regime.
- Increase impacts from natural processes (drought, floods, fire, etc.)
- Decline in wildlife and plant species diversity
- Avoidance by wildlife
- Trophic linkage, disease and internal parasitism, external parasitism, and chemical contamination.
- Decreased water filtration impacting watershed health
- Reduction of soil organic matter and soil moisture
- Increase in particulate generation, and significant changes in biogeochemical cycles

Riparian overstory is often reduced by livestock grazing (Kauffman and Krueger 1984), and this stratum provides cover and nesting habitat for many vertebrates and affects water temperature for aquatic organisms. Streamside vegetation influences bank and channel morphology via altering flow velocities, reducing cutting during flood conditions, and holding erosion inputs from uplands. Riparian areas are potentially impacted to a greater degree than adjacent uplands by livestock, but these areas can recover from disturbance more quickly than uplands due to faster vegetation growth rates (Milchunas 2006).

Riparian and upland areas provide important terrestrial and aquatic habitat to wildlife species. Congregation of livestock (herding, stock tank areas, trailering, loading/unloading, maintenance of livestock facilities, branding) have direct effects to wildlife or associated habitat when considering all grazing alternatives. Effects may include removal of vegetation, dust accumulation, noise, avoidance of areas by wildlife, and localized soil compaction. For the most part, effects associated with congregation of livestock are primarily within riparian key reaches, developed waters, and salting areas.

Grazing and trampling impacts destabilize and break down stream banks which results in undesirable effects to aquatic wildlife. These effects may be realized through modification of stream morphology and function, increased siltation, increased water temperatures, and reduction of woody and herbaceous vegetation. During scouring floods fish populations are more vulnerable to removal without stable banks and associated vegetation in place.

Deterioration of the ecosystem can result in a significant decline of species diversity, loss of vegetative cover, reduction of soil organic matter and soil moisture, increase in particulate generation, and significant changes in biogeochemical cycles. Vegetation contributes organic matter to the soil which affects albedo, adds insulation, and increases water holding capacity and infiltration (Balling et al. 1998). Historically, compacted soils in the uplands have caused lower rates of water infiltration and result in increased runoff and soil loss resulting in indirect negative effects to riparian aquatic and terrestrial species. As a result, wildlife habitat is affected by increased runoff and soil loss, especially if riparian and upland conditions are not properly functioning.

Use of woody and herbaceous vegetation by livestock may result in increased stream temperatures, reduced ground cover, and organic litter which may indirectly affect aquatic and terrestrial wildlife through increased surface runoff and potentially reducing the establishment of additional vegetative cover in the uplands and riparian areas. In addition,

habitat available to prey species in the uplands and riparian area may be reduced by livestock grazing, resulting in reduced numbers of prey species and / or increased predation upon those species. Water quality may also be indirectly affected by livestock use in the uplands as a result of decreased infiltration of surface water and livestock fecal accumulation.

Some species fall victim to livestock production inadvertently and unexpectedly. These species' declines are indirect effects of grazing and other industry activities. These effects illustrate the complexity of challenges to wildlife biology on western rangelands (Krausman 1996). These effects include trophic linkage, disease and internal parasitism, external parasitism, and chemical contamination. The most important ecological conditions that affect the productivity and species composition of arid rangelands today are: fire, livestock grazing, spatial variation in soil, and temporal variation in climate (Dick-Peddie 1993). To manage rangeland ecosystems, humans must manipulate fire and livestock to attain particular goals.

Grazing systems persist under marginal bioclimatic and edaphic conditions of different biomes, leading to the emergence of three regional syndromes inherent to global grazing: desertification, woody encroachment, and deforestation. These syndromes have widespread but differential effects on the structure, biogeochemistry, hydrology, and biosphere-atmosphere exchange of grazed ecosystems (Asner et al. 2004).

Typically the effects of grazing individual species are neither obvious nor demonstrable. Certain related facts are; wildlife occupy ecosystems valued for livestock forage, grazing alters those ecosystems, and many native species associated with those ecosystems have suffered severe population declines

Grazing promotes species diversity (light to moderate), but compromises natural successional processes and also results in the elimination of palatable native species. We accept that grazing ungulates may have a place in maintaining elements of the native vegetation, but we must remember that cattle do not add to the natural character of our lands; they merely equalize the balance between competitively suppressed native and grazing-adapted naturalized species. Without some such control of the latter in mesic, relatively unstressed sites, the slower growing native flora is overwhelmed (Hart and Horton 1988).

Livestock grazing can affect wildlife species and their habitats in several ways if not managed correctly. Grazing may reduce vegetation growth and litter cover resulting in increased runoff and reduced infiltration of rainfall into upland soils. Increased runoff can degrade riparian areas, and reduced infiltration can limit moisture available to upland plants. Therefore, wildlife that uses vegetation for food, nesting sites, and cover could be affected.

Herding and salting will have an effect by improving cattle distribution and at the same time draw cattle into places that previously received little or no use. For songbirds, nest losses due to brood parasitism by the brown-headed cowbird (hereafter, cowbird) also could be an important indirect effect of livestock. The cowbird is an open habitat species that commonly associates with livestock because of the foraging opportunities livestock provide. In the western United States, expansion of livestock grazing into forested areas appears to have facilitated cowbird population increases and range expansion. Given that brood parasitism

generally reduces host nesting productivity increases in cowbird abundance could affect the breeding success of songbird populations (Goguen and Mathews 1998).

A phenomenon related to managed grazing, land degradation, and desertification is the human-mediated dispersal of African grasses worldwide. Introduced African grasses have made their ecological mark in dry land (and tropical) systems in North America, Central and South America, Australia, and Oceania. These grasses compete effectively with native grass species and can alter nutrient cycling and other ecosystem processes (Asner et al.2004).

Natural process such as resource pulses have greater impacts upon the land where managed grazing occurs. Pulses of rainfall also influence higher trophic levels and entire food webs. Better understanding of how rainfall affects the diversity, species composition, and dynamics of arid environments can contribute to solving environmental problems stemming from land use (Chesson et al. 2004).

Cumulative Effects:

Cumulative effects include both NEPA and Endangered Species Act (ESA) definitions. The definitions of each are as follows:

1. NEPA - the impact on the environment which results from the incremental impact of the Action when added to other past, present, and reasonably foreseeable future actions regardless of what agency undertakes them (state, private, federal).
2. ESA - future state, private, and non-federal (tribal in some cases) activities that are reasonably certain to occur within the action area.

The action area has been described from the standpoint of watersheds that drain the analysis area, because of downstream effects to listed and sensitive species. This approach includes effects of the Action from a larger landscape scale which includes affects to the watershed across time and space. Due to the location of the action area and its remoteness in central Arizona and the Tonto NF, most cumulative effects are federal or state. Projects or related environmental impacts are:

Vegetation and soils were impacted by livestock in the past when the allotment was more heavily stocked than more recent levels. Many of the vegetation communities on gentler slopes have reduced species diversity, decreased plant vigor, and decreased forage production as a result of heavy stocking rates and associated impacts to vegetation, soils, and riparian areas. Cattle grazing began in Tonto Basin shortly after the Civil War in the late 1800's, which predates the Forest Service (Croxen 1926).

Table 4: Relative impacts of alternatives on federally-listed and sensitive species and on bird species of concern

Status	Magnitude of Effects		
	-1	-2	+1

Status	Magnitude of Effects		
	-1	**-2**	**+1**
Federally-listed species (T&E)	Likely to adversely affect for many species, but a jeopardy opinion would be unlikely.	Likely to adversely affect for many species, and 1 species could reach a jeopardy opinion	Beneficial in short or long term
Forest Sensitive Species (FS)	Not likely to affect population viability or trend towards federal listing	May affect population viability or trend towards federal listing for at least 1 species	Beneficial in short or long term
Tonto NF migratory bird species of concern (birds)	Not likely to affect migratory bird populations	May affect migratory bird populations	Beneficial in the short or long term.

Table 5: Cumulative effects past, present, and foreseeable future actions

Effects	Forest Service	State	Private landowners or outside agency control
Loss or modification of habitat	Future and current grazing (-1) Mining (-1) Fuels management (+1) Non-native treatment (+1) Construction activities (-1) Current proposals for road designation (-0.5)	Mining (-1) Creation of wildlife waters (+1) Native Fish Stocking (+1) Special Status Species Stocking (+1)	 SRP Roosevelt Dam Operations (net=0; flycatcher) Mining (-1) Drought (-1) Urban development (-1)
Disturbance	Visitor use (-1) Wildlife closures (+1) Outfitter guiding (-1) Visitor restrictions (+1)	Hunting (-1)	
Direct mortality	Road kill (-1)		Poaching (-1)
Disease and predation	Visitor use (-1)		Non-native Fish Stocking (-1)

Unique to Action Area:

1. Grazing Allotments adjacent to analysis area or within the action area. These allotments are all managed at conservative use (30-40%) with upland and riparian conditions on the ground showing a trend towards desired future conditions.
    a. Greenback Allotment
    b. Walnut Allotment
    c. Tonto Basin Allotment
2. Recreational Uses
    a. OHV use in area increasing
    b. Hunting
    c. Mining
3. Prescribed Fire
    a. Maverick Prescribed Burn falls within the Greenback Creek watershed.
4. Wildland Fire
    a. Mistake Peak Fire
5. AZGFD
    a. Creation of wildlife waters
    b. Reintroductions of special status species.
    c. Hunting

Past actions: effects from past actions are already described under affected environment for general wildlife and special status wildlife and plants and alternative 1.

Tonto NF foreseeable actions: reasonable foreseeable actions that can affect wildlife resources are reauthorization of livestock grazing allotments, fuels reduction projects, forest thinning, watershed improvement projects, recreation management (obliteration of social trails and dispersed campsites, designation of trails, and campsites), lands special use permits (new issuances and maintenance on existing structures), personal use activities, and new road construction. While these activities can directly and indirectly affect wildlife species as well as cause destruction or modification to wildlife and plant habitat, these actions are planned to minimize (and when possible, to eliminate) effects to species and their habitat above current conditions and have mitigation measures and Best Management Practices designed to mitigate disturbance that may occur from project implementation.

Legal and illegal personal use activities, particularly fuel wood harvesting, affects wildlife and their habitat: removal of dead and downed wood can result in loss of habitat for invertebrates, small mammals, and reptiles; all of which are important prey items for wildlife of higher tropic levels. Removal of snags not only can affect prey species like invertebrates and reptiles; it also results in loss of bat roosting habitat and bird nesting and roosting habitat. Illegal fuel wood harvesting has resulted in removal of large, Gambel oak trees, which are also important for birds that nest in their natural cavities.

Summary: significant impacts are not expected given that the majority of these activities only represent a small portion of the forest and activities in this area are light and inconsistent. Boneyback Allotment is isolated from the full impact of these activities given the location of

the allotment, with few roads and little public use. Desired future conditions could still be met with these cumulative effects although at a slower rate.

Forest sensitive species that occur on Boneyback Allotment are listed below. Although this allotment is not directly adjacent to occupied or critical southwestern willow flycatcher habitat (flycatcher), sediment inflows from grazed uplands may affect flycatchers and their habitat.

Table 6: Special status of species

Name	Common name	ESA	USFS	STATE
Empidonax trailii extimus	Southwestern willow flycatcher	E		WSC
Agosia chrysogaster chrysogaster	Gila longfin dace	SC	S	WSC
	Spikedace (Critical Habitat)	CH		
Coccyzus americanus occidentalis	Yellow-billed cuckoo	C	S	WSC
Thamnophis eques megalops	Northern Mexican garter snake	C	S	WSC
Rana yavapaiensis	Lowland leopard frog	SC	S	WSC

WSC = Species of Concern, S = Sensitive, C=Candidate for listing, CH = Critical Habitat

Effects of Alternatives on Sensitive Species

Southwestern willow flycatcher (Endangered)
Boneyback Allotment is within the watershed where flycatcher critical habitat segments occur on Tonto Creek. No critical habitat exists within the allotment boundaries, but critical habitat is included in the action area. Actions outside of critical habitat boundaries are evaluated if they diminish the value of the primary constituent elements.

No known nesting habitat exists on Boneyback Allotment; however potential nesting habitat, not designated as critical habitat for the flycatcher, occurs on Greenback Creek. This potential habitat is generally of narrow width and low quality for flycatchers. Development of this area into suitable habitat could be protracted by grazing in the creek since these areas are accessible to cattle; however, the limited extent of the habitat diminishes its value to willow flycatchers. Flycatchers nesting along Tonto Creek are approximately five miles from this allotment.

Direct Effects
No direct effects on migratory flycatchers are anticipated since birds will likely fly away from the disturbance created by grazing activities.

Indirect Effects
There is a possibility of riparian habitat alteration that would affect watershed conditions. Migrant birds have been detected in riparian habitat suitable and unsuitable for nesting and may occur in non-riparian areas. The migratory route flycatchers travel to known breeding

populations from their wintering areas is unknown. Flycatchers are known to use major drainages. It is conceivable that some may fly overland utilizing smaller drainages as they are encountered making all riparian areas somewhat important to flycatchers. Outside of Greenback Creek, other riparian areas are not known to contain suitable or potential flycatcher nesting habitat, but migrating flycatchers could use these riparian areas. Riparian use requirements outlined in the selected action should minimize the impacts of cattle grazing to these areas.

Boneyback Allotment is about 6,800 of the 274,000 acres in Management Area 6J. USFWS concluded, in Forest Plan consultation (USFWS 2005) for continued grazing in Management Area 6J, that continued livestock use, as proposed, would facilitate decreased bank stabilization, increased run-off, increased sedimentation, increased erosion, and reduced capacity of soils to hold water. These factors would reduce the occurrence, longevity, and quality of the habitat-based primary constituent elements for the flycatcher and designated critical habitat. Since the consultation and Flycatcher Recovery Plan (USFWS 2002) were written, the Forest Service has adopted FSH 2209.13, Ch. 90 which uses adaptive management and conservative use grazing levels to allow for watershed maintenance and improvement. This should reduce the possibility of heavy grazing and thus minimize the impacts associated with grazing summarized above. Grazing within the riparian area of Greenback Creek would be expected to affect development of flycatcher habitat by depressing vegetation vigor, biomass, and plant species composition, prevent the establishment of seedling trees, and removing low-level vegetation (USFWS 2002). However, implementation of riparian use guidelines described in this EA should minimize these effects.

In light of effects to the watershed listed above, it is anticipated that grazing on Boneyback Allotment may affect the flycatcher and its designated critical habitat on Tonto Creek within the action area. Activities could contribute to the watershed effects described above, which could delay and/or prevent development of potential flycatcher breeding habitat in Greenback Creek and also reduce the occurrence, longevity, and quality of habitat-based primary constituent elements of flycatcher critical habitat and habitat occupied by the flycatcher along lower Tonto Creek. However, the selected action is not anticipated to have significant adverse effects on southwestern willow flycatchers or diminish the conservation value of critical habitat for the following reasons:

- No grazing will occur within occupied willow flycatcher habitat or critical habitat.
- No grazing will occur within two miles of occupied flycatcher habitat during the breeding season.
- The potential habitat along Greenback Creek is narrow and is of minimal conservation value to southwestern willow flycatchers.
- Boneyback Allotment is only about 2 percent of Management Area 6J and a smaller proportion of the entire Tonto Creek watershed.
- Tonto NF has continued to prohibit grazing on Tonto Creek which has alleviated some of the overall negative impacts from historical upland overuse.

Each alternative would have a different effect on this species.

- Alternative 2 would have more impacts for the species. Cattle would be able to graze riparian areas, and direct effects would be compounded by cumulative effects.
- Alternative 1 would have less impacts to the species, as eliminating grazing would eliminate effects caused by grazing in riparian areas and would not compound cumulative effects.

Spikedace Critical Habitat
Critical habitat is found along 9.4 miles of Greenback Creek beginning at the confluence with Tonto Creek and continuing upstream to the confluence with Lime Springs. Within the allotment there is 1.2 miles of stream that are categorized as critical habitat. The suitable habitat in Greenback Creek, its connection with Tonto Creek, and the fact that it occurs almost entirely on Federal lands makes this area an important expansion area for spikedace recovery, and is therefore considered essential to the conservation of spikedace.

Critical habitat is located within the allotment near the southern boundary and very difficult for cattle to access because of steep canyons. Also, there is little riparian vegetation from Lime Spring to the border of the allotment and the stream bed is full of boulders and difficult to move around in. Direct effects of grazing would be inconsequential.

Primary Constituent Elements (PCE) for spikedace are:

1. Habitat to support all egg, larval, juvenile, and adult spikedace, which includes:
    a. Perennial flows with a stream depth generally less than 1 m (3.3 ft), and with slow to swift flow velocities between 5 and 80 cm per second (1.9 and 31.5 in. per second).
    b. Appropriate stream microhabitat types including glides, runs, riffles, the margins of pools and eddies, and backwater components over sand, gravel, and cobble substrates with low or moderate amounts of fine sediment and substrate embeddedness;
    c. Appropriate stream habitat with a low gradient of less than approximately 1.0 percent, at elevations below 2,100 m (6,890 ft.); and
    d. Water temperatures in the general range of 8.0 to 28.0 °C (46.4 to 82.4 °F).
2. An abundant aquatic insect food base consisting of mayflies, true flies, black flies, caddisflies, stoneflies, and dragonflies.
3. Streams with no or no more than low levels of pollutants.
4. Perennial flows, or interrupted stream courses that are periodically dewatered but that serve as connective corridors between occupied or seasonally occupied habitat and through which the species may move when the habitat is wetted.
5. No nonnative aquatic species or levels of nonnative aquatic species that are sufficiently low as to allow persistence of spikedace.
6. Streams with a natural, unregulated flow regime that allows for periodic flooding or, if flows are modified or regulated, a flow regime that allows for adequate river functions, such as flows capable of transporting sediments.

