BIOLOGICAL EVALUATION

Copper Creek Allotment
Yavapai County, Arizona

USDA Forest Service
Tonto National Forest
Cave Creek Ranger District

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April 2017

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Introduction

The Tonto National Forest (Tonto NF), Cave Creek Ranger District (District) proposes to issue a grazing lease/permit renewal and decision to provide area-specific direction and management actions for the Copper Creek Allotment in the southeastern portion of Yavapai County, Arizona.

The Tonto NF proposes to authorize livestock grazing on the Copper Creek Allotment in a manner that is consistent with the Forest Plan standards, guidelines, and objectives, and maintains or improves natural resources. The proposed action includes permitting 200 to 500 cattle (2,400 to 6,000 animal unit months[1] (AUMs)) annually, and up to 250 yearlings (2,700 AUMs) for natural increase from January 1 to May 5 annually. The allotment consists of roughly 34,670 acres with elevations ranging from 3,400 feet near the south end of Perry Mesa to approximately 5,800 feet in the northeast portion of the allotment. Mean annual precipitation on the allotment is about 14 inches.

This action is needed to analyze existing environmental conditions and expected effects of continued livestock grazing on Copper Creek Allotment. Suitability of these lands for livestock grazing is documented in the Tonto National Forest Land and Resource Management Plan (LRMP) (1985 as amended). The proposed action includes adaptive management strategies and the addition of water developments and exclosure fences which would be incorporated into the subsequent Allotment or Coordinated Resource Management Plan. These strategies and structural improvements are designed to maintain or improve existing conditions.

This biological evaluation (BE) has been completed to analyze the effects of a no grazing alternative and action alternative on sensitive species and their associated habitats on the Copper Creek Allotment, Cave Creek Ranger District, Tonto National Forest (Tonto NF).

Permitted grazing on the Tonto NF is authorized by public law as implemented by Tonto NF Land and Resource Management Plan, as amended (LRMP) (USFS 1985). The LRMP provides guidance and direction for a 10-15 year period. It establishes goals, objectives, and standards and guidelines for multiple-use and sustained yield management of renewable resources.

Purpose of and Need for Action

The Copper Creek Allotment is a priority for completing grazing allotment planning in conformance with the requirements of the National Environmental Policy Act on the Cave Creek Ranger District. Completing this effort on time and to standard is essential. Tonto National Forest Land Management Plan (Forest Plan) identifies the Copper Creek Allotment as suitable for domestic livestock. The purpose of this action is to consider livestock grazing opportunities on public lands where consistent with management objectives. In addition, per Forest Service Handbook 2209.13, Chapter 90, section 92.22, the purpose of this action is to authorize livestock grazing in a manner consistent with direction to move ecosystems towards their desired conditions.

[1] The amount of forage needed by an "animal unit" (AU) grazing for one month. The quantity of forage needed, based on the cow's weight, and the animal unit is defined as one mature 1,000 pound cow and her suckling calf. It is assumed that such a cow nursing her calf will consume 26 pounds of dry matter of forage per day.

Authorization is needed on this allotment because:

- Where consistent with other multiple use goals and objectives, there is Congressional intent to allow grazing on suitable lands (Multiple Use Sustained Yield Act of 1960, Wilderness Act of 1964, Forest and Rangeland Renewable Resources Planning Act of 1974, Federal Land Policy and Management Act of 1976, National Forest Management Act of 1976).
- This allotment contains lands identified as suitable for domestic livestock grazing in the Tonto National Forest Plan and continued domestic livestock grazing is consistent with the goals, objectives, standards, and guidelines of the Forest Plan (Forest Plan, pages 24, 91 - 118).
- It is Forest Service policy to make forage available to qualified livestock operators from lands suitable for grazing consistent with land management plans (FSM 2203.1; 36 CFR 222.2 (c)).
- It is Forest Service policy to continue contributions to the economic and social well-being of people by providing opportunities for economic diversity and by promoting stability for communities that depend on range resources for their livelihood. (FSM 2202.1)

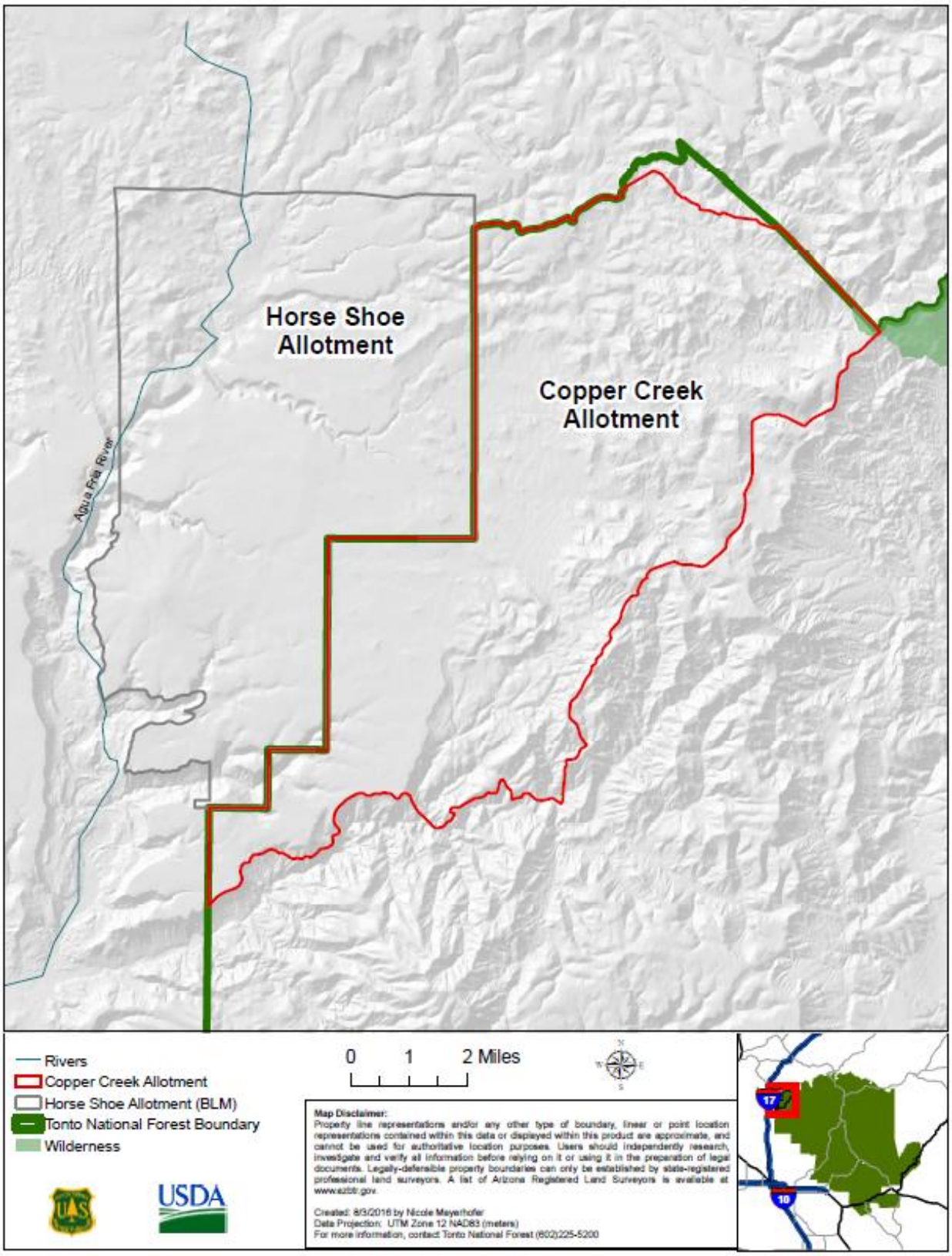
Additionally, there is a need to coordinate management of the Copper Creek Allotment with the adjacent Horseshoe Allotment (Bureau of Land Management (BLM)) and allow for flexibility in scheduling pasture use and rest periods to meet resource objectives across the two allotments. As part of a collaborative management approach, and consistent with objectives described in the Forest Plan, range and wildlife habitat improvements are needed to facilitate livestock distribution and provide reliable waters for wildlife in the area.