Direct Effects:
PCE (1): livestock grazing has been one of the most widespread and long-term causes of adverse impacts to native fishes and their habitat (Miller 1961), but is one of the few threats

where adverse effects to species such as spikedace and loach minnow are decreasing, due to improved management on federal lands. This improvement occurred primarily by discontinuing grazing in the riparian and stream corridors. However, although adverse effects are less than in the past, livestock grazing within watersheds where spikedace and loach minnow and their habitats are located continues to cause adverse effects. These adverse effects occur through watershed alteration and subsequent changes in the natural flow regime, sediment production, and stream channel morphology (Platts et al. 1990).

Livestock grazing can destabilize stream channels and disturb riparian ecosystem functions (Platts et al. 1990). Medina et al. (2005) not that the impacts of grazing vary within and among ecoregions, and some riparian areas can sustain little to no ungulate grazing, while others can sustain very high use. They further note that threatened and endangered fish populations and their associated riparian habitat may require some form of protection from grazing of all ungulates (e.g., elk, deer, cattle).

PCE (2): The proposed action has no direct effect on this element.

PCE (3): The proposed action has no direct effect on this element.

PCE (4): The proposed action has no direct effect on this element.

PCE (5): The proposed action has no direct effect on this element.

PCE (6): livestock grazing can also cause increased sediment in the stream channel, due to stream bank trampling and riparian vegetation loss (A. Belsky 1999). Livestock can physically alter the stream bank through trampling and shearing, leading to bank erosion (Trimble and Mendel 1995). In combination, loss of riparian vegetation and bank erosion can alter channel morphology, including increased erosion and deposition, increased sediment loads, down cutting, and an increased width-to-depth ratio, all of which lead to a loss of spikedace and loach minnow habitat components.

Indirect Effects:

PCE (5): an indirect effect of grazing can include the development of water tanks for livestock. In some cases, stock tanks are used to stock nonnative fish for sport fishing, or they may support other nonnative aquatic species such as bullfrogs or crayfish. In cases where stock tanks are in close proximity to live streams, they may occasionally be breached or flooded, with nonnative fish escaping from the stock tank and entering stream habitats (Weedman 2005). Green sunfish already inhabit Greenback Creek and were introduced from ponds on private lands that escaped.

Each alternative would have a different effect on this species.

- Alternative 2 would have more impacts for the species. Cattle would be able to graze riparian areas, and direct effects would be compounded by cumulative effects.

- Alternative 1 would have less impacts to the species, as eliminating grazing would eliminate detrimental effects caused by grazing in riparian areas and would not compound cumulative effects.

Yellow-billed Cuckoo (Sensitive, Candidate for listing)

Currently, cuckoos breed in disjunct riparian habitats in the west. They winter in South America to Peru, Bolivia and Argentina. In Arizona, it is an uncommon to fairly common breeder in riparian habitats, below the Mogollon Rim in the Colorado and Gila River drainages. These cuckoos feed entirely on large insects including grasshoppers, cicadas, katydids, and caterpillars. Occasionally berries and fruit may be taken. They typically nest on a horizontal branch 6-25 feet off the ground, mostly in willow or other dense deciduous vegetation close to water. Yellow-billed cuckoos are not parasitic. They require a minimum of 25 acres of broadleaf forest at least 100 m wide (Gaines 1974) and at least 2.5 acres of dense nesting habitat per pair (Laymon and Halterman 1989). In Arizona, pairs are usually distributed every 0.5 miles in large blocks of contiguous habitat.

There has been a drastic reduction in the breeding range of Western yellow-billed cuckoos within the past 60 years due to riparian habitat alteration or destruction (Laymon and Halterman 1987). Habitat loss is the primary reason for declines of this species; causes of habitat loss include grazing.

This species is proposed for listing and inhabits similar habitat patches as the southwestern willow flycatcher. There have been no observations of yellow-billed cuckoo on the allotment. However, potential habitat does exist for a short stretch of the allotment on Greenback creek, below the allotment on Greenback Creek, and in Salome Creek on the southeast border of the allotment. Cattle management activities on this allotment have the potential to affect riparian habitat in the watershed.

Each alternative would have a different effect on this species.

- Alternative 2 would have more impacts for the species. Cattle would be able to graze riparian areas, and direct effects would be compounded by cumulative effects.
- Alternative 1 would have less impacts to the species, as eliminating grazing would eliminate effects caused by grazing in riparian areas and would not compound cumulative effects.

Northern Mexican Garter snake

Status in Action Area:

There are no records in Greenback Creek, but suitable habitat exists.

Analysis of Effects

Livestock grazing can cause: (1) declines in the structural richness of the vegetative community; (2) losses or reductions of the prey base; (3) increased aridity of habitat; (4) loss of thermal cover and protection from predators; and (5) a rise in water temperatures to levels lethal to larval stages of amphibian and fish development (A. Belsky et al. 1999).

Specifically, study results have indicated that snake abundance and biomass were significantly higher in ungrazed habitat, with a five-fold difference in number of snakes captured, despite the difficulty of making observations in areas of increased habitat complexity (Szaro and Jackle 1985). They also noted the importance of riparian vegetation for the maintenance of an adequate prey base and as cover in thermoregulation and predation avoidance behaviors, as well as for foraging success. In contrast, observations in Mexico with respect to the relationship between garter snake populations, nonnatives, and grazing effects. Garter snakes were found in what was presumed to be satisfactory numbers in areas that were affected by grazing; these areas were also largely free of nonnatives. In areas affected by nonnatives, garter snakes were rare or nonexistent, regardless of the quality of the habitat itself.

Indirect Effects

Observations in Mexico suggest that garter snakes may be more resilient to habitat destruction in the absence of nonnatives, but more vulnerable in the presence of nonnatives. Activities that degrade or remove habitat structure in areas affected by nonnatives are likely to adversely affect garter snake recruitment. Greenback Creek has nonnative green sunfish established. These fish were introduced from private property ponds above the allotment.

In southeastern Arizona, there have been observations of effects to the vegetative community suggesting that livestock grazing activities continue to adversely affect remaining populations of northern Mexican garter snakes by reducing or eliminating cover required by the northern Mexican garter snake for thermoregulation, protection from predation, and foraging (USFWS 2008). Direct mortality of amphibian species, in all life stages, from being trampled by livestock has been documented in the literature (USFWS 2008). The resultant extirpation risk of amphibian populations as a prey base for northern Mexican garter snakes by direct mortality is governed by the relative isolation of the amphibian population, the viability of that population, and the propensity for stochastic events such as wildfires. Livestock grazing within habitat occupied by northern Mexican garter snakes can result in direct mortality of individual garter snakes as observed in a closely related taxon on the Apache-Sitgreaves National Forest. In that instance, a black-necked garter snake (*Thamnophis cyrtopsis cyrtopsis*) had apparently been killed by trampling by cattle along the shore of a stock tank within an actively grazed allotment (USFWS 2008).

Each alternative would have a different effect on this species.

- Alternative 2 would have more impacts for the species. Cattle would be able to graze riparian areas, and direct effects would be compounded by cumulative effects.
- Alternative 1 would have less impacts to the species, as eliminating grazing would eliminate effects caused by grazing in riparian areas and would not compound cumulative effects.

Lowland Leopard Frog

Livestock grazing can have positive and negative effects on amphibians (Sredl and Saylor 1998). Cattle can trample egg masses and increase levels of organic wastes (Hayes and Jennings 1988) Livestock tanks may benefit amphibians by providing aquatic habitat if they contain approved wildlife escape ramps and are maintained yearlong, even when cattle are

not in that pasture. Therefore, the proposed piping and water storage project could benefit this species.

Each alternative would have a different effect on this species.

- Alternative 2 would have more impacts for the species. Cattle would be able to graze riparian areas, and direct effects would be compounded by cumulative effects.
- Alternative 1 would have less impacts to the species, as eliminating grazing would eliminate effects caused by grazing in riparian areas and would not compound cumulative effects.

Gila longfin dace

Gila longfin dace (*Agosia chrysogaster chrysogaster*) may spawn throughout the year but spawn primarily from December to July, and occasionally to September in low desert habitats. They are omnivorous, but detritus comprises is a major diet component (Minckley 1973). Dace will also forage on aquatic invertebrates and algae. They are susceptible to predation, and thus high crayfish populations may limit their population numbers. This fish is widely distributed throughout Tonto NF, but is decreasing throughout their range. The species is present in Greenback Creek, but no data exists for other allotment springs.

Each alternative would have a different effect on this species.

- Alternative 2 would have more impacts for the species. Cattle would be able to graze riparian areas, and direct effects would be compounded by cumulative effects.
- Alternative 1 would have less impacts to the species, as eliminating grazing would eliminate effects caused by grazing in riparian areas and would not compound cumulative effects.

Bald and Golden Eagles

There are no known nests in the analysis area. The nearest breeding area for bald eagles is Dupont Cabin, which has been inactive for 10 years. Habitat may be used by both for foraging. There should be no effect on eagles within the action area.

Management Indicator Species (MIS)

MIS were selected during the Forest Planning process to adequately monitor implementation of project actions on wildlife habitat and species diversity. These indicator species reflect general habitat conditions or significant habitat components which are of value to these and other species with similar habitat needs. Please see Appendix B for a complete report on MIS.

Neotropical Migratory Birds and Important Bird Areas

Executive Order 13186 directs Federal agencies to support migratory bird conservation and to "ensure environmental review processes evaluate the effects of actions and agency plans on migratory birds, with emphasis on species of concern". No designated Important Bird Areas occur within the action area.

Riparian areas 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.

Alternative 1 (No Grazing) Direct and Indirect Effects:

General Wildlife: With discontinuation of grazing wildlife habitat conditions would improve. Riparian areas would continue to recover from past grazing and fire affects. Recruitment of woody and herbaceous riparian species, including deer grass, would increase. It is expected that, over time, structural and age class diversity in riparian areas would improve. That would result in increased potential for riparian dependent wildlife species to occur on the allotment.

Improvements in aquatic and riparian habitat will likely be quicker, as compared to other alternatives. Soil compaction problems and herbaceous plant vigor in key areas would improve without livestock grazing, and it is expected that, over time, watershed and soil conditions across the allotment would continue to improve. Upland habitat capability for game species such as deer and quail would generally increase in herbaceous vigor and density in the openings, and an improvement in riparian habitat. Small game and non-game species will generally increase over time with an increase in herbaceous cover and probable increase in grass species diversity. Improvements in these resource conditions would be expected to occur more quickly than they would under implementation of Alternative 2.

One undesirable effect would be removal or lack of maintenance of waters. Water structures that provide water to cattle also provide water to wildlife, including amphibians, birds, ungulates, bears, and bats. Wildlife using these waters may have become dependent on them, and these individuals may suffer from declines. However, these declines would likely be temporary, and the overall improvements of removing cattle may outweigh the sort-term costs to wildlife.

MIS: Habitat conditions for these species are expected to improve with cessation of livestock grazing. With an improvement in soils and vegetation, increases in high-quality wildlife habitat should occur over time in all life zones and vegetation communities. Improvements to terrestrial habitat are as described above. Elimination of livestock from stream courses should result in overall improvements in water quality and may result in some increases in macroinvertebrate populations, although presence of crayfish in streams will still cause undesirable effects to macroinvertebrate populations. Elimination of bank trampling and trailing from livestock should more greatly improve aquatic conditions for species than Alternative 2.

TES Species: Please see the discussion above regarding effects to southwestern willow flycatchers.

Alternative 1 would lead to desired future conditions at a faster rate than Alternative 2 due to removal of livestock grazing and no cumulative grazing effects on wildlife species. Removal of livestock grazing would reduce impacts to upland and riparian resources and associated

species. Riparian resources would likely improve to a greater degree even within the context of other recreational activities that occur within the area. Riparian canopy cover, stream banks, vegetative cover in the uplands and riparian areas would improve under this alternative. Soil compaction and watershed effects would be reduced under this alternative.

Alternative 2 (Proposed Action):

General Wildlife: Riparian areas may continue to recover from past grazing and fire effects, although at slower rates than with Alternative 2. Portions of several riparian areas would be exposed to grazing under this alternative. As a result, direct effects from grazing may occur, such as use of riparian woody and herbaceous species, bank trampling/trailing, and reduced water quality. It is expected that, over time, structural and age class diversity in riparian areas would improve under this alternative relative to historic grazing. However, recovery would be to a lesser degree than under Alternative 1.

Soil compaction problems and herbaceous plant vigor in key areas would likely be slower to recover under this alternative, compared to the other alternatives due to year-long grazing resulting in a more rapid rotation schedule to stay within use guidelines. Overall, it is expected that, over time, watershed and soil conditions across the allotment would continue to improve under this alternative relative to historic grazing levels, although improvement would be slower than without grazing.

Over time, upland habitat capability for game species such as deer and quail may slowly improve due to increase in herbaceous vigor and density in the openings due to light to conservative use under this alternative, compared to higher past utilization limits. Improvements to upland habitat are expected to be slower under this alternative, compared to a no grazing alternative due to year-long grazing and resulting quicker attainment of authorized utilization levels on browse and herbaceous species. Riparian habitat and stream channels are expected to improve under this alternative, although at a slower rate than no grazing, if management prescriptions are followed and cattle are moved when use guidelines are met.

Small game and non-game species will generally increase over time with an increase in herbaceous cover and probable increase in grass species diversity, although at slower rates than Alternative 1 for reasons described above. Improvements in these resource conditions would be expected to occur more slowly than they would under implementation of any of the other alternative for the reasons outlined above.

MIS: Generally, with an improvement in soils and vegetation under this alternative, improvements in wildlife habitat should occur over time, although at a slower rate and to a lesser degree than Alternative 1for the reasons mentioned above. Improvements to terrestrial habitat are as described under the General Wildlife discussion above.

Habitat conditions for riparian (summer tanager, hooded oriole, black hawk, western wood pewee) and aquatic (macroinvertebrates) species are expected to improve over time due to lower grazing levels than historical levels, although at a slower rate than Alternative 1, if

management prescriptions are followed and cattle are moved when use guidelines are met. Slower recovery is due to year-long use of the allotment.

Species that are indicators of good ground cover (ash-throated flycatcher) and general woodland conditions (juniper titmouse) would likely experience the smallest habitat gain under this alternative than any of the other alternatives because it could result in the lowest potential for an increase in native perennial grasses in the most-frequently used areas. This is due to year-long use of the allotment.

Chaparral species (rufous-sided towhee, black-chinned sparrow) may experience the smallest habitat gain under this alternative than any of the other alternatives reasons outlined above.

Habitat conditions for desert scrub species (black-throated sparrow, brown towhee) are not as likely to improve under this alternative as under Alternative 1 for reasons outlined above.

TES Species: please see discussion above for TES species.

Fire and Fuels

Existing Condition: Historically, fire has played a significant role in the ecology of the Southwest. A high occurrence of lightning throughout the region supports frequent wildfire ignitions during late spring and summer. Native Americans were known to have used fire for hunting, brush clearing, and other purposes. The advent of European settlement during the late 19th century brought livestock grazing and other land management activities which significantly modified existing vegetation. The ability for fire to spread and affect large areas across the landscape was significantly reduced. Additionally, aggressive fire suppression policies adopted by state and federal agencies virtually eliminated the role of fire in natural ecological processes. In many cases, ecosystems today are very different from those where fire was once an integral part of the landscape (Allen 1996).

The 2005 Salome Fire burned 469 acres in the northeast corner of the allotment. Most of the area burned experienced low burn severity. A Burned Area Emergency Response (BAER) team evaluated the fire and a recommendation of 'No Treatment' was given.

There are five natural fire regimes based on the average number of years between fires, severity of fire, and its effects on dominant overstory vegetation. Fire regime condition classes measure the degree of departure from reference conditions, possibly resulting in changes to key ecosystem components. The table below displays existing conditions for vegetation types found on Boneyback Allotment.

Vegetation Type	Natural Fire Regime	Mean Fire Interval	Current Fire Regime Condition Class
Pinyon-juniper (1323 acres)	III- frequent, mixed severity	31 years	2- Moderate departure
Interior chaparral (2779 acres)	IV- less frequent, stand replacement	45 years	3- High departure

Semi-desert grassland (2561 acres)	II- frequent, stand replacement	10 years	2- Moderate departure

Table 7: Existing Fire Regime Condition Class (FRCC)

Desired Condition: Reference condition characteristics have been identified and descriptions developed for each vegetation type represented on Boneyback Allotment. These reference conditions are an estimate of the historical mix of vegetation successional classes, fire frequency and severity across the landscape. In simple terms, they represent an ongoing process and how different vegetation groups responded and evolved before natural fire cycles were disrupted.