Description of the Action Area

Copper Creek Allotment consists of approximately 35,000 acres in southeast Yavapai County, 50 miles north of Phoenix, Arizona (Figure 1). It is located at the northwest end of the Cave Creek Ranger District of the Tonto National Forest. Copper Creek consists primarily of five pastures: Bobcat, Brooklyn, Cornstalk, Granite-Mesa Butte, and Perry Mesa. Vegetation on the allotment is dominated by a tobosa grassland on Perry Mesa and semi desert grassland and desert scrub in the lower elevations. There are approximately 17,200 acres of interior chaparral, 14,000 acres of semi-desert grassland, 2,600 acres of Sonoran desert scrub, 870 acres of great basin conifer woodland (USFS, 1985) (Figure 1). Small areas of riparian vegetation occur in some drainages.

Topographical features range from nearly level mesa tops in the southwest to rolling hills in the north and steep mountains in the west. Elevations range from approximately 3,000 feet near the south end of Perry Mesa to 5,800 feet in the northeast portion of the allotment. Mean annual precipitation is about 14 inches (USDI, BLM 2014).

Figure 1: Location of the Copper Creek Allotment on the Tonto National Forest and BLM Horseshoe Allotment.



Allotment Background

Historically, a portion of the Copper Creek Allotment was part of the Tangle Creek Sheep Driveway from the area of present day north Phoenix to the Prescott National Forest. The driveway was used to trail bands of sheep to the high country in spring and back to the desert in fall. The area was also used by cattle at the time and resulted in higher grazing levels than currently authorized. The driveway has not been used since the 1970s, and there is no longer any permitted sheep grazing currently on the Cave Creek Ranger District.

Copper Creek was used as a winter sheep range until 1948 when permitted use was converted to cattle. From 1960 through 1994, Copper Creek was under permit to the Wingfields of the Horseshoe Ranch. The Wingfields also operated the neighboring Horseshoe allotment, formerly of the Arizona State Land Department (ASLD) and currently on Bureau of Land Management (BLM) land. During this period, they ran between 700 and 800 head of cattle between the Horseshoe and Copper Creek Allotments. In 1994, CTW Cattle Company acquired the Copper Creek permit and grazed up to 1,350 yearlings in the winter. In 1998, the permit was modified and permitted livestock numbers allowed 450-500 adult cattle yearlong and 375-950 yearlings from October 15 to May 15. Yearling numbers were adjusted in response to winter precipitation and available forage on the allotment. In 2004, the permit was waived to Red Mountain Mining. Approximately 270 adult cattle grazed from 2004-2005.

In 2005 the Cave Creek Complex fire (Complex fire) burned 243,800 acres of the Cave Creek Ranger District including most of the Copper Creek Allotment. After the fire, cattle were removed and the allotment was put into non-use for resource protection and development while conditions on the allotment improved. Cattle were restocked on Copper Creek in 2012 when the permit changed hands to JH Grassfed Inc. Since 2012, there have been 170 to 285 adult cattle on the allotment.

In the mid-1990s, a Coordinated Resource Management Plan (CRMP) was proposed that would allow Copper Creek to be grazed in conjunction with Bureau of Land Management's (BLM) adjacent Horseshoe allotment to the west. The goal of the CRMP was to achieve desired conditions for this portion of the Aqua Fria Grassland by running one livestock operation with a common herd of cattle across the two allotments on the Tonto National Forest and BLM lands. With implementation of the CRMP, it was anticipated that conditions would improve by allowing the livestock operator to have greater flexibility in grazing patterns and stocking levels.

An environmental assessment was completed in 1997 to evaluate the effects of implementing the CRMP under the National Environmental Policy Act (NEPA) (Environmental Assessment #AZ-024-95-60: "Horseshoe/Copper Creek Allotments Coordinated Resources Management Plan".) That same year the Decision Notice (DN) was signed by both the Forest Service and BLM. The resulting CRMP for Copper Creek Allotment was signed in spring of 1998. Since the CRMP was implemented in 1998, the Copper Creek and Horseshoe Allotments have been run as a single operation. The Forest Service, BLM, and permittees are partners in the implementation of the grazing plans.

Grazing Management Prescribed by the 1998 CRMP

The 1998 CRMP grazing management called for a cow/calf herd that utilized both allotments with Copper Creek occupancy typically between October and April. It was anticipated calves would use the rougher portion of the allotment. Younger cattle, generally more agile than mature cows, will graze more

uniformly over steeper terrain (Vallentine, 1990). Bobcat and Granite-Mesa pastures have riparian areas and limited water in the uplands so livestock were limited in these pastures to winter use when there is more available water, November 1 to March 1. Because of the Copper Creek riparian area and limited water in the pasture, Cornstalk pasture was scheduled for grazing 1.5-2 months, 4 years out of 5, between February and May. Perry Mesa pasture was scheduled 4 years out of 5, for 3-4 months, typically between spring and fall and alternating the month cattle entered the pasture annually. Brooklyn pasture was used by yearlings annually between March and May. Pasture moves were planned with consideration of prescribed burning on the Aqua Fria Grassland. Pastures that fell within planned burn areas, would be rested January through July prior to burning and then one growing season post burning. Cow/calf numbers were planned for a sustained herd of 500 head yearlong although herd numbers could fluctuate from 375 to 950 adult cattle depending on current conditions.

Annual Operating Instructions

Every year annual operating instructions (AOI) are developed in coordination with the permittee. The AOIs are within the bounds and constraints of the original 1997 EA and is guided by the CRMP. However, because the NEPA decision was to implement the CRMP and the CRMP had specific dates, schedules, and limitations on when certain pastures could be used, the recent AOIs are outside of these specific timelines for pastures used. The most recent AOIs have been developed within revised policy (FSH 2209.13 Chapter 90) that administratively authorizes additional flexibility in grazing schedules within specific utilization standards that have been held to for this allotment. These authorized numbers are different than what is authorized in the 1997 EA. The current permittee's herd size has ranged from 170 to 285 adult cattle. Numbers have increased as the permittee continues to develop their ranching operation.

Grazing Permit

In 2015, a 10-year grazing permit for BLM's Horseshoe allotment was issued to the sub lessee of the Horseshoe Ranch, who is the preferred applicant for grazing privileges on the Horseshoe and Copper Creek Allotments. Since 2012, the same permitee has been issued a temporary grazing permit (annually) for Copper Creek with permitted numbers based on what is authorized in the 1997 Decision Notice. **Error! Reference source not found.** shows the animal unit months (AUMs) and duration of authorized use for both the Horseshoe and Copper Creek Allotments under the current grazing permits. Base property is not owned by the current livestock operator. As a result they have been unable to obtain a term grazing permit and have been operating under a temporary grazing permit since 2012 (FSM 2231.22a).

Table 1: Current Permitted AUMs.

Allotment	Begin Date	End Date	AUMs
Horseshoe	03/01	02/28	4572
Copper Creek	03/01	02/28	3420*

***Current permitted AUMs may vary annually with the temporary permit issued. These AUMs vary based on current range condition and may not exceed what is authorized in a previous NEPA decision, which is 6000 AUMs (or 500 adult cattle).*

Existing Conditions

Vegetation

Vegetation on the allotment is dominated by tobosa grassland on Perry Mesa to semi-desert grassland and desert scrub in the lower elevations. There are approximately 17,200 acres of interior chaparral, 14,000 acres of semi-desert grassland, 2,600 acres of Sonoran desert scrub, 870 acres of great basin conifer woodland (USFS, 1985) (Figure 2).