The long term goal for fire management on the Tonto National Forest is to reintroduce fire back into fire dependent ecosystems and allow it to resume its natural role (Hart et al 2011). This will be accomplished through the combined use of prescribed fire, mechanical treatments, and wildfire managed for natural resource benefit.

Effects: Over time, restoring fire to these ecosystems will shift areas currently classified as FRCC 3 to FRCC 1 and 2 while serving to maintain areas already in FRCC1. Reference conditions will serve as the baseline for determining departure from natural or historic range.

Table 8: Reference Condition Characteristics for Boneyback Vegetation Types

Vegetation Type	Early Seral % of Landscape	Mid-Seral Closed %	Mid Seral Open %	Late Seral Open %	Late Seral Closed %	Fire Frequency (MFI)	Dominant Fire Regime	Replace. Fire %
Pinyon-Juniper	20	10	20	40	10	31	III	41
Interior Chaparral	20	45	5	5	25	45	IV	90
Semi - Desert Grasslands	5	25	67	2	1	10	II	99

1) Replacement fire % refers to the total percentage of all fires that result in stand replacement.

Removal of fine fuels through livestock grazing will continue to limit the ability of fire to spread across the landscape. If livestock are removed from the allotment through selection of a No Grazing Alternative, fire will resume a more natural role yet still be limited by grazing activity in similar vegetation types on adjacent allotments.

Supporting documentation for this section can be found at Project Record #53.

Heritage

Boneyback Allotment is known to contain many prehistoric archaeological sites representing the occupation and agricultural modification and use of this area by people related to Hohokam and Salado archaeological traditions over a period of 8,000 to 10,000 years. It also

contains many historic sites reflecting the use and occupation by Apache hunters, gatherers and farmers, Anglo ranchers, stockmen, miners and prospectors, and US Forest Service.

Few archaeological surveys have been conducted within Boneyback Allotment. As a result, only a handful of sites have been formally inventoried. Many more are known or have been reported and informal reconnaissance has revealed that some areas within the allotment have very high site densities. Known heritage properties include a wide variety of features ranging from multi-room prehistoric settlements to simple artifact scatters. Most features are prehistoric and consist of collapsed stone masonry structures ranging from single room field houses to large compound sites, various water control devices such as check dams and terraces, and roasting pits for processing agave. There are also 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 nothing more than a scatter of artifacts on the surface.

No traditional cultural properties, native plant gathering areas or tribal sacred sites are currently know to be located on the allotment. The nearby Conway Ranch area is known to have been important historically to the Dilzhe'e or Tonto Apache, many of whom were known to gather there seasonally to harvest acorns well into the 20th century. No specific efforts to identify and inventory such areas have been made.

From the 1870s to early 1920s, grazing of what would become Boneyback Allotment was heavy and unregulated. This resulted in an initial reduction of vegetation cover which would have affected heritage resources through soil loss, erosion, and trampling. Since establishment of allotments and implementation of grazing management, impacts to known heritage resources inventoried have lessened and, in many cases, these properties may have improved in condition as vegetative cover has returned.

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

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

Based on a history of observation and consultation with the State Historic Preservation Officer (SHPO), managed grazing is not considered in and of itself to constitute an effect on

heritage resources when the grazing strategy is designed to match herd size with capacity and distribute livestock as evenly as possible across the allotment in order to avoid localized concentrations of animals and the resultant impacts to soils and vegetation associated with intense trampling. Changes in grazing strategy are likewise not considered to have an effect provided that whatever new strategy is implemented does not alter these conditions.

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

Implementation of a No Grazing Alternative would remove the potential for site damage from concentrated grazing, trailing, and range improvement development on Boneyback Allotment. Sites would continue to be vulnerable to damage from motorized vehicles or vandalism.

Supporting documentation for this section can be found at Project #31.

Recreation

Existing Condition: Cactus Butte Trail #60 was originally described as passing through Boneyback Allotment. More accurate map interpretation and permittee input has since revealed this trail does not pass through the allotment but rather nearby on Greenback Allotment along the eastern boundary of Boneyback. Forest Road 1417 circles around the bottom of Boneyback Peak from east to west and is accessible only through private property (locked gate) with permission from landowners.

Desired Condition: Members of the public have expressed interest in motorized access to lands within Boneyback Allotment for hunting and other recreational activities. The current road passes in close proximity to private dwellings so the agency would need to consider constructing a bypass route linking Forest Road 21 with Forest Road 1417 or an easement agreement to provide access.

Effects: Removing livestock grazing from Boneyback Allotment could benefit recreational users hiking cross-country or traveling FR 1417 if obstructions such as fences, cattleguards, and gates were removed. Visual quality and overall user experience could improve with removal of range improvements and livestock. Some users rely on water developments while hiking or horseback riding in the area and may experience an undesirable effect if those water developments were removed or no longer maintained. Users desiring motorized access would still require a bypass road or easement agreement to access lands in the area. If access

were provided, motorized users would benefit from removal of gates and cattleguards along designated routes.

Under the proposed action, recreational users would continue to experience existing range improvements, new range improvements, and livestock presence on the allotment. Gates are occasionally left open by users, providing opportunity for livestock to move into pastures not authorized for grazing under annual allotment grazing plans. Constructing walk-throughs or replacing wire gates with swing gates could make hiking access easier. Occasionally, range improvements are vandalized through shooting or tampering with operational parts, creating financial burdens to the permittee. Rarely, hikers on active grazing allotments have been threatened by bulls protecting cows or cows protecting calves.

Cumulatively, recreational users have access to most public lands in the analysis area by motorized vehicle, and all public lands in the area by foot or horseback. All forest lands adjacent to Boneyback Allotment are active grazing allotments although there are places inaccessible to livestock while accessible to users traveling on foot. Motorized travelers will experience livestock and range improvements along most designated routes in the analysis area.

Supporting documentation for this section can be found at Project Record #8.

Air and Water Quality

Existing Condition Air: Air quality for the analysis area is monitored by Arizona Department of Environmental Quality under direction from the Clean Air Act and Environmental Protection Agency, who provide National Ambient Air Quality Standards (NAAQS). The analysis area is not in a nonattainment area or maintenance area for regulated air pollution and the Proposed Action and No Grazing Alternative are expected to have a minimal effect on air quality (ADEQ 2012).

Desired Condition Air: Projects related to the Proposed Action and No Grazing Alternative are subject to NAAQS and should strive to keep particulate matter within those standards during normal operations or special projects.

Effects: Particulate matter (10 microns and smaller) dispersed during activities associated with livestock grazing management can penetrate human and animal lungs. Inhaling particulate matter 2.5 microns and smaller has been linked to increases in death rates, heart attacks, plaque and clotting, respiratory infections, asthma attacks, and cardiopulmonary obstructive disease (ADEQ 2012). Effects can be mitigated through proper site preparation and construction techniques and through site restoration following ground-disturbing activities. These effects could occur during livestock gathering (heavy trailing, increased vehicle movement) and during construction of range improvements. Effects would be minimized under a No Grazing Alternative without livestock gathering and trailing however use of roads in the area would still occur and construction of improvements for wildlife/ recreational benefit could still occur on the allotment. Air quality would still be affected by activities on other active grazing allotments in the analysis area and by continued recreation and gravel mining operations in Tonto Basin.

Existing Condition Water: Arizona Department of Environmental Quality (ADEQ) evaluates water quality status of waters within the state in a Nonpoint Source Assessment

Report (2011a). No streams on the allotment have been evaluated by ADEQ for the 2010 report.

Roosevelt Lake is listed as Attaining Some Uses by ADEQ (2011a) due to inconclusive sampling for aquatic and wildlife-warm water fisheries (A&Ww), full body contact recreation (FBC), domestic water source (DWS), agricultural livestock watering (AGL) and agricultural irrigation (AGI). However, the lake was added to the 303d list of impaired waters by the U.S. Environmental Protection Agency (EPA) for fish consumption (FC) due to exceedence of narrative water quality standards for mercury in fish tissue. An FC advisory is currently in place (EPA 2009). In July 2011, ADEQ also issued an FC advisory for mercury contamination in Tonto Creek, a major tributary to Roosevelt Lake. A TMDL (Total Daily Maximum Load) review is scheduled to begin in 2014 for Roosevelt Lake (ADEQ 2011b). This review will help determine the source of mercury contamination.

Designated uses for non-ephemeral, unlisted tributaries above 5000 feet are aquatic and wildlife-cold water fisheries (A&Wc), FC, and FBC. Designated uses for non-ephemeral, unlisted tributaries below 5000 feet are aquatic and A&Ww, FC, and FBC. Designated uses for ephemeral, unlisted tributaries are aquatic and wildlife-ephemeral water fisheries (A&We) and partial body contact recreation (PBC) (A.A.C. R18-11-105).

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

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

Supporting documentation for this section can be found at Project Record #44, 58, and 64.

Climate

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

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

The nearest climate gauge to the allotment is Roosevelt 1WNW. The period of record is 1905 to present and the average annual precipitation is 16.89 inches. Data indicates seven

out of the last ten years have had below average precipitation, with 2002 being below fifty percent of average.

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

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

Effects: Research indicates livestock grazing may affect climate through emissions of methane gas produced by cattle (Gill et al. 2010). This effect is anticipated to be minor in the analysis area as cumulative livestock numbers are low and distributed broadly across the landscape for all grazing allotments in Tonto Basin. It would be difficult to separate effects of livestock emissions from those produced by other human activities, such as passenger vehicles and off-road vehicles traveling on roads in the analysis area, industrial activities such as mining, and outflow from major metropolitan areas such as Phoenix, Arizona, which lies 60 miles west of the analysis area.

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

Climatic fluctuations, on the other hand, can have a profound effect on livestock grazing. Photo point monitoring from Boneyback Allotment demonstrates how varied production of vegetation can be as precipitation and temperatures fluctuate. Implementing an adaptive management strategy will be critical for responding to these fluctuations by adjusting stocking rates as needed in periods of below average or above average precipitation to meet desired conditions for all resources.

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

Supporting documentation for this section can be found at Project Record #61.

Socioeconomics

Tonto Basin's population is divided between two communities; Roosevelt at the eastern end of Theodore Roosevelt Lake, and Punkin Center/ Tonto Basin along Tonto Creek north of the lake. These communities are completely surrounded by the Tonto National Forest. At present these communities are primarily retirement and second home communities, with the median age of the population being 58.4 years. 2000 Census data recorded a population of 840 residents in Punkin Center and 616 in Roosevelt. The local economy is dominated by ranching, tourism/ recreation, retirement and gravel mining industries.

Gila County, with a population of 51,335 (US Census 2000), encompasses approximately 4,752 square miles. Within the county, ownership or administrative control occurs as follows: the US Forest Service -55.5% of the land, Apache Tribe -37%, individuals and corporations -3.7%, US Bureau of Land Management -1.9%and the state of Arizona –less than 1 percent (Arizona Department of Commerce 2008). With little private land to assess property taxes, the county is dependent upon funding from the federal government. The US Government makes payments to Gila County under various programs, the two most important being:

1. Payments in Lieu of Taxes (PILT). These payments are made to the local governments based upon the acreage of federal land within the county, population, consumer price index and previous year payments. In 2010, Gila County was to receive approximately $3,108,571 from this program (USDOI 2010).

2. Secure Rural Schools and Community Self Determination Act of 2000 (PL 106-393). Traditionally, the federal government had returned 25 percent of the revenues collected on Forest Service lands from grazing permits, timber sales, etc to the counties on which these revenues were generated. With decreased timber sales and fees generated from grazing permits, the above Act was designed to "...restore stability and predictability to the annual payments made to States and counties containing National Forest System lands and public domain lands managed by the Bureau of Land Management for use by the counties for the benefit of public schools, roads and other purposes." Under the legislation, the County would receive a fixed income from the federal government, regardless of the income generated on the federally administered lands. The amount is to be based on the average of the highest three years within a ten-year period. Gila County has elected to be funded under the Act, rather than continue to receive 25 percent of the revenues generated from the Forest Service System lands.

Social Environment

The social environment is perhaps the most diverse and emotionally charged arena in ecosystem management. The social environment for this analysis comprises the people living in and adjacent to the Tonto 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 abuts the Forest along its western boundary. The smaller communities tend to rely at least partially on Forest resources (mining, ranching and

timber) for their economic development. This is evidenced by the Gila County Land Use and Resource Policy Plan 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). The Phoenix metropolitan area and Tonto Basin area have experienced great population growths in recent years. The influx of people in recent decades has also brought about more diverse views and public opinion regarding appropriate uses of the public lands. The demand for recreational type activities on public lands is greatly increasing.

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

Lifestyles

Ranching and the grazing of domestic livestock have been a part of the Southwest culture for 400 years. Grazing sheep and cattle in the Southwest was introduced by the Spanish in the late 16th century. The tradition of an open range endured for several hundred years before Anglo-Americans arrived in the Southwest, and when they came, the new arrivals expanded the traditional pastoral practices into 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)

Economic Impacts

Other than reported actual livestock numbers (from Bills for Collections) that have been placed on Boneyback Allotment, data has not been provided to the Forest Service in regards to the economic returns from ranching operations or expenses incurred for maintenance of range improvements. Stocking rates have been quite variable throughout recent history on the allotment 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 the greatest gross economic returns, while moderate stocking rates maximize net economic returns (Holechek et al. 1999). Over time, heavy stocking tends to result in higher death loss, a greater need for supplemental feeding, especially in years of below average precipitation, and lower weaning weight percentages. Under heavy stocking rates, livestock tend to make high gains for a few years, especially when precipitation remains at average or above average levels. However, during drier periods, livestock productivity tends to reduce per animal unit and per unit area. The severity of reduction is related to the stocking density, i.e. heavier stocking rates result in more severe reductions in economic returns than moderate stocking rates, especially in drought years. Under the adaptive management proposal, desirable stocking rates would be moderate over the long-term to achieve desired resource conditions.

A No Grazing alternative will not affect future payments received through PILT or PL 106-393. Tonto Basin and Gila County could be affected by a No Grazing alternative due to the amount of money made by the 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 from Boneyback Allotment could result in loss of some of the culture and lifestyle tied to ranching. The current permittee's family has been ranching in Tonto Basin for several generations. Implementing the No Grazing alternative could intensify feelings of mistrust, loss of personal control, and threaten lifestyles, resulting in negative attitudes towards the Forest Service and other federal agencies in general. Conversely, those individuals who perceive grazing to be an unsuitable use of federal lands may feel increased trust and increased positive attitude towards the Forest Service and other federal agencies in general. These individuals may perceive an increased social benefit from livestock removal.

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

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

Supporting documentation for this section can be found at Project Record #62.

Environmental Justice

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

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

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

CONSULTATION AND COORDINATION

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

ID TEAM MEMBERS:

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Genevieve Johnson, Forest Planner, Tonto NF

Chuck Denton, Ecosystems Staff Officer, Tonto NF

Kelly Jardine, District Ranger, Tonto Basin RD

FEDERAL, STATE, AND LOCAL AGENCIES:

Natural Resources Conservation Service

Tonto Natural Resource Conservation District

Arizona Game and Fish Department

Salt River Project

Arizona Department of Environmental Quality

Globe Chamber of Commerce

City of Globe

Gila County Board of Supervisors

Gila County Community Development

Southern Gila County Economic Development Corporation

US Fish and Wildlife Service

Gila County Extension Service

Arizona Department of Transportation

Arizona Department of Agriculture

US Army Corps of Engineers

Environmental Protection Agency

US Park Service- Tonto National Monument

Bureau of Reclamation

TRIBES:

Ft. McDowell Yavapai Nation

Yavapai-Prescott Tribe

Yavapai-Apache Nation

Tonto Apache Tribe

Pueblo of Zuni

Salt River Pima-Maricopa Indian Community

Hopi Tribe

San Carlos Apache Tribe

White Mountain Apache Tribe

Gila River Indian Community

OTHERS:

Tonto Basin RD grazing permittees

Maricopa Audubon Society

Mogollon Sporting Association

Arizona Desert Bighorn Sheep Society

Arizona Wildlife Federation

People for the West

Sierra Club

Western Watersheds Project

Center for Biological Diversity

Gila County Cattle Growers

Forest Guardians

Audubon Society

Arizona Trails Association

Gila County Trails Association

Nature Conservancy

APPENDIX A- MONITORING DATA

Photo Point #	Identifiable Species	2004	2005	2006	2007	2008	2009	2010
PP1	JUMO, CINE, Upland Grass, OPEN, GUSA	Upland Grass savanna with JUMO intermix	Large increase in GUSA	GUSA gone	GUSA does not re-appear	No Change	No Change	No Change
PP2	JUMO, GUSA, DAWH2, BOCU, OPEN,	Hill slope with moderate to dense upland grass cover	Fire Event	Large increase in Grasses	No Change	More half shrubs present	Less grass more half shrubs	No Change
PP3	JUMO, GUSA, BOCU, OPEN,	Hill slope with moderate upland grass cover with rocky solid, Transitioning to JUMO	No Photo	No Photo	No Photo	No Photo	No Photo	No Photo
PP4	JUMO, GUSA, BOCU,	Hill slope with moderate upland grass cover intermixed with JUMO, GUSA	Fire Event	Increase in Grasses	Grasses continue to increase	Annual forbs seem to take over	No Change	No Change
PP5	ERWR, BOCU, JUMO, NOMI, GUSA	Hillside with intermix of grasses and ERWR	Increase in GUSA	No Change	No Change	Less vigor	No Change	No Change
PP6	JUMO, OPEN, GUSA, Upland Grasses	Patches of dense annual grass mix on hill slope	Increase in GUSA	No Change	No Change	No Change	Increase in Grass production	No Change
PP7	JUMO, OPEN, GUSA, Upland Grasses	Moderate upland grass cover with JUMO intermixed	Increase in GUSA and annuals	Increase in GUSA	No change	Increase in Annuals	Increase in Grass production	No Change
PP8	JUMO, OPEN, GUSA, Upland Grasses	OPEN, JUMO, and upland grass intermixed on hill slope	Increase in grass production	No Change	No Change	No Change	Slight increase in grass production	Increase in annual forbs
PP9	JUMO, OPEN, GUSA, Echino spp. Upland Grasses	OPEN, JUMO, and upland grass intermixed on hill slope	Decrease in grasses increase in	Decrease in annual forbs	No change	No change	No change	increase in annual forbs

			annual forbs					
PP10	JUMO, OPEN, BRRU2 Upland Grass	Juniper and Grass Savanna, High cover Upland grasses	Fire Event	Large increase in grass production	Grass production declines	GUSA increase	Less grass, more annuals	Increase in annual forbs and grasses

JUMO- Juniperus monosperma (one seed juniper)
CINE- Cirsium neomexicanum (New Mexico thistle)
OPEN-Opuntia engelmannii (prickly pear)
GUSA-Gutierrezia sarothrae (broom snakeweed)
DAWH2-Dasilyrion wheeleri (common sotol)
BOCU-Bouteloua curtipendula (side oats grama)
ERWR-Eriogonum wheeleri (shrubby buckwheat)
NOMI-Nolina micrantha (chaparral beargrass)
Echino.-Echinocereus (hedgehog cactus)
BRRU2-Bromus rubens (red brome)

APPENDIX B- WILDLIFE SUPPORTING DOCUMENTATION

Tonto National Forest Sensitive Species List

Common Name	Species	Status	Tonto Occurrence	Species habitat occurs on Allotment
Federally Listed				
Arizona Hedgehog Cactus	*Echinocereus triglochidiatus var. arizonicus*	E	Y	
Arizona Cliffrose	*Purshia subintegra*	E	Y	
Chiricahua Leopard Frog	*Rana chiricahuensis*	T, WC	Y, PCH	
Southwestern Willow Flycatcher	*Empidonax traillii extimus*	E, WC	Y, CH	X
Mexican Spotted Owl	*Strix occidentalis lucida*	T, WC	Y, CH	
Yuma Clapper Rail	*Rallus longirostris yumanensis*	E, WC	Y	
California Condor	*Gymnogyps californianus*	E, WC	H	
Western Yellow-billed Cuckoo	*Coccyzus americanus occidentalis*	C, WC	Y	X
Desert Pupfish	*Cyprinodon macularius macularius*	E, WC	H	
Loach minnow	*Tiaroga cobitis*	T, PE, WC	H, PCH	
Colorado Pikeminnow	*Ptychochelius lucius*	E	H, CH	
Spikedace	*Meda fulgida*	T, PE, WC	H, PCH	X
Woundfin	*Plagopterus argentissimus*	E, WC	H, some ENE	
Razorback Sucker	*Xyrauchen texanus*	E, WC	Y, CH	
Gila Topminnow	*Poeciliposis occidentalis occidentalis*	E, WC	Y	
Gila Chub	*Gila intermedia*	E	Y, CH	
Headwater Chub	*Gila nigra*	C	H	
Roundtail Chub	*Gila robusta*	C	Y	
Gila Trout	*Oncorhynchus gilae gilae*	E, WC	Y	
Ocelot	*Leopardis pardalis*	E	Y	
Lesser Long-nosed Bat	*Leptonycteris curasoae yerbabuenae*	E, WC	Y, foraging only	
Gartersnake, Northern Mexican	*Thamnophis eques megalops*	C	Y	X
Tortoise, Sonoran Desert	*Gopherus agassizii*	C	Y	X
Sensitive Birds				
Bald Eagle	*Haliaetus leucocephalus*	S, WC, MIS	Y	
American Peregrine Falcon	*Falco peregrinus anatum*	S, WC	Y	X
Common Black Hawk	*Buteogallus anthracinus*	S, WC,	Y	X

Common Name	Species	Status	Tonto Occurrence	Species habitat occurs on Allotment
		MIS		
Northern Goshawk	*Accipiter gentilis*	S, WC, MIS	Y	
Northern Gray Hawk	*Asturina nitida maxima*	S, WC	Y	
Zone-tailed Hawk	*Buteo albonotatus*	S	Y	
Clark's Grebe	*Aechmophorus clarkia*	S	Y	
Arizona Bell's Vireo	*Vireo bellii*	S, MIS	Y	X
Abert's Towhee	*Pipilo aberti*	S	Y	X
Sensitive Mammals				
Southwestern River Otter	*Lutra Canadensis Sonora*	S, WC	H	
White-nosed Coati	*Nasua narica*	S	Y	X
Desert Bighorn Sheep	*Ovis Canadensis Mexicana*	S	Y	
Rocky Mountain Bighorn Sheep	*Ovic Canadensis Canadensis*	S	Y	
California Leaf-nosed Bat	*Macrotus californicus*	WC, HP	Y	X
Western Red Bat	*Lasiurus blossevillii*	WC, HP	H	
Spotted Bat	*Euderma maculatum*	WC, HP	Y	
Allen's Lappet-eared Bat	*Idionycteris phyllotis*	HP	Y	X
Townsend's Big-eared Bat	*Corynorhinus townsendii (formerly Plecotus)*	HP	Y	X
Greater Western Mastiff Bat	*Eumops perotis californicus*	S	Y	
Pocketed Free-tailed Bat	*Nyctinopmops femorosaccus*	S	Y	
Sensitive Amphibians				
Lowland Leopard Frog	*Rana yavapaiensis*	S, WC	Y	X
Northern Leopard Frog	*Rana pipiens*	S	Y	
Arizona Southwestern Toad	*Bufo microscaphus microscaphus*	S	Y	X
Western Barking Frog	*Eleutherodactylus augusti cactorum*	S	Y	
Sensitive Reptiles				
Arizona Night Lizard	*Xantusia vigilis arizonae*	S	Y	
Maricopa Leafnose Snake	*Phyllorhynchus browni lucidus*	S	Y	
Narrow-headed Garter Snake	*Thamnophis rufipunctatus*	S, WC	Y	X
Reticulated Gila Monster	*Heloderma suspectum suspectum*	S,WC	Y	X
Sensitive Fish				
Longfin Dace	*Agosia chrysogaster*	S	Y	X
Sonora Sucker	*Catostomus insignis*	S	Y	
Desert Sucker	*Catostomus clarki*	S	Y	
Sensitive Plants				
Pima Indian Mallow	*Abutilon parishii*	S	Y	

Common Name	Species	Status	Tonto Occurrence	Species habitat occurs on Allotment
Hualapai Milkwort	*Polygala rusbyi*	S	Y	
Tonto Basin Agave	*Agave delamateri*	S	Y	X
Hohokam Agave	*Agave murpheyi*	S	Y	X
Chihuahua Sedge	*Carex chihuahuaensis*	S	Y	
Cochise Sedge	*Carex ultra* (=C.spissa var. ultra)	S	Y	X
Mogollon Fleabane	*Erigeron anchana*	S	Y	X
Fish Creek Fleabane	*Erigeron piscaticus*	S	Y	
Arizona Bugbane	*Cimicifuga arizonica*	S	Y	
Ripley Wild Buckwheat	*Eriogonum ripleyi*	S	Y	X
Eastwood Alum Root	*Heuchera eastwoodiae*	S	Y	
Arizona Alum Root	*Heuchera glomerulata*	S	Y	X
Alamos Deer Vetch	*Lotus alamosanus*	S	Y	X
Horseshoe Deer Vetch	*Lotus mearnsii var. equisolensis*	S	Y	
Sweet Cicely	*Osmorhiza brachypoda*	S	Y	X
Salt River Rock Daisy	*Perityle gilensis var. salensis*	S	Y	X
Fish Creek Rock Daisy	*Perityle saxicola*	S	Y	
Arizona Phlox	*Phlox amabilis*	S	Y	
Galiuro Sage	*Salvia amissa*	S	Y	X
Groundsel Toumey	*Packera neomexicana var. toumeyi* (=*Senecio n. var. t.*)	S	Y	
Blumer's Dock	*Rumex orthoneurus*	S	Y	
Mt. Dellenbaugh Sandwort	*Arenaria aberrans*	S	Y	
Aravaipa Woodfern	*Thlypteris puberula var. sonorensis*	S	Y	
Sensitive Invertebrates				
Parker's Riffle Beetle	*Cylloepus parkeri*	S	Y	
Netwing Midge	*Agathon arizonicus*	S	Y	
Fossil Springsnail	*Pyrgulopsis simplex*	S	Y	

Key:
S = on Regional Forester's Sensitive Species List (03/21/2011
E = Federally Listed as Endangered, under ESA
T = Federally Listed as Threatened, under ESA
WC = Wildlife of Special Concern in Arizona (AZ Game and Fish Dept. Draft 3/16/96)
HP = High Priority Species; "at high risk of imperilment" (Western Bat Species Regional Priority Matrix (1998).
MIS = Tonto National Forest Management Indicator Species (Tonto Plan 1985)
Y = Known to occur on Tonto
H = Historically known from Tonto
CH = Critical Habitat designated on Tonto
PCH = Proposed Critical Habitat designated on Tonto
ENE = Reintroduced populations designated as Experimental - Nonessential, under ESA.
Known Occupied Pastures are those pastures with records of the species in them

Pastures with Habitat Present are those pastures that are likely to contain habitat for the species based on personal observation and other specialists' reports.

Status of Management Indicator Species Populations

Tonto National Forest

Species Name	Indicator of:	Species Status	Evidence of Status	Determined by:	Habitat occur on allotment	Comments
Elk	General forest conditions	I	AZGFD surveys	Henry Apfel, Dave Carrothers		
turkey	PP/MC - vertical diversity; general forest mix	I	AZGFD surveys	Henry Apfel, Dave Carrothers		Numbers on the forest have generally decreased since the mid-80's. Drought conditions may cause for decline.
Arizona grey squirrel	High Elevation Riparian (>3000')	I	AZGFD surveys	Henry Apfel, Dave Carrothers	X	One biologist thought that they might be increasing due to mild winters.
Abert's squirrel	PP/MC - successional stages PP	I	AZGFD surveys	Henry Apfel, Dave Carrothers		They may be increasing on one portion of the Forest, but decreased in Unit 23 due to the level of harvest in the 1980's.
pygmy nuthatch	PP - old growth	I	BBA, BBS, CP, Monitoirng	Troy Corman, Marjorie Latta, Debbie Lutch, Mike Ross	X	Declining in parts or the State or specific locations, but overall stable on the Tonto.
violet-green swallow	PP/MC - cavity nesting	I	BBA, BBS, CP, Monitoirng	Troy Corman, Marjorie Latta, Debbie Lutch, Mike Ross	X	Declining in parts or the State or specific locations, but overall stable on the Tonto
western bluebird	PP/MC - forest openings	I	BBA, BBS, CP, Monitoirng	Troy Corman, Marjorie Latta, Debbie Lutch, Mike Ross	X	Declining in parts or the State or specific locations, but overall stable on the Tonto
northern goshawk	PP/MC - vertical diversity	I	BBA, BBS, CP, Monitoirng	Troy Corman, Marjorie Latta, Debbie Lutch, Mike Ross		Forest is on edge of range. Found several new territories since mid-80's, but don't have large numbers.

Species Name	Indicator of:	Species Status	Evidence of Status	Determined by:	Habitat occur on allotment	Comments
ash-throated flycatcher	PJ Woodland - ground cover	I	BBA, BBS, CP, Monitoirng	Troy Corman, Marjorie Latta, Debbie Lutch, Mike Ross	X	Not a good species for this because it isn't a ground feeder or nester. Gray flycatcher would be better species
Townsends solitare	PJ - berry production (winter)	D		Corman, Latta, Lutch, & Ross	X	Few winter surveys. Pinyon jay would be better
northern flicker	PJ Woodland - snags	I	BBA, BBS, CP, Monitoirng	Troy Corman, Marjorie Latta, Debbie Lutch, Mike Ross	X	Cavity nester in PJ. Titmouse is better indicator. Not necessarily snags, but cavities in PJ type.
spotted towhee	PJ Woodland - successional stage Chaparral - shrub density	I	BBA, BBS, CP, Monitoirng	Troy Corman, Marjorie Latta, Debbie Lutch, Mike Ross	X	Shrub type habitat may be increasing on Tonto due to lack of fires, grazing, timber harvest, etc.
black-chinned sparrow	Chaparral - shrub density	I	BBA, BBS, CP, Monitoirng	Troy Corman, Marjorie Latta, Debbie Lutch, Mike Ross	X	Found on slopes. Prefers more open shrub, such as transition zone between chaparral and desert grassland.
savannah sparrow	Desert-Grassland - grass species diversity (winter)	I	Monitoirng, range condition trends	Troy Corman, Marjorie Latta, Debbie Lutch, Mike Ross	X	Declining in areas where perennial grass density and diversity are reduced.
horned lark	Desert-Grassland - vegetative aspect	I	BBA, BBS, CP, Monitoirng	Troy Corman, Marjorie Latta, Debbie Lutch, Mike Ross	X	Everywhere. Don't need a lot of cover. May indicate reductions in shrub and grass density and composition.
black-throated sparrow	Desertscrub - shrub diversity	I	BBA, BBS, CP, Monitoirng	Troy Corman, Marjorie Latta, Debbie Lutch, Mike Ross	X	May be increasing if grass areas are transitioning to brush (see spotted towhee also)
canyon towhee	Desertscrub - ground cover	I	BBA, BBS, CP, Monitoirng	Troy Corman, Marjorie Latta, Debbie Lutch, Mike Ross	X	Need mix of grass and shrubs

Species Name	Indicator of:	Species Status	Evidence of Status	Determined by:	Habitat occur on allotment	Comments
gray vireo	PJ Woodland - tree density	D	BBA, BBS, CP, Monitoirng	Troy Corman, Marjorie Latta, Debbie Lutch, Mike Ross	X	More open PJ on dry slopes is preferred nesting habitat. Arizona has majority of breeding range therefore a key species.
warbling vireo	High Elevation Riaprian (>3000') tall overstory	I	BBA, BBS, CP, Monitoirng	Troy Corman, Marjorie Latta, Debbie Lutch, Mike Ross	X	Elk are affecting aspen and Gambel oak reproduction used for nesting.
western wood peewee	High Elevation Riaprian (>3000') medium overstory	I	BBA, BBS, CP, Monitoirng	Troy Corman, Marjorie Latta, Debbie Lutch, Mike Ross	X	Also common in adjacent pines.
macro invertebrates	fisheries habitat water quality	U	Sampling and Analysis	Macroinvert. lab	X	Overall assessment of individual analyses to determine trend has not been completed.

Determinations of pastures with habitat present for each species were taken from the riparian and vegetation/soils specialist reports of habitat types contained in each pasture.

Status
I = increasing
S = stable
D = decreasing
U = unknown

Evidence of Status
BBS = Breeding Bird Surveys
BBA = Breeding Bird Atlas Blocks
CP = Partners In Flight Conservation Plan

Management Indicator Species and Reasons for Including or Excluding from Analysis

Species	Vegetation Type	Indicator of:	Primary Reasons for Selection	Considered impacted by project alternatives?
Elk	PP/MC	general forest conditions	Indicates early successional stages, grass, openings, water distribution, road density and disturbance, thermal or hiding cover, and the overall job of wildlife coordination with timber management. Basis for state strategic plan and of economic importance.	No. Project alternatives does not affect general forest conditions. This habitat type does not occur on this allotment.
Turkey	PP/MC	Vertical diversity – forest mix	Indicates forest openings, grass, insects for poults and well-distributed waters. Turkeys require a minimum of four roosts per section (large trees in clumps with large lateral limbs on sidehills). Good production requires fair or better range condition with rest-rotation and proper stocking. Indicates good nesting cover near water and open stocking. Indicates good nesting cover near water and open foraging areas.	No. Project alternatives does not affect vertical diversity. This habitat type does not occur on this allotment.
Pygmy Nuthatch	PP/MC	Old growth pine	Requires vertical diversity and specific old growth characteristics in the upper range of the sawtimber stage. Sensitive to silvicultural treatments in old growth.	No. Project alternatives does not affect old growth pine. This habitat type does not occur on this allotment.
Violet-green swallow	PP/MC	Cavity-nesting habitat	Indicates old growth, water and snags.	No. Project alternatives does not affect cavity nesting habitat. This habitat type does not occur on this allotment.
Western Bluebird	Pp/mc	Forest openings	May indicate heavy cutting of the conifer type and too many openings in one area.	No. Project alternatives does not affect forest openings This habitat type does not occur on this allotment.
Hairy Woodpecker	PP/MC	Snags	Species chosen to indicate the minimum legal compliance standard for snag densities. High densities at upper elevations may indicate insect outbreaks. Primary excavator, utilizing a variety of species snags.	No. Project alternatives does not affect snags This habitat type does not occur on this allotment.