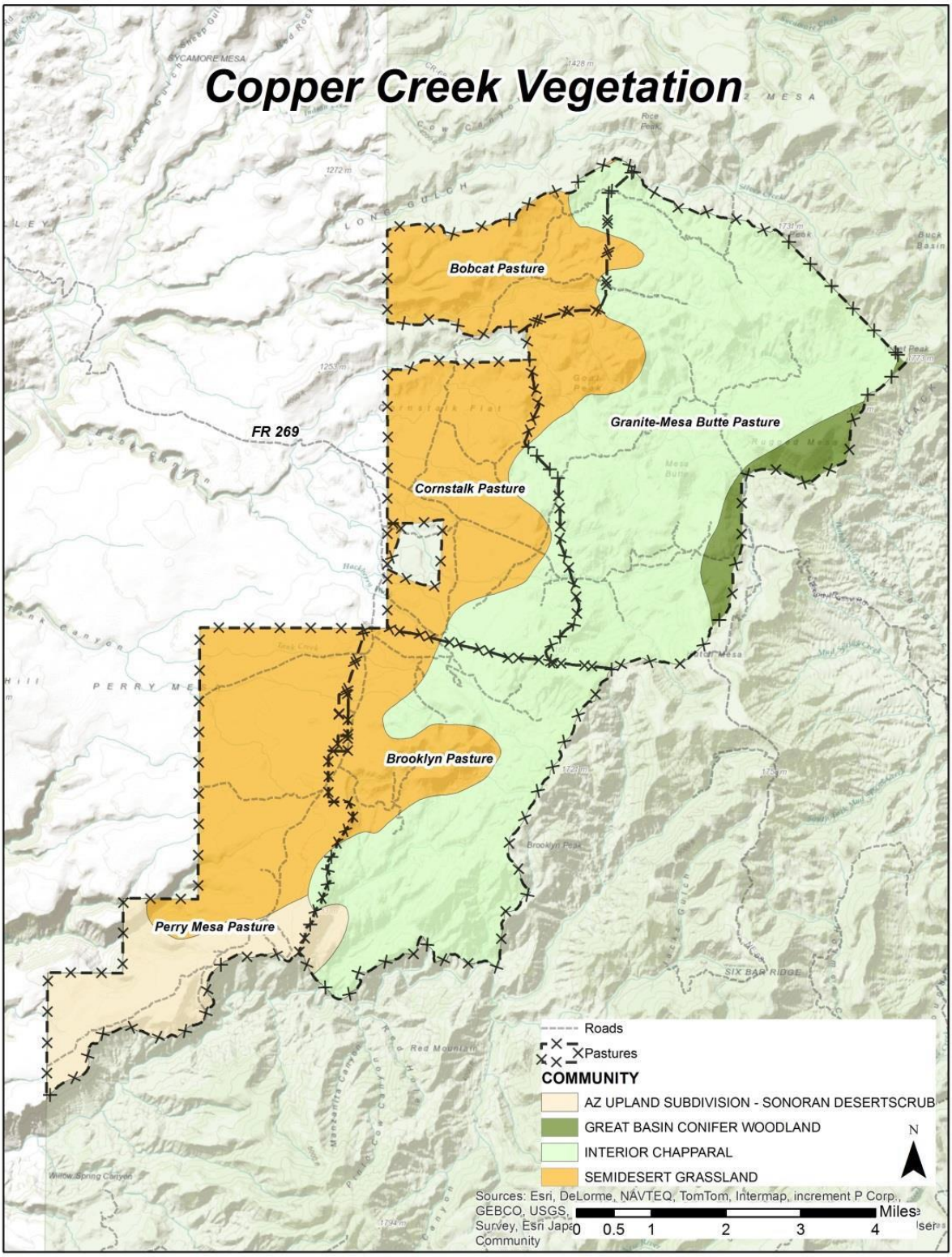
Interior chaparral: This vegetative community comprises generally the higher elevation areas on the east half of the allotment. Vegetation is characterized by evergreen shrubs, the dominant being juniper (*Juniperous spp.*) and shrub live oak (*Quercus turbinella*). Other common shrubs include catclaw acacia (*Acacia greggi),* wait-a-minute bush (*Mimosa biuncifera),* sugar sumac *(Rhus ovata),* skunkbush sumac (*R. trilobata),* and algerita (*Berberis trifoliata)*. Upland perennial grasses include side oats grama (*Bouteloua curtipendula)*, curly mesquite (*Hilaria belangeri)*, black grama (*B. eriopoda),* hairy grama (*B. hirsuta),* squirreltail (*Elymus elymoides)* and threeawn species (*Aristida spp.).*