Species	Vegetation Type	Indicator of:	Primary Reasons for Selection	Considered impacted by project alternatives?
Goshawk	PP/MC	Vertical diversity	Requires 20% of 5,000 acre management units to be managed for vertical diversity "old growth" characteristics.	No. Project alternatives does not affect vertical diversity. This habitat type does not occur on this allotment.
Abert Squirrel	PP/MC	Successional stages of pine	Dependent on pole sized ponderosa pine.	No. Project alternatives does not affect successional stages of pine. This habitat type does not occur on this allotment.
Ash-throated Flycatcher	P/J	Ground cover	Indicator of grassland modification, public issue.	Yes. Project alternatives may affect ground cover.
Gray Vireo	P/J	Tree density	Sensitive indicator of livestock grazing in wetlands, economically important.	Yes. Project alternatives may affect tree density.
Townsend's Solitaire	P/J	Juniper berry production	Probably was designed to measure changes in acreage of mature juniper, although no notes are available on why the species was selected. Species wasn't in final May 1982 list as candidate MIS.	No. Project alternatives does not affect juniper berry production.
Juniper Titmouse	P/J	General woodland conditions	Requires old growth characteristics in the pinyon-juniper type. Sensitive indicator of P-J woodland modification, utilizes juniper snags	Yes. Project alternatives may affect general woodland conditions.
Common Flicker	P/J	Snags	Snag availability and ants.	No. Project alternatives does not affect snags.
Spotted Towhee	P/J	Successional stages of pinyon-juniper	Indicates high, mid-story and shrub densities. Requires mid-successional stages in the pinyon/juniper type.	Yes. Project alternatives may affect successional stages of pinyon-juniper.
Spotted Towhee	chaparral	Shrub density	Indicates overstory composition and crown density. Indicates species diversity.	Yes. Project alternatives may affect shrub density.
Black-chinned Sparrow	chaparral	Shrub diversity	Indicates overstory composition and crown density. Indicates species diversity.	Yes. Project alternatives may affect shrub diversity.

Species	Vegetation Type	Indicator of:	Primary Reasons for Selection	Considered impacted by project alternatives?
Savannah Sparrow	desert grassland	Grass species diversity	Species wasn't in final May 1982 list as candidate MIS.	Yes. Project alternatives may affect grass species diversity.
Horned Lark	desert grassland	Vegetation aspect	Increases with moderate to heavy grazing.	No. Project alternatives does not affect vegetation aspect.
Black-throated Sparrow	desert-scrub	Shrub diversity	Increases in density as grazing pressure decreases, but this species increases in grazed desert grassland.	No. Project alternatives does not affect shrub diversity. This habitat type does not occur on this allotment.
Canyon Towhee	desert-scrub	Ground cover	Decreases with heavy grazing pressure.	No. Project alternatives does not affect ground cover. This habitat type does not occur on this allotment.
Bald Eagle	Low elev. riparian	General riparian	An increase in nesting or winter use along the Salt and Verde Rivers may indicate the riparian condition is improving.	No. Project alternatives does not affect general riparian. This habitat type does not occur on this allotment.
Bell's Vireo	Low elev. riparian	Well-developed understory	Indicates a well-developed understory	No. Project alternatives does not affect well-developed understory. This habitat type does not occur on this allotment.
Summer Tanager	Low elev. riparian	Tall, mature trees	Indicates a good overstory	No. Project alternatives does not affect tall, mature trees. This habitat type does not occur on this allotment.
Hooded Oriole	Low elev. riparian	Medium-sized Trees	Indicates a good overstory	No. Project alternatives does not affect medium-sized trees. This habitat type does not occur on this allotment.
Hairy Woodpecker	High elev. Riparian	Snags, cavities	Indicates the snag components	No. Project alternatives does not affect snags and cavities.
Arizona Gray Squirrel	High elev. Riparian	General riparian	May indicate alder component	Yes. Project alternatives may affect general riparian.
Warbling Vireo	High elev. Riparian	Tall overstory	Indicates a tall tree overstory	No. Project alternatives does not affect tall overstory.

Species	Vegetation Type	Indicator of:	Primary Reasons for Selection	Considered impacted by project alternatives?
Western Wood Pewee	High elev. Riparian	Medium overstory	Indicates mid-story	No. Project alternatives does not affect medium overstory.
Common black-hawk	High elev. Riparian	Riparian streamside	Indicates upper elevation riparian in a good condition with perennial stream and fish prey base available.	Yes. Project alternatives may affect riparian streamside.
Marcro-invertebrates	Aquatic	Water quality	Presence and composition reflects water quality, management practices, permanent water	Yes. Project alternatives may affect water quality.

Ash-Throated Flycatcher (*Myiarchus tyrannulus*)

MIS Role: Ground cover in the pinyon/juniper type.
Summary of Key Habitat Components:

- Secondary cavities
- Open habitats
- Habitat generalist (desert-scrub, pinyon-juniper, ponderosa pine)

Survey information documented in the 2005 Forest MIS report indicates that the population trend for this species is stable in Arizona, but is showing a significant increase in the western United States. Populations are considered stable or increasing on the Tonto NF and the species is known to be well distributed on the Tonto NF.

Forest types most associated with ash-throated flycatchers in Arizona are ponderosa pine and pinyon-juniper. They breed in scrub, chaparral, and open and riparian woodlands, especially in oak and pinyon – juniper. They are considered cavity nesters, using natural or artificial cavities such as old woodpecker holes in dead or dying trees, holes in fence posts, old cactus wren nests, or bluebird nest boxes, anywhere from 3 to 20 feet above ground. They forage for insects in the air, and hunt from an open perch.

The proposed project is expected to be beneficial to this species. Juniper removal and prescribed burns in pinyon/juniper habitats in the analysis areas will result in a more open structural condition. Larger snags and larger trees will be retained and canopy cover will be decreased, thus improving herbaceous growth and consequently insect production. Broadcast burning or pile burning will have little if any effect on this species.

Range Management Effects Determinations

- Alternative 1 would result in no loss of habitat quality or quantity for ash-throated flycatcher, so it is not expected to alter Forest-wide habitat and population trends.
- Alternative 2 would result in a small (<1%) increase in habitat quantity and quality for ash-throated flycatcher. The total increases in quantity and quality (~1.6% of Forest-wide habitat) could contribute to the observed increased Forest-wide population trends, but is not expected to alter the Forest-wide habitat trend.

Gray Vireo (*Vireo vicinior*)

MIS Role: Tree density in pinyon/juniper.
Summary of Key Habitat Components:

- Large juniper or chaparral with scattered trees
- Extensive shrubland or scattered shrubs among pinyon – juniper woodlands
- Mature or late in post-fire succession shrublands
- Shrub cover continuous and dense, between 1.0 and 5.0 feet tall

Survey information documented in the 2005 Forest MIS report indicates that the population trend for this species is stable in Arizona, but is showing a significant increase in the western United States. Populations are considered decreasing on the Tonto NF.

In Arizona and New Mexico gray vireos occur in chaparral/juniper and dwarf conifer species, as well as sites with oaks, mixed pinyon, and madrone. Gray vireos in Arizona frequent juniper habitats of the Upper Sonoran Zone and mesquite, usually preferring large juniper or chaparral with scattered trees. They require either extensive shrublands or scattered shrubs among pinyon/juniper woodlands.

They may prefer shrublands that are mature or late in post-fire succession (USDA Forest Service 1994). Shrub cover that is continuous and dense between 1.0 and 5.0 feet tall is a common habitat factor. In Arizona, and Texas, territories were near a water supply available during at least part of the breeding season.

For the most part, pinyon/juniper woodlands in the analysis area are currently in a condition that benefits this species. High densities of brush are commonly intermixed with pinyon/juniper stands. Most of these habitats have been long protected from wildfire. Pure juniper stands and historic juniper savanna are less suitable because the understory is comprised of less brush, but often significant juniper regeneration.

Implementation of juniper removal and fuel treatments will probably result in some reduction of habitat quality for gray vireos where the resulting structure will become more of a juniper savanna. Burning in the pinyon/juniper/shrub types will result in a mosaic of treated and untreated habitat, which, though reducing overall shrub cover will provide greater structural diversity within stands. Nearly half of the Tonto NF is pinyon-juniper woodlands and as a result, a considerable amount of suitable habitat for gray vireos will remain within and adjacent to the analysis area.

Range Management Effects Determinations

- Alternative 1 would result in no loss of habitat quality or quantity for gray vireo, so it is not expected to alter Forest-wide habitat and population trends.
- Alternative 2 would result in a small (<%) decrease in habitat quantity and quality for gray vireo. The total decrease in quantity and quality (~1.6% of Forest-wide habitat) could contribute to the observed decreased Forest-wide population trends, but is not expected to alter the Forest-wide habitat trend.

***Juniper Titmouse* (*Baeolophus ridgwayi*)**

MIS Role: General woodland conditions in pinyon/ juniper
Summary of Key Habitat Components:

- Late seral stage pinyon-juniper woodlands with large old junipers
- Canopy cover less than 30%-40%
- 63-154 trees per acre
- Secondary cavities
- Dense foliage for roosting

Survey information documented in the 2005 Forest MIS report indicates that the population trend for this species is stable range-wide, although populations are considered to be decreasing on the Tonto NF.

The juniper titmouse is most often associated with late-succession pinyon-juniper with open canopies and associated riparian woodlands. It can be found in all structural stages within the pinyon-juniper, but old growth pinyon-juniper appears to be the primary nesting habitat utilized. Breeding titmice utilize pinyon-juniper stands with canopy cover less than 30% and densities between 63 and 154 trees/acre.

This species needs are similar to those of the Townsend's solitaire, although this species appears to be more adapted to different structural stages, tending toward more open, less dense stands. Implementation of juniper treatments associated with range management and prescribed burns associated with fuel treatments are expected to result in improved structural diversity within the pinyon/juniper woodlands, thus resulting in generally improved conditions for the species.

Range Management Effects Determinations

- Alternative 1 would result in no loss of habitat quality or quantity for juniper titmouse, so it is not expected to alter Forest-wide habitat and population trends.
- Alternative 2 would result in a small (<1%) increase in habitat quantity and quality for juniper titmouse. The total increases in quantity and quality are small enough (~1.6%) that they are not expected to alter the Forest-wide habitat and population trends.

Spotted Towhee (Pipilo maculates)

MIS Role: Successional stages of pinyon/juniper & shrub density in chaparral.

Summary of Key Habitat Components:

- Maintain adequate large, dense stands of chaparral.
- In pinyon-juniper woodland, manage adequate stands to maintain or create mid-successional stages with dense midstory shrub components.
- Avoid fragmenting large shrub stands with trails, livestock water developments, or other facilities that would attract cowbirds.

Survey information documented in the 2005 Forest MIS report indicates that the population trend for this species shows a non-significant increase on the Tonto NF as well as rangewide. This species is secure, widespread, and abundant throughout its range.

Spotted towhees are year around residents of brush vegetation types found in Arizona. They are known to inhabit interior chaparral, Gambel's oak, riparian shrubs, sagebrush and a variety of other brush vegetation types. It uses dense shrubs for nesting and foraging. Spotted towhees also inhabit pinyon-juniper woodland where there is a mid-successional stage of dense shrubs. This species is commonly observed on the Forest in areas with dense shrubs, from chaparral stands, through chaparral associations mixed with pinyon and/or juniper, to ponderosa pine.

Range management and fire management activities in the pinyon/juniper/shrub types will result in a mosaic of treated and untreated habitat, although reducing overall shrub cover will provide greater structural diversity within stands. Overall there could be a short-term reduction in suitable habitat for this species; however such reductions will be short-lived until re-sprouting vegetation provides suitable ground cover again. Large quantities of dense brush, both as chaparral stands and within pinyon-juniper, will remain in and adjacent to the analysis area.

Range Management Effects Determinations

Pinyon-Juniper

- Alternative 1 would result in no loss of habitat quality or quantity for spotted towhee, so it is not expected to alter Forest-wide habitat and population trends.
- Alternative 2 would result in a small (<1%) decrease in habitat quantity and quality for spotted towhee. The total decreases in quantity and quality are small enough (~1.6%) that they are not expected to alter the Forest-wide habitat and population trends.

Chaparral

- Alternative 1 would result in no loss of habitat quality or quantity spotted towhee, so it is not expected to alter Forest-wide habitat and population trends.
- Alternative 2 would result in a small (<1%) decrease in habitat quality for spotted towhee, but no loss of habitat quantity. The total decrease in quality is small enough (~0.5%) that it is not expected to alter the Forest-wide habitat and population trends.

Black-Chinned Sparrow* (*Spizella atrogularis)

MIS Role: Shrub density in chaparral

Summary of Key Habitat Components:
- Brush 3-6.5 ft tall
- Very dense brush of mixed species interspersed with scattered tall shrubs
- Young stands with openings and passageways in brush
- Desert scrub and washes for winter habitat

Survey information documented in the 2005 Forest MIS report indicates that the population trend for this species shows a decrease in the western breeding bird region. This is largely attributed to degraded grassland conditions in the species wintering range in the southwest U.S. and northern Mexico. Breeding habitat is not considered limiting, and as such, populations are considered increasing on the Tonto NF.

During the summer, this species prefers rocky slopes of mixed chaparral, arid scrub, or sagebrush, from near sea level to almost 8,200 feet in elevation. The brush inhabited by black-chinned sparrows is usually 3 to 6.5 feet tall. Very dense, mixed shrub species interspersed with scattered tall shrubs or trees and rocky outcrops on slight to steep slopes are preferred. Some studies have shown that black-chinned sparrows prefer young stands with openings through the brush, and avoid overgrown stands. In montane chaparral, this species is associated with C*eanothus* spp. and scrub oak dominated habitat. Research has shown that habitat quality may benefit with recurrent fires, dependent on the vegetation type and region.

Certainly, range management and fuel treatment activities within the chaparral types will, over the short-term, limit habitat for this species, but there are significant quantities of dense brush (i.e. suitable habitat) over much of the entire Tonto NF. As a result, habitat changes created by the proposed actions will not lead to declines in the population of the species.

Range Management Effects Determinations
- Alternative 1 would result in no loss of habitat quality or quantity for black-chinned sparrow, so it is not expected to alter Forest-wide habitat and population trends.
- Alternative 2 would result in a small (<1%) decrease in habitat quality for black-chinned sparrow, but no loss of habitat quantity. The total decrease in quality is small enough (~0.5%) that it is not expected to alter the Forest-wide habitat and population trends.

Savannah sparrow* (*Passerculus sandwichensis)

MIS Role: Grass species diversity in desert grassland

Summary of Key Habitat Components
- Prefers open habitats of >20-40 acres on the Tonto such as agriculture fields, meadows, marshes, weed patches with dense ground cover
- Avoids extensive tree cover
- Highly sensitive to fragmentation
- Winter resident on Tonto
- May be indicator of grassland diversity

In Arizona, this species is listed as S5, secure, common, widespread, and abundant (ibid). "NatureServe and the Heritage Natural Network was formed in 1999 as the Association for

Biodiversity Information when The Nature Conservancy and the Natural Heritage Network jointly established an independent organization to advance the application of biodiversity information to conservation" (NatureServe Explorer website 2001).

Breeding Bird Survey (BBS) trend estimates are not available at the USGS Patuxtent Wildlife Research Center website for the state of Arizona, since this species is more common as a migrant and is extremely local as a breeding bird in this state.
Based on regional data and relatively static desert grassland trends on TNF, this species is considered **stable**.
Range management activities within the grassland type may, over the short-term, limit habitat for this species, but there are significant quantities of semi-desert grassland (i.e. suitable habitat) over much of the entire Tonto NF. As a result, habitat changes created by the proposed actions will not lead to declines in the population of the species.

Range Management Effects Determinations

- Alternative 1 would result in no loss of habitat quantity for savannah sparrow, but may lead to increase in habitat quality. The total increase in quality is small (0.2%) and as a result is not expected to alter the Forest-wide habitat or population trends.
- Alternative 2 would result in a small decrease in habitat quantity and quality for savannah sparrow, and may lead to reductions in habitat quality. The total decrease in quality is small (0.3%) and as a result is not expected to alter the Forest-wide habitat or population trends.

Range Management Effects Determinations

- Alternative 1 would result in no loss of habitat quantity for canyon towhee, but will lead to reductions in habitat quality. The total decrease in quality is small (0.2%) and as a result is not expected to alter the Forest-wide habitat or population trends.
- Alternative 2 would result in a small decrease in habitat quantity and quality for canyon towhee, but will lead to reductions in habitat quality. The total decrease in quality is small (0.3%) and as a result is not expected to alter the Forest-wide habitat or population trends.

Arizona Gray Squirrel

MIS Role: General forest conditions in high elevation riparian.

Summary of Key Habitat Components:

- Dense broadleaf communities of riparian deciduous forest (i.e. acres of structural Type 1 Riparian Areas).
- Uplands with tall oaks, including Gambel (*Quercus gambelii*) and/or Emory oaks (*Q. emoryi*).
- For nest sites: oaks and/or deciduous riparian trees such as Arizona sycamore (*Platanus wrightii*), box elder (*Acer negundo*), Arizona alder (*Alnus oblongifolia*), Arizona ash (*Fraxinus velutina*), Arizona walnut (*Juglans major*), and others

The 2005 Forest MIS report indicates that the population trend for the Arizona gray squirrel shows some variability, but overall is stable in the state. Similarly, the trend on the Tonto NF is thought to be stable, if not increasing, as rehabilitation and protection of riparian habitats has resulted in an increase in habitat quality for the species.

The presence of large evergreen oaks (*Q. arizonica*, *Q. emoryi* and *Q. grisea*), while not always conspicuous, appears universal throughout the range of the Arizona gray squirrel. These oaks,

including Gambel and Emory, provide sources of mast, cavities, and nest platforms. This species inhabits hollows in deciduous trees, builds conspicuous leaf and builds covered bolus nest, which are dome shaped and constructed of branches and leaves in a tree. These are used as nursery as well as a den sites. Squirrels may have several leaf nests or none, depending on the availability of den trees. Nest trees are >12 meters tall and nests are located 9-30 meters above the ground, usually at the fork of two or more substantial branches or in a crotch formed by the trunk and a major branch. Favorite foods are acorns, ponderosa pine seeds, and green walnuts, but gray squirrels also consume subterranean and emergent fungi, flower parts, juniper berries (*Juniperus sp.*), hackberries (*Celtis sp.*), and mistletoe (*Arceuthobium sp.*). This species may play an important role in dispersal of tree seeds and the spores of mycorrhizal fungi.

Grazing within high-elevation riparian habitats could result in reductions in vegetative ground cover and impede growth of new trees. Loss of understory could affect availability of hiding cover for squirrels while foraging, while the lack of new trees could limit future nest locations and food sources. The strategy of adaptive management proposed for the analysis area allows for the ability to make changes in management based on vegetative conditions year-to-year. This should minimize potential long-term effects to riparian vegetation but temporary, short-term effects are still likely to occur. As a result of adaptive management, no change to the amount of habitat available to this species is expected to occur, but small decreases in habitat quality are likely in portions of the analysis area. Without grazing, a small increase in the quality of riparian habitats would be expected.

Range Management Effects Determinations

- Alternative 1 would result in an increase in habitat quality for Arizona gray squirrel in the analysis area, but no loss of habitat quantity is expected. The increase is small (1.4%), so it is not expected to alter Forest-wide habitat and population trends.
- Alternative 2 would result in a decrease in habitat quality for Arizona gray squirrel in the analysis area, but no loss of habitat quantity is expected. The decrease is small (1.4%), so is not expected to alter Forest-wide habitat and population trends.

Common Black Hawk

MIS Role: Streamside conditions in high elevation riparian

Summary of Key Habitat Components:

- Require isolated groves of mature broadleaf trees along perennial streams for nesting rather than single mature trees.
- Low branches, downed trees, exposed rocks, and prominent rocks are important for hunting perches.
- Nesting areas need a reliable supply of riparian-associated vertebrate and invertebrate prey.
- Aquatic vertebrates and reptiles are primary prey, but a diverse array of prey species may be necessary.

As detailed in the 2005 Forest MIS report, survey information to determining population trends for this species are limited in the Southwest. Based on the emphasis on rehabilitating and protecting riparian habitats across the region in recent years, it is believed that black hawk populations are stable, if not slightly increasing, across its range, including on the Tonto NF.

The common black hawk in the southwestern U.S. is dependent upon riparian communities for nest trees and prey. This species is typically found in mature broadleaf trees along perennial streams, although they can nest along intermittent watercourses with small impoundments where water persists throughout the breeding season (Schnell et al. 1988). Black hawks largely hunt from low branches,

downed trees, exposed roots, and prominent rocks, but occasionally wade into water to stalk prey. The majority of their diet is comprised of aquatic vertebrates and reptiles, but their diets fluctuate from season to season as prey availability changes. As a result, a diverse array of prey species may be in important component of suitable habitat.

Grazing within high-elevation riparian habitats could result in reductions in vegetative ground cover and impede growth of new trees. Loss of cover could affect availability of some preferred prey species, while the lack of new trees could limit future nest locations. The strategy of adaptive management proposed for the analysis area allows for the ability to make changes in management based on vegetative conditions year-to-year. This should minimize potential long-term effects to riparian vegetation but temporary, short-term effects are still likely to occur. As a result of adaptive management, no change to the amount of habitat available to this species is expected to occur, but small decreases in habitat quality are likely in portions of the analysis area. Without grazing, a small increase in the quality of riparian habitats would be expected.

Range Management Effects Determinations

- Alternative 1 would result in an increase in habitat quality for common black hawk in the analysis area, but no loss of habitat quantity is expected. The increase is small (1.4%), so it is not expected to alter Forest-wide habitat and population trends.
- Alternative 2 would result in a decrease in habitat quality for common black hawk in the analysis area, but no loss of habitat quantity is expected. The decrease is small (1.4%), so it is not expected to alter Forest-wide habitat and population trends.

Aquatic Macroinvertebrates

MIS Role: Water quality and fisheries habitat.

Macroinvertebrates have been sampled in 15 perennial streams on the Tonto NF from 1986 to present. None of the streams within the Flying V & H analysis area are monitored; the nearest monitored stream section is in Cherry Creek, south of the analysis area.

Tonto Creek - Overall aquatic conditions in Tonto Creek appear to be poor as indicated by BCI values from 1986 to 2005. BCI values ranged from 68 in 1986 to 60 in 2005. This indicates poor aquatic conditions continue to persist in this drainage. Diversity of aquatic macroinvertebrates has declined in this drainage as indicated by DAT analyses. For example station 15 had a DAT of 14.1 in 1986 and a DAT of 2.1 in 1991.

Range management in the analysis area requires the use of adaptive management, which allows for changes to be made in the number of livestock grazing, the length of time spent in a pasture, the time of year a pasture is grazed, or the degree to which animals are distributed in a pasture. While short-term effects are possible, the ability to make changes in management based on vegetative conditions year-to-year should minimize potential long-term effects to macroinvertebrates in the analysis area. With implementation of these measures, it is unlikely either proposed action will result in a decline in water quality in the analysis area.

Range Management Effects Determinations

- Alternative 1 would result in no loss of habitat quality or quantity for macroinvertebrates, so it is not expected to alter Forest-wide habitat and population trends.

Alternative 2 would result in no loss of habitat quality or quantity for macroinvertebrates, so it is not expected to alter Forest-wide habitat and population trends.

Migratory Bird Species of concern in Sonoran and Sierra Madre Occidental ecological regions of the Tonto National Forest, and estimated trend response to the proposed action and alternative

Species	Vegetation Type	Habitat	Examples of Invasive Plant Species in or near Habitat	Current condition/trend forest wide	Estimated Trend in Habitat and Population Under the Proposed Action	Estimated Trend in Habitat and Population Under Alternative 1
Yellow-billed cuckoo Scientific Name also	Low elevation riparian	Cottonwood and willow with dense patches	Saltcedar, tree of heaven, mustards, fountain grass, oleander, giant reed, Russian knapweed, camelthorn, yellow sweetclover, African sumac	No Change/Stable	No change	No change
Elf owl	Sonoran Desert scrub, riparian, piñyon/juniper	Cavity nester	Starthistles, Saltcedar, tree of heaven, mustards, yellow sweetclover, African sumac, Siberian elm	Static/Increase	No change	No change
Burrowing owl	Semi-desert grassland, grasslands	Nests in animal burrows in open ground	Mustards, Schismus, buffelgrass, fountain grass, bromes, sandbur	Static/Stable	No change	No change
Loggerhead shrike	Sonoran Desert scrub, semi-desert grassland	Open areas	Mustards, Schismus, buffelgrass, fountain grass, bromes, sandbur	Static/Decreasing	No change	No change
Gray vireo	Piñyon/juniper with broad-leafed shrubs	Low and tall shrubs with a tree component; drier, rocky, steep slopes	Bromes, knapweeds, starthistles, mustards	Static/Stable	No change	No change
Bendire's thrasher	Sonoran Desert scrub, semi-desert grassland	Open habitat with large cacti, shrubs	Mustards, Schismus, buffelgrass, fountain grass, bromes, sandbur	No Change/Stable	No change	No change
Yellow warbler	Riparian	Willows	Saltcedar, tree of heaven, giant reed, knapweeds, Siberian elm, oleander, fountain grass	Static/Increase	No change	No change

Species	Vegetation Type	Habitat	Examples of Invasive Plant Species in or near Habitat	Current condition/trend forest wide	Estimated Trend in Habitat and Population Under the Proposed Action	Estimated Trend in Habitat and Population Under Alternative 1
Black-chinned sparrow	Sonoran Desert scrub, P/J-turbinella oak	Dense shrub w/ passages	Malta starthistle, bromes, Lehmann's lovegrass, Jerusalem thorn, buffelgrass, Russian thistle	Static/Stable	No change	No change
Lark bunting	Sonoran Desert scrub, semi-desert grassland	Grass cover less than 30 centimeters	Mustards, Schismus, buffelgrass, fountain grass, bromes, sandbur, Jerusalem thorn	No Change/Stable	No change	No change
Lawrence's goldfinch	Riparian, piñyon/juniper	Woodland near water	Starthistles, Saltcedar, tree of heaven, mustards, yellow sweetclover, African sumac, Siberian elm	Static/Increase	No change	No change
Northern goshawk	Ponderosa pine	Denser portions of conifer stands	Oxeye daisy, Dalmatian toadflax, biennial thistles, Canada thistle, yellow starthistle, field bindweed, Japanese knotweed	No Change/Stable	No change	No change
Gray hawk	Riparian	Woodlands with open areas	Starthistles, Saltcedar, tree of heaven, mustards, yellow sweetclover, African sumac, Siberian elm	No Change/Increase	No change	No change
Common blackhawk	Riparian	Mature riparian woodlands with permanent water	Starthistles, Saltcedar, tree of heaven, mustards, yellow sweetclover, African sumac, Siberian elm	Static/Decrease	No change	No change
Ferruginous hawk	Riparian, Sonoran Desert scrub, semi-desert grassland	Varied	Starthistles, Saltcedar, tree of heaven, mustards, yellow sweetclover, African sumac, Siberian elm, Jerusalem thorn	Static/Increase	No change	No change
Peregrine Falcon	Sonoran Desert scrub, piñyon-juniper, chaparral	Cliffs, rocky outcroppings in open areas	Mustards, bromes, Schismus, Jerusalem thorn, camelthorn, white bietou, resinbush	No Change/Stable	No change	No change

Species	Vegetation Type	Habitat	Examples of Invasive Plant Species in or near Habitat	Current condition/trend forest wide	Estimated Trend in Habitat and Population Under the Proposed Action	Estimated Trend in Habitat and Population Under Alternative 1
Flammulated Owl	Ponderosa pine, mixed Conifer	Open woodlands with brushy understory	Oxeye daisy, Dalmatian toadflax, biennial thistles, Canada thistle, yellow starthistle, field bindweed, curveseed butterwort, diffuse knapweed, Japanese knotweed	Static/Increase	No change	No change
Lucy's warbler	Low elevation riparian	Mesquite, willow, cottonwood with dense midstory	Giant reed, Jerusalem thorn, oleander, tree of heaven, Saltcedar, fountain grass	Static/Increase	No change	No change
Broad-billed hummingbird	Riparian, piñyon/juniper	Small tree, shrub, vines	Giant reed, Jerusalem thorn, oleander, tree of heaven, Saltcedar, fountain grass, knapweeds	Static/Increase	No change	No change
Costa's hummingbird	Sonoran Desert scrub	Small dense trees or shrubs near riparian zone and flowering plants	Buffelgrass, bromes, mustards, Malta starthistle, camelthorn, Schismus, fountain grass, sandbur, Jerusalem thorn	No Change/Stable	No change	No change
Northern beardless-tyrannulet	Riparian	Cottonwood groves adjacent to water	Giant reed, Jerusalem thorn, oleander, tree of heaven, Saltcedar, fountain grass	No Change/Increase	No change	No Change
Greater pewee	Riparian	Woodland	Giant reed, Jerusalem thorn, oleander, tree of heaven, Saltcedar, fountain grass, teasel	Static/Stable	No change	No change
Purple martin	Sonoran Desert scrub	Large saguaros with numerous holes in denser stands	Mustards, Schismus, buffelgrass, fountain grass, bromes, sandbur, Jerusalem thorn	No Change/Stable	No change	No change
Baird's sparrow	Semi-desert grassland	Grass with no woody canopy	Buffelgrass, bromes, mustards, Lehmann's lovegrass	Static/Decrease	No Change	No change
Common blackhawk	Low and high elevation riparian	Perennial streams with tree galleries	Giant reed, Jerusalem thorn, oleander, tree of heaven, Saltcedar, fountain grass	Static/Increase	No change	No change

Proposed Action Impact Analysis for TNF Migratory Bird Priority Species of Concern

Species	TNF Vegetation Type Designation	Brown's (1994) Biotic Community Equivalent	Habitat Preferences*	Potential Habitat and Disturbance Impacts
BAND-TAILED PIGEON (*COLUMBA FASCIATA)*	MIXED CONIFER WOODLAND	ROCKY MOUNTAIN MONTANE CONIFER FOREST	Nest in forested areas and feed primarily in oak forest and meadows primarily on acorns and berry crops such as manzanita, madrone and elderberry. Dependent on oaks, they are rare in pure ponderosa forest.	This species is not present in the Proposed Action Area.
CORDILLERAN FLYCATCHER (*EMPIDONAX OCCIDENTALIS)*	MIXED CONIFER WOODLAND	ROCKY MOUNTAIN MONTANE CONIFER FOREST	Breeding habitat includes spruce, fir, aspen, and pine forests, preferably in moist and shaded forests. It also inhabits hollows, canyon bottoms, and riparian woodlands. Natural nest sites include rock crevices, niches formed by scars in trunks (especially aspen), tree roots, cavities in small trees, and in forks of small branches	This species is not present in the Proposed Action Area.
FLAMMULATED OWL (*Otus flammeolus)*	MIXED CONIFER WOODLAND	ROCKY MOUNTAIN MONTANE CONIFER FOREST	They are associated with dry coniferous forests. Require an abundance of natural or abandoned cavities in snags, large dead limbs, or live trees in which to select a nest site. Prefer old growth forests dominated by ponderosa pine and large Gambel's Oaks for	This species is not present in the Proposed Action Area

Proposed Action Impact Analysis for TNF Migratory Bird Priority Species of Concern

Species	TNF Vegetation Type Designation	Brown's (1994) Biotic Community Equivalent	Habitat Preferences*	Potential Habitat and Disturbance Impacts
			nesting and foraging.	
GOLDEN-CROWNED KINGLET (*REGULUS SATRAPA)*	MIXED CONIFER WOODLAND	ROCKY MOUNTAIN MONTANE CONIFER FOREST	Breed primarily in mixed conifer, deciduous, and single-species stands. They prefer to nest near water or edges of clearings in closed or open canopies. Density of understory is not important. In Arizona, Golden-crowned Kinglets sometimes nest in riparian cottonwood and Goodding's willow stands.	This species is not present in the Proposed Action Area.
NORTHERN GOSHAWK (*ACCIPITER GENTILIS)*	MIXED CONIFER WOODLAND	ROCKY MOUNTAIN MONTANE CONIFER FOREST	Mature forests with interspersed openings. Moderately dense to Dense over story for Nesting. Fairly open mid and Understory. Snags and dead and Down (plucking posts, observation perches, prey Habitat). Drainages important (nest tree base often in lower third of drainage). Nest often level with ridge. Elevation spans entire range of mixed conifer. Mosaic of dense stands interspersed with openings With a wide variety of Patch sizes. Edge (roads, forest cuts) good for prey availability Wide variety of successional	This species is not present in the Proposed Action Area.