Semi-desert grassland: Largely making up the west half of the allotment, this community is dominated by warm season perennial grasses. Predominant species include tobossa (*Pleuraphis mutica),* side oats grama (*B. curtipendula),* curly mesquite (*H. belangeri),* black grama (*B. eriopoda),* hairy grama (*B. hirsuta),* and threeawn species (*Aristida spp.).* Wild oat (*Avena fatua)* is a non-native annual grass that is found in much of the range to the west. Common shrubs and sub-shrubs species include mesquite (*Prosopis veluntina),* false mesquite (*Calliandra eriophylla)*, globe mallow (*Sphaeralcea ambigua),* Wright's buckwheat (*Eriogonum wrightii)*, snakeweed (*Gutierrezia spp.),* and prickly pear cactus (*Opuntia engelmannii).* The south end of this community is predominately tobosa grassland, extending from FR 269 (Bloody Basin Road) to the south end of Perry Mesa. These species and their distribution is typical for this vegetation type.

Sonoran desert scrub: Located at the south end and lowest elevation in the allotment, this community is dominated by mesquite (*P. veluntina),* paloverde (*Parkinsonia spp.)* prickly pear cactus (*O. engelmannii),* snakeweed (*G. spp)* and desert senna (*Senna covesii).* Grasses include curly mesquite (*H. belangeri),* hairy grama (*B. hirsuta),* and threeawn species (*Aristida spp.).* These species and their distribution is typical for this vegetation type.

Great basin conifer woodland: This community makes up a relatively small part of the allotment at the east boundary, primarily in the Rugged Mesa area, species present in this are juniper (*Juniperous spp.*) emory oak (*Quervus emoryi),* and alligator juniper (*J. deppeana).* Grasses include side oats grama (*B. curtipendula),* hairy grama (*B. hirsuta),* and squirrel tail (*E. elymoides).* These species and their distribution is typical for this vegetation type.

Figure 2: Copper Creek Vegetation Type.



Riparian: Found in steep drainages and portions of intermittent washes, these areas are characterized by deergrass (*Muhlenbergia rigens)* sedges (*Scripus spp.)* and bermuda grass (*Cynodon dactylon)*. Freemont cottonwood (*Populus fremontii),* willows (*Salix spp.),* Arizona sycamore (*Platanus wrightii),* and Arizona ash (*Fraxinus velutina)* are typically found here. These species and their distribution is typical for this vegetation type.

Tributaries of the Agua Fria River on the allotment are Silver Creek, Bishop Creek, and Copper Creek and contain approximately 6.7 miles of riparian habitat on the allotment. Silver and Bishop Creeks have been impacted by sedimentation following the Complex fire. Copper Creek has not been affected by the fire to the extent Silver and Bishop Creeks experienced.