Proposed Action Impact Analysis for TNF Migratory Bird Priority Species of Concern

Species	TNF Vegetation Type Designation	Brown's (1994) Biotic Community Equivalent	Habitat Preferences*	Potential Habitat and Disturbance Impacts
			stages with the majority in the mature to old growth stage and irregular tree spacing	
OLIVE-SIDED FLYCATCHER (*CONTOPUS COOPERI)*	MIXED CONIFER WOODLAND; MONTANE RIPARIAN WETLAND	ROCKY MOUNTAIN MONTANE CONIFER FOREST; MONTANE RIPARIAN WETLAND	Prefer coniferous forests offering tall prominent trees and snags. Prefers forest edge habitats with semi-open canopies naturally created by montane streams, lakes, and beaver ponds.	This species is present in the Proposed Action Area. Significant impacts to the species are unlikely. The Proposed Action will have no effect on long-term population trends within TNF.
RED-FACED WARBLER (*CARDELLINA RUBRIFRONS)*	MIXED CONIFER WOODLAND, MONTANE RIPARIAN WETLAND	ROCKY MOUNTAIN MONTANE CONIFER FOREST; MONTANE RIPARIAN WETLAND	Prefer deep, heavily forested canyons and cool, steeply sloping drainages. Nesting areas are on the ground, typically low on steep slope, bank, or among forbs on rock faces.	This species is not present in the Proposed Action Area.
RED-NAPED SAPSUCKER (*SPHYRAPICUS NUCHALIS*)	MIXED CONIFER WOODLAND; MONTANE RIPARIAN WETLAND	ROCKY MOUNTAIN MONTANE CONIFER FOREST; MONTANE RIPARIAN WETLAND	This woodpecker typically breeds higher elevation mixed conifer forests and associated montane drainages. During the winter it may be found at lower elevations in riparian areas and adjacent vegetation, including Madrean evergreen woodlands.	This species occurs within the Proposed Action Area. Direct or significant indirect impacts to this species are unlikely. The Proposed Action will have no effect on long-term population trends within TNF.
GRACE'S WARBLER (*DENDROICA GRACIAE)*	MIXED CONIFER WOODLAND	ROCKY MOUNTAIN MONTANE CONIFER FOREST	Prefer park like stands of mature trees and favor open conifer forests that are dominated by ponderosa pine.	This species is present in the Proposed Action Area. Significant impacts to the species are unlikely. The Proposed Action will have no effect on long-term population trends within TNF.

Proposed Action Impact Analysis for TNF Migratory Bird Priority Species of Concern

Species	TNF Vegetation Type Designation	Brown's (1994) Biotic Community Equivalent	Habitat Preferences*	Potential Habitat and Disturbance Impacts
OLIVE WARBLER (*PEUCEDRAMUS TAENIATUS)*	MIXED CONIFER WOODLAND	ROCKY MOUNTAIN MONTANE CONIFER FOREST	Closely associated with open pine forests particularly those on mountain slopes and ridges containing ponderosa pine.	This species is not present in the Proposed Action Area.
LEWIS'S WOODPECKER (*MELANERPES LEWIS)*	MIXED CONIFER WOODLAND: PINYON-JUNIPER	ROCKY MOUNTAIN MONTANE CONIFER FOREST	Prefer open ponderosa pine or riparian woodlands that offer a brushy understory, open foraging areas, and snags for perching.	This species is not present in the Proposed Action Area.
MACGILLIVRAYS' WARBLER (*OPORORNIS TOLMIEI)*	MONTANE RIPARIAN WETLAND	MONTANE RIPARIAN WETLAND	Nesting along mountain drainages, springs, or slopes with a mixture of coniferous and deciduous trees and shrubs. Associated with drainages and canyons consisting of varying combinations of Douglas fir, ponderosa pine, and quaking aspen with a fairly dense understory. Required to have short, dense vegetation available for nesting and foraging substrates.	This species is present in the Proposed Action Area. Significant impacts to the species are unlikely. The Proposed Action will have no effect on long-term population trends within TNF.
GOLDEN EAGLE (*AQUILA CHRYSAETOS*)	PINYON-JUNIPER; MADREAN EVERGREEN WOODLAND. SONORAN DESERTSCRUB	GREAT BASIN CONIFER WOODLAND, MADREAN EVERGREEN WOODLAND, ARIZONA UPLAND SUBDIVISION	This raptor is usually found in open country, in prairies, open wooded country and barren areas, especially in hilly or mountainous regions. They nest on rock ledges, cliffs or in large trees.	This species is known from the Arizona Upland subdivision. Direct or significant indirect impacts to this species are unlikely. The Proposed Action will have no effect on long-term population trends within TNF.
PEREGRINE FALCON	PINYON-	GREAT BASIN CONIFER	Optimum peregrine habitat is	This species is also known to occur

Proposed Action Impact Analysis for TNF Migratory Bird Priority Species of Concern

Species	TNF Vegetation Type Designation	Brown's (1994) Biotic Community Equivalent	Habitat Preferences*	Potential Habitat and Disturbance Impacts
(*FALCO PEREGRINUS*)	JUNIPER; SONORAN DESERTSCRUB	WOODLAND; ARIZONA UPLAND SUBDIVISION	generally considered to be steep, sheer cliffs overlooking woodlands, riparian areas or other habitats supporting avian prey species in abundance.	throughout the action area. Direct or significant indirect impacts to this species are unlikely. The Proposed Action will have no effect on long-term population trends within TNF.
GRAY FLYCATCHER (*EMPIDONAX WRIGHTII*)	PINYON-JUNIPER	GREAT BASIN CONIFER WOODLAND	This flycatcher is most commonly associated with larger stands of pinyon-juniper with sagebrush understory and ponderosa overstory. Occasionally found in areas with Madrean evergreen species. Nest height generally at 2 to 9 ft. This species may need some ground cover to support insect populations for foraging.	This species is also known to occur throughout the action area. Direct or significant indirect impacts to this species are unlikely. The Proposed Action will have no effect on long-term population trends within TNF.
GRAY VIREO (*VIREO VICINIOR*)	PINYON-JUNIPER	GREAT BASIN CONIFER WOODLAND	This vireo prefers relatively arid, open areas dominated by pinyon and juniper with a shrubby understory. Associated to a lesser extent with Madrean evergreen woodland and chaparral-covered slopes. Commonly nests and forages at 2 to 8 ft.	This species is also known to occur throughout the action area. Direct or significant indirect impacts to this species are unlikely. The Proposed Action will have no effect on long-term population trends within TNF.
BLACK-THROATED GRAY WARBLER (*DENDROICA NIGRESCENS*)	PINYON-JUNIPER; MADREAN EVERGREEEN WOODLAND	GREAT BASIN CONIFER WOODLAND, MADREAN EVERGREEN WOODLAND	This warbler is generally associated with open pinyon-juniper or oak woodlands. It is most closely associated with pinyon pine; and it is not	This species is also known to occur throughout the action area. Direct or significant indirect impacts to this species are unlikely. The Proposed Action will have no effect

Proposed Action Impact Analysis for TNF Migratory Bird Priority Species of Concern

Species	TNF Vegetation Type Designation	Brown's (1994) Biotic Community Equivalent	Habitat Preferences*	Potential Habitat and Disturbance Impacts
			usually found where juniper becomes dominant.	on long-term population trends within TNF.
JUNIPER TITMOUSE (*BAEOLOPHUS RIDGWAYI*)	PINYON-JUNIPER	GREAT BASIN CONIFER WOODLAND	This titmouse is primarily found in arid, juniper-dominated woodland communities; infrequently forages and nests on the edges of other communities including chaparral. Observed nest heights have ranged from approximately 4 to 14 ft.	This species is also known to occur throughout the action area. Direct or significant indirect impacts to this species are unlikely. The Proposed Action will have no effect on long-term population trends within TNF.
COSTA'S HUMMINGBIRD (*CALYPTE COSTAE*)	SONORAN DESERTSCRUB; SONORAN RIPARIAN DECIDUOUS FOREST AND WOODLANDS	ARIZONA UPLAND SUBDIVISION, SONORAN DESERTSCRUB, SONORAN RIPARIAN DECIDUOUS FOREST AND WOODLANDS	This hummingbird is generally associated with well vegetated Sonoran and Mojave desert scrub uplands, particularly near desert washes. Nesting often occurs in a variety of trees, including Palo Verde, at heights of approximately 1 to 16 ft.	This species is present in the Proposed Action Area. Significant impacts to the species are unlikely. The Proposed Action will have no effect on long-term population trends within TNF.
BENDIRE'S THRAHER (*TOXOSTOMA BENDIREI*)	SONORAN DESERTSCRUB	ARIZONA UPLAND SUBDIVISION, SONORAN DESERTSCRUB	This thrasher is most commonly found in Sonoran desert scrub, usually in areas with an abundance of trees, shrubs, and cacti that are adjacent to more open areas. They are often found in xeroriparian conditions, and they may use rural agricultural areas. They will use grasslands if enough shrubs are present.	This species could be present on the Proposed Action Area. Significant impacts to the species are unlikely. The Proposed Action will have no effect on long-term population trends within TNF.

Proposed Action Impact Analysis for TNF Migratory Bird Priority Species of Concern

Species	TNF Vegetation Type Designation	Brown's (1994) Biotic Community Equivalent	Habitat Preferences*	Potential Habitat and Disturbance Impacts
CANYON TOWHEE (*PIPILO FUSCUS*)	SONORAN DESERTSCRUB	ARIZONA UPLAND SUBDIVISION, SONORAN DESERTSCRUB	This towhee is generally found in arid and brushy conditions, and it is most common in Sonoran desert scrub, including more densely vegetated dry washes and rocky foothill slopes. It is occasionally found in chaparral, Madrean evergreen woodland, and sparsely populated rural communities.	This species is present in the Proposed Action Area. Significant impacts to the species are unlikely. The Proposed Action will have no effect on long-term population trends within TNF.
ELF OWL (*MICRATHENE WHITNEYI*)	SONORAN DESERTSCRUB	ARIZONA UPLAND SUBDIVISION, SONORAN DESERTSCRUB	This small owl is commonly found in Arizona upland vegetation, but it is also common in other habitats with woody vegetation, including Madrean evergreen woodland. It requires cavities in saguaros or trees for nest sites.	This species is present in the Proposed Action Area. Significant impacts to the species are unlikely. The Proposed Action will have no effect on long-term population trends within TNF.
GILA WOODPECKER (*MELANERPES UROPYGIALIS*)	SONORAN DESERTSCRUB	ARIZONA UPLAND SUBDIVISION, SONORAN DESERTSCRUB	This woodpecker is most commonly found in the Arizona upland subdivision, although it will also use riparian areas with large cottonwoods, willows, sycamores, and mesquites. It requires saguaros or large trees for excavation of its nest cavities.	This species is present in the Proposed Action Area. Significant impacts to the species are unlikely. The Proposed Action will have no effect on long-term population trends within TNF.
GILDED FLICKER (*COLAPTES CHRYSOIDES*)	SONORAN DESERTSCRUB	ARIZONA UPLAND SUBDIVISION, SONORAN DESERTSCRUB	This woodpecker is found primarily in Sonoran desert uplands, particularly in areas	This species is present in the Proposed Action Area. Significant impacts to the species are unlikely.

Proposed Action Impact Analysis for TNF Migratory Bird Priority Species of Concern

Species	TNF Vegetation Type Designation	Brown's (1994) Biotic Community Equivalent	Habitat Preferences*	Potential Habitat and Disturbance Impacts
			containing saguaro cacti. It commonly nests in cavities in saguaros greater than 15 ft tall or riparian trees.	The Proposed Action will have no effect on long-term population trends within TNF.
PHAINOPEPLA (*PHAINOPEPLA NITENS*)	SONORAN DESERTSCRUB	ARIZONA UPLAND SUBDIVISION, SONORAN DESERTSCRUB	Mistletoe is a key habitat requirement for this species, and it is able to use a variety of vegetation types if mistletoe is present. The phainopepla is most common in Sonoran desert scrub, but it may also be found in riparian woodlands. It is less common in pinyon-juniper woodlands and in Madrean evergreen woodlands.	This species is present in the Proposed Action Area. Significant impacts to the species are unlikely. The Proposed Action will have no effect on long-term population trends within TNF.
PRAIRIE FALCON (*FALCO MEXICANUS*)	SONORAN DESERTSCRUB	ARIZONA UPLAND SUBDIVISION, SONORAN DESERTSCRUB	This raptor is mainly found in deserts and grasslands, where it prefers more arid and more open conditions than the peregrine falcon. Nesting areas have been reported in pinyon-juniper areas and in Madrean evergreen woodlands.	This species could be present in the Proposed Action Area. Significant impacts to the species are unlikely. The Proposed Action will have no effect on long-term population trends within TNF.
PURPLE MARTIN (*PROGNE SUBIS*)	SONORAN DESERTSCRUB	SONORAN DESERTSCRUB	Depending on subspecies, this large swallow is found in Sonoran desert scrub with numerous saguaro cavities or in higher elevation woodlands. It nests primarily in cavities above approximately 15 ft in saguaros and 30 ft in trees.	This species is present in the Proposed Action Area. Significant impacts to the species are unlikely. The Proposed Action will have no effect on long-term population trends within TNF.

Proposed Action Impact Analysis for TNF Migratory Bird Priority Species of Concern

Species	TNF Vegetation Type Designation	Brown's (1994) Biotic Community Equivalent	Habitat Preferences*	Potential Habitat and Disturbance Impacts
BLACK-CHINNED SPARROW (*SPIZELLA ATROGULARIS*)	CHAPARRAL	INTERIOR CHAPARRAL	This sparrow is closely associated with arid, brushy, and generally sloping chaparral habitats. It generally nests in dense shrubs at a height of 1-7 ft.	This species is also known to occur throughout the action area. Direct or significant indirect impacts to this species are unlikely. The Proposed Action will have no effect on long-term population trends within TNF.
BELL'S VIREO (*VIREO BELLII*)	SONORAN RIPARIAN SCRUBLAND; SONORAN RIPARIAN DECIDUOUS FOREST AND WOODLANDS	SONORAN RIPARIAN SCRUBLAND; SONORAN RIPARIAN DECIDUOUS FOREST AND WOODLANDS	This vireo prefers dense, low, shrubby vegetation in lowland riparian areas, with willows, mesquite and seep willows.	This species is also known to occur throughout the action area. Direct or significant indirect impacts to this species are unlikely. The Proposed Action will have a positive effect on long-term population trends within TNF.
LUCY'S WARBLER (*VERMIVORA LUCIAE*)	SONORAN RIPARIAN SCRUBLAND	SONORAN RIPARIAN SCRUBLAND	Although this warbler will breed in dryer conditions than other north American warblers, it is most abundant along perennial or intermittent drainages with mesquite. They are primarily found in Sonoran desert scrub, but they may also use cottonwood-willow riparian areas.	This species is also known to occur throughout the action area. Direct or significant indirect impacts to this species are unlikely. The Proposed Action will have no effect on long-term population trends within TNF.
COMMON BLACK-HAWK (*BUTEOGALLUS ANTHRACINUS)*	INTERIOR RIPARIAN DECIDUOUS FORESTS AND WOODLANDS; SONORAN	INTERIOR RIPARIAN DECIDUOUS FORESTS AND WOODLANDS; SONORAN RIPARIAN DECIDUOUS FOREST AND WOODLANDS	Riparian obligate raptors, nesting primarily along perennial drainages with mature gallery forests of broadleaf deciduous trees. Favor continuous flowing streams less	This species is present in the Proposed Action Area. Significant impacts to the species are unlikely. The Proposed Action will have no effect on long-term population trends within TNF.

Proposed Action Impact Analysis for TNF Migratory Bird Priority Species of Concern

Species	TNF Vegetation Type Designation	Brown's (1994) Biotic Community Equivalent	Habitat Preferences*	Potential Habitat and Disturbance Impacts
	RIPARIAN DECIDUOUS FOREST AND WOODLANDS		than 8 inches deep with low to moderate gradients and riffles, runs, and pools. Need abundance of low, streamside perches such as boulders, logs, and branches.	
NORTHERN BEARDLESS-TYRANNULET *(CAMPTOSTOMA IMBERBE)*	INTERIOR RIPARIAN DECIDUOUS FORESTS AND WOODLANDS; SONORAN RIPARIAN DECIDUOUS FOREST AND WOODLANDS	INTERIOR RIPARIAN DECIDUOUS FORESTS AND WOODLANDS; SONORAN RIPARIAN DECIDUOUS FOREST AND WOODLANDS	Primarily inhabit fairly open riparian woodlands, including lower canyons and heavily wooded dry washes. The dominant tree species are Fremont cottonwood and Goodding's willow stands.	This species is present in the Proposed Action Area. Significant impacts to the species are unlikely. The Proposed Action will have no effect on long-term population trends within TNF.
YELLOW WARBLER (*DENDROICA PETECHIA)*	INTERIOR RIPARIAN DECIDUOUS FORESTS AND WOODLANDS; SONORAN RIPARIAN DECIDUOUS FOREST AND WOODLANDS	INTERIOR RIPARIAN DECIDUOUS FORESTS AND WOODLANDS; SONORAN RIPARIAN DECIDUOUS FOREST AND WOODLANDS	Closely associated with moisture-loving deciduous trees dominated by cottonwood and willow. Areas often include a dense understory of deciduous saplings, seep willow, and mesquite.	This species is present in the Proposed Action Area. Significant impacts to the species are unlikely. The Proposed Action will have no effect on long-term population trends within TNF.

* SOURCES:

LATTA, M.J., C.J. BEARDMORE, AND T.E. CORMAN, 1999. ARIZONA PARTNERS IN FLIGHT BIRD CONSERVATION PLAN. VERSION 1.0. NONGAME AND ENDANGERED WILDLIFE PROGRAM TECHNICAL REPORT 142. ARIZONA GAME AND FISH DEPARTMENT. PHOENIX, ARIZONA.

CORMAN, T.E. AND C. WISE-GERVAIS. 2005. *ARIZONA BREEDING BIRD ATLAS.* UNIVERSITY OF NEW MEXICO PRESS. ALBUQUERQUE, NEW MEXICO.

United States Department of the Interior
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In reply refer to:
AESO/SE
02EAAZ00-2012-I-0319

September 4, 2012

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Mr. Gregory D. Dunn
Tonto Basin Ranger District
28079 North Arizona Highway 188
Roosevelt, Arizona 85545

Re: Boneyback Allotment

Dear Mr. Dunn:

Thank you for your correspondence of June 22, 2012, received on June 28, 2012. Additional information was provided via two emails on August 17, and August 22, 2012, by your staff. This letter documents our review of the Biological Assessment and Evaluation for Boneyback Allotment Management Area, in the Tonto Basin Ranger District, of the Tonto National Forest, Gila County, Arizona, in compliance with section 7 of the Endangered Species Act of 1973 (ESA) as amended (16 U.S.C. 1531 et seq.). The Forest Service requests our concurrence that the proposed project may affect, but is not likely to adversely affect the southwestern willow flycatcher (*Empidonax traillii extimus*), and the critical habitat for the spikedace (*Meda fulgida*). We concur with your determinations and provide our rationales below for the southwestern willow flycatcher and spikedace critical habitat. The Forest Service also requested conservation recommendations regarding the proposed species of the Northern Mexican gartersnake. A response to that request is below.

Description of the Proposed Action
A complete description of the proposed action is found in your June 22, 2012, biological evaluation and assessment (BAE), sent to our office the same day, and is included herein by reference.

The Boneyback Allotment is located in the Tonto Basin Ranger District of the Tonto National Forest. This allotment is approximately 6,800 acres in size with a range of elevation of 3,880 feet to 5,558 feet. The Tonto Basin Allotment borders the Boneyback Allotment on the north, south, and west sides. The east side is bordered by the Greenback Allotment.

A Holistic Resource Management Plan was implemented on the Boneyback Allotment in the 1980s. Under that plan, cattle were rotated between eleven paddocks and a holding pasture.

However, with current drought conditions, multiple paddocks are being grazed together. A table of the rotation schedule is in the BAE.

The proposed action will continue to authorize the grazing of up to 101 cattle year-round and 70 yearlings seasonally using the rotation between paddocks as described above. Additional actions described would be the repair of sections of fencing, the removal of electric fencing in the project area, and the potential construction of water developments. These water developments could include pipelines, tanks, and troughs. The cattle in the area would continue to be moved between the different paddocks, with monitoring done with each rotation. Use was described to be light to conservative, with 30-40% of the year's growth on herbaceous material and 50% or less on browse material. The proposed action would implement the use of adaptive management practices as described in Forest Service Handbook 2209, 13, Chapter 90.

DETERMINATION OF EFFECTS

Southwestern Willow Flycatcher & It's Critical Habitat

We concur with your determination that the proposed action may affect, but will not likely adversely affect the Southwestern Willow Flycatcher, or its habitat. We base our concurrence on the following:

- There is no known nesting habitat on the Boneyback Allotment. The Tonto National Forest notes that portions of Greenback Creek might have the potential to develop into suitable breeding habitat, but believe that the area is too narrow. We concur with this statement given that breeding birds are typically found on larger, broader floodplains.

- No grazing will occur within occupied flycatcher habitat or critical habitat. Nor will grazing occur within two miles of occupied flycatcher habitat during the breeding season. The nearest occupied habitat occurs in patches north of Punkin Center, two miles south of the allotment in Tonto Creek. We therefore do not anticipate adverse indirect effects from cowbirds and parasitism, or adverse direct affects due to disturbance.

- Given the proximity of this allotment to Tonto Creek and Roosevelt Lake, a known nesting location, it is probable that migration and dispersal of southwestern willow flycatchers will occur in brief increments. Given the short time frames of these events, the broad range of habitat believed to be used during migration and dispersal, and the use of adaptive management practices, we believe that adverse effects will be insignificant and discountable due to their infrequency, and short duration.

- The Boneyback Allotment is a small allotment of 6,800 acres. It encompasses a small proportion of Greenback Creek, and is northwest of Roosevelt Lake. Because of its small acreage, and use of an adaptive management plan in rotating the cattle, effects to the Tonto Creek watershed will be insignificant and discountable.

Spikedace Critical Habitat

In developing the critical habitat designation for spikedace, we identified areas occupied at listing, and retained segments that contained Primary Constituent Elements (PCEs) that supported the life history functions essential to the conservation of the species, as well as stream segments not known to have been occupied at listing but that were within the historical range of the species and were essential to the survival and conservation (i.e., recovery) of the species. On the Tonto National Forest, the critical habitat designation includes portions of Tonto, Rye, Greenback, Spring, and Rock creeks. According to the BA, the Boneyback Allotment includes 1.2 miles of the critical habitat designation on Greenback Creek.

As noted in the final rule (77 FR 10810) essential areas are those that serve as an extension of habitat within the geographic area of an occupied unit, or that expand the geographic distribution of the species within unoccupied areas within its historical range. Spikedace are currently limited to approximately 10 percent or less of their historical range. Spikedace records in the Salt River system, which includes Tonto Creek and its tributaries, are limited. In evaluating areas to include within the critical habitat designation, we included not only those that are currently occupied, but also those that are within their historical range and are essential to the survival and recovery of the species. These essential areas will serve as an extension of habitat within the geographic area of an occupied unit, or, as is the case with Greenback Creek, will help to expand the geographic distribution of the species within unoccupied areas within its historical range. Because of its reduced current distribution, identifying areas that are currently unoccupied, but that have one or more of the PCEs is necessary to ultimately reach delisting and recovery.

A recovery team has been formed to modify the existing recovery plan for the species. No criteria have yet been developed, but we preliminarily believe that areas like Tonto Creek and its tributaries will be necessary to restore spikedace to a larger portion of its historical range. Because water is limited in the desert southwest, suitable habitat is limited, and streams like Tonto Creek or its tributaries, which contain one or more of the PCEs, are important to the survival and conservation of the species. We therefore consider impacts to critical habitat carefully for each proposed project.

After reviewing the potential impacts of the proposed action, we concur with your determination that the proposed action "may affect, but is not likely to adversely affect" spikedace critical habitat for the following reasons:

- There is limited cattle access to some portions of critical habitat designated along Greenback Creek due to the presence of canyon walls or boulders. Cattle use of some portions of the critical habitat is limited due to the steep terrain and the lack of shade and water. The Forest Service has determined that those portions of the critical habitat from Lime Springs downstream to Devils Canyon therefore receive little to no use by cattle.

- For those portions of critical habitat downstream of Devils Canyon, the terrain is steep, and cattle use is therefore also limited.

- The Forest Service has determined that upland range conditions are fair to good, and the allotment has been grazed lightly for 15 years, never meeting utilization levels of 30 to 40 percent.

- The proposed action involves grazing at 30 to 40 percent, and the Forest Service has indicated that interim monitoring will be completed in pastures that would affect critical habitat so that cattle will be moved at or prior to reaching utilization levels, rather than after utilization levels have been met.

- The combination of fair to good range conditions, paired with interim monitoring, will enable the Forest Service to determine if the proposed action is resulting in any unanticipated affects to critical habitat.

- The Forest Service has developed desired conditions that include achieving at least 80% of the potential riparian over-story crown coverage; achieving at least 50% of the cottonwood-willow and mixed broadleaf by 2030; and rehabilitating at least 80% of the potential shrub cover in riparian areas through the use of appropriate grazing systems and methods.

- The Forest Service has determined that initial stocking would be seventeen head of cattle (sixteen cows, one bull) and would increase through carryover of calves or purchase of new animals only as resource conditions allow.

- The Forest Service has committed to using an adaptive management approach, so that if any undesirable impacts occur, they will amend the intensity, timing, numbers, frequency, and/or duration of the proposed action.

- The Forest Service will analyze any future water developments separately and address the potential for them to spread nonnative aquatic species at that time.

Recommended conservation measures for the Northern Mexican gartersnake would predominantly be aggressive management of harmful nonnative species like bullfrogs, crayfish, and spiny-rayed nonnative fish. It has been observed that the Northern Mexican gartersnake can be resilient to vegetation changes due to grazing when nonnative species are absent, or are maintained at low enough levels that allow for effective recruitment of snakes in the population. A further measure would be to retain a protective capacity of existing vegetation within 300 feet of the water channel.

Thank you for your continued coordination. No further section 7 consultation is required for this project at this time. If project plans change, or if information on the distribution or abundance of listed species or critical habitat becomes available, this determination may need to be reconsidered. In all future correspondence on this project, please refer to the consultation number 02EAAZ00-2012-I-0319. We also encourage you to coordinate the review of this project with the Arizona Game and Fish Department.

Mr. Gregory D. Dunn 5

If you require further assistance or if you have any questions, please contact Nichole Engelmann (x237) or Debra Bills (x239).

Sincerely,

for Steven L. Spangle
Field Supervisor

cc: Chief, Habitat Branch, Arizona Game and Fish Department, Phoenix, AZ
Regional Supervisor, Arizona Game and Fish Department, Tucson, AZ
Assistant Field Supervisor, Fish and Wildlife Service, Tucson, AZ
Director, Environmental Programs, Bureau of Indian Affairs, Tucson, AZ

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APPENDIX C-DEFINITIONS

Definitions as provided in FSH 2209.13, Chapter 90

Adaptive Management is a formal, systematic, and rigorous approach to learning from the outcomes of management actions, accommodating change, and improving management. See Figure 1.

Reference: Nyberg, J.B., Forest Practices Branch, BC Forest Service. An Introductory Guide to Adaptive Management For Project Leaders and Participants, January 1999.

Apparent Trend. An interpretation of trend based on observation and professional judgment at a single point in time.* An assessment, using professional judgment, based on a one-time observation. It includes consideration of such factors as plant vigor, abundance of seedlings and young plants, accumulation or lack of plant residues on the soil surface, and soil surface characteristics (i.e. crusting, gravel pavement, pedestalled plants, and sheet or rill erosion). Interagency Technical Reference 1734-4

Benchmark. A permanent reference point, in range inventory and effectiveness (trend) monitoring, it is used as a point where changes in vegetation, in response to applied management through time, are measured. Adapted from "A Glossary of Terms Used in Range Management." Forth Edition, edited by the Glossary Update Task Group, Society for Range Management, Thomas E. Bedell, Chairman. 1998. Second Printing 2003.

Deferment. The delay of grazing to achieve a specific management objective. A strategy aimed at providing time for plant reproduction, establishment of new plants, restoration of plant vigor, a return to environmental conditions appropriate for grazing, or the accumulation of forage for later use. *

Deferred Grazing. The deferment of grazing in a non-systematic rotation with other land units. *

Deferred-Rotation. Any grazing system, which provides for a systematic rotation of the deferment among pastures. *

Desired Conditions. Descriptions of the social, economic and ecological attributes that characterize or exemplify the desired outcome of land management. They are aspirational and likely to vary both in time and space. Adapted from: *Foundations of Forest Planning: Volume 1(Version 2.0) Model of a Forest Plan*. USDA Forest Service, January 2005

Ecological Site (ES) is a kind of land with specific physical characteristics which differs from other kinds of land in its ability to produce distinctive kinds and amounts of vegetation and its response to management.* Also refer to the National Range and Pasture Handbook, USDA, Natural Resources Conservation Service, page 3.1.

Ecological Site Description (ESD) ESDs contain information about soil, physical features, climatic features, associated hydrologic features, plant communities possible on the site, plant community dynamics, annual production estimates and distribution of production throughout the year, associated animal communities, associated and similar sites, and interpretations for management. ESDs are narratives and map units containing ecological sites. Many ESDs also have State and Transition Models developed for them. Refer to the National Range and Pasture Handbook, USDA, Natural Resources Conservation Service, page 3.1-1.

Ecological Type is a category of lands with a distinctive (i.e., mappable) combination of landscape elements. The elements making up an ecological type are climate, geology, geomorphology, soils, and potential natural vegetation. Ecological types differ from each other in their ability to produce vegetation and respond to management and natural disturbances. (Terrestrial Ecological Unit Inventory Technical Guide: Landscape and Land Unit Scales, USDA Forest Service, Gen Tech Report WO-68, 2005)

Ecological Units. Map units designed to identify land and water areas at different levels of resolution based on similar capabilities and potentials for response to management and natural disturbance. These capabilities and potentials derive from multiple elements: climate, geomorphology, geology, soils and potential natural vegetation. Ecological units should, by design, be rather stable. They may, however, be refined or updated as better information becomes available. (Terrestrial Ecological Unit Inventory Technical Guide: Landscape and Land Unit Scales, USDA Forest Service, Gen Tech Report WO-68, 2005)

Frequency (as a management tool) refers to the number of times forage plants are defoliated during the grazing period. Reed Floyd, Roy Roath, and Dave Bradford. 1999. The Grazing Response Index: A Simple and Effective Method to Evaluate Grazing Impacts. *Rangelands* 21(4): 3-6.

Frequency (as a measurement for trend) The ratio between the number of sample units that contain a species and the total number of sample units.*

Grazing Intensity is the degree of herbage removed through grazing and trampling by livestock. Grazing intensity may be described in terms herbage removed during the grazing and/or growing period or as a utilization level at the end of the growing period. It is important to clearly define how intensity is being viewed and described. Removal of leaf material, when the plant is actively growing can affect root growth which in turn affects future leaf growth. Sufficient leaf area is essential to support plant functions through photosynthesis. Heavy to severe intensity or utilization can affect current plant development and growth, as well as growth during subsequent growing seasons.

Grazing Intensity is discussed by Holechek (Reference 1 below):

> **Light**- Only choice plants are used. There is no use of poor forage plants. The range appears practically undisturbed.

Moderate- About ½ of the good and fair forage value plants are used. There is little evidence of livestock trailing and most of the accessible range shows some use.

Heavy- Range has a clipped or mowed appearance. Over half of the fair and poor value forage plants are used. All accessible parts of the range show use and key areas are closely cropped. They may appear stripped if grazing is very severe and there is evidence of livestock trailing to forage.

The above descriptions may be especially helpful when reviewing grazing during the growing season.

Additional qualitative assessment of grazing intensity can be determined using the Landscape Appearance Method. It can be found in the Interagency Technical Reference 1734-3 *Utilization Studies and Residual Measurements.* Page 119.

Grazing Intensity as depicted as a utilization level at the end of the growing season as discussed by Holechek, (Reference 2 below):

Light to non-use	0-30 percent
Conservative	31-40 percent
Moderate	41-50 percent
Heavy	51-60 percent
Severe	61+ percent

References: (1) Holechek, Jerry L., Rex D. Pieper, and Carlton H. Herbel. 2004. Range Management, Principles & Practices. Prentice Hall, page 248.

(2) Holechek, Jerry L. and Dee Galt. 2000. Grazing Intensity Guidelines. *Rangelands* 22(3): 11-14.

An additional qualitative grazing assessment and planning tool is the Grazing Response Index (GRI). Reed Floyd, Roy Roath, and Dave Bradford. 1999. The Grazing Response Index: A Simple and Effective Method to Evaluate Grazing Impacts. *Rangelands* 21(4): 3-6.

Grazing Occurrence is how often a given area is grazed. How often a pasture is exposed to grazing or rested from grazing provides for different responses within the plant community due to differing opportunities for plant recovery.

Grazing Period is defined as the length of time grazing livestock or wildlife occupies a specific land area. * The length of time a pasture is exposed to grazing affects many variables such as potential for regrowth of plant material, soil impacts and animal behavior. The grazing period influences the intensity of grazing and the frequency of grazing. It can also influence items tied to animal behavior such as trailing, and trampling such as between loafing and watering areas.

APPENDIX D- RIPARIAN MONITORING DATA

Summary of field visits for Boneyback Allotment.

Pasture	Stream Name	Date	Stream Type	Condition	Comments
Paddock 11	Greenback Creek- from ranch to Devils Canyon	7/14/2011			The creek had little impacts visible from the recent grazing pressure, and appeared to be in excellent condition. Recent floods in the local area have devastated other creeks, but Greenback Creek has shown remarkable resilience to this flooding event.
	Greenback Creek- from ranch to Devils Canyon	10/29/2009	B		Vegetation is robust and diverse and includes mature cottonwood, willow, sycamore, and ash in the overstory and a variety of seedlings and saplings. Herbaceous vegetation is abundant and diverse and includes sedges, rushes, spikerush, cattail, Bermuda grass, deergrass and forbs.
	Greenback Creek- from ranch to Devils Canyon	5/30/2002			The purpose of the trip was to discuss Eddie Conway's rotations and have him explain fences. We GPS'ed all fence locations and mapped water gaps.
	Greenback Creek- from ranch to Devils Canyon	10/18/2000	F6	Impaired	The channel is wide and shallow. Floodplains are bermuda with a few young sycamores. Past use on woody vegetation was high
	Greenback Creek- from ranch to Devils Canyon	7/19/1993	D5		Channel primarily braided. Grazing on herbaceous component moderately adverse, but woodys not too badly grazed.
	Greenback Creek-above Lime	7/14/1993	D2		Sycamore, baccharis, burro-bush plants

Pasture	Stream Name	Date	Stream Type	Condition	Comments
	Springs				grazed.
	Greenback Creek-below Lime Springs	7/14/1993	F4		Bimodal silt and cobble.
Paddock 3	Oak Creek	10/13/2011	F with B	Unstable	This channel got blown out in the fall 2010 flood. Spotty deergrass, lots of sycamore seedlings.