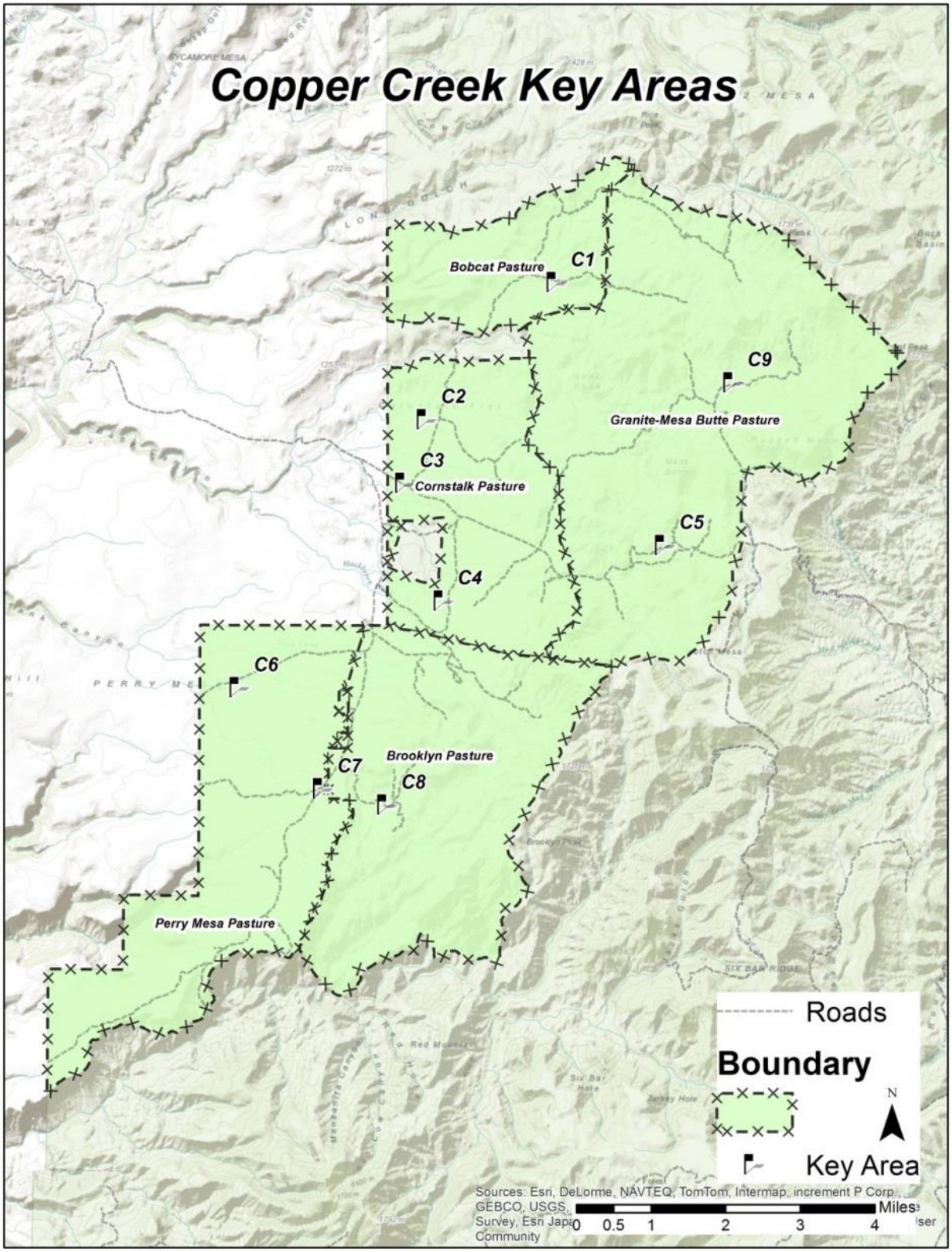
Copper Creek, Bishop Creek, and Silver Creek east of FR 677 experienced direct effects from the Complex fire. Indirect effects to all three areas have been experienced largely in the form of sedimentation and material deposition. Prior to the fire Silver Creek had perennial flow for approximately 0.5 mile upstream from the Forest boundary. Until recently no surface flow has been present due to sedimentation, primarily decomposed granite deposition.

Watershed and soil condition and erosion are key components to consider when assessing aquatic and terrestrial wildlife habitats. The Copper Creek allotment is largely relatively flat country with some rolling hills on the west and central portions and increases in elevation and slope on the eastern portions. Sedimentation of Silver and Bishop Creeks following the Complex fire is a result of steeper topography and resulting movement of granite and other materials into both creeks. Unfortunately low stream gradients with wide channel widths do not flush material as quickly as other systems.

Copper Creek has monitoring locations which are commonly referred to as key areas. These key areas are defined as a relatively small portion of a rangeland selected because of its' location, use, or grazing value as a monitoring reference point for grazing use (Holechek et al. 2004). Key areas are intended to be within a single ecological site or plant community, responsive to management actions, and indicative of the ecological site or plant community they are intended to represent (ITT 1996).
Key areas are utilized to collect implementation (long term) and effectiveness (short term) monitoring data. They are evaluated for plant composition, ground cover, frequency of perennial forage plants and vigor. These factors are rated to provide a summary rating for range, soil, and vegetation condition and trend. Existing conditions for range vegetative condition, soil/watershed condition and long term trend are compared to desired conditions. Desired conditions are optimal condition ratings for each site or key area that are in alignment with the Tonto National Forest Plan and management objectives (USFS, 1985).

Parker Three-Step monitoring sites (Parker Clusters) pace transects were established in key areas on the allotment in the mid-1950s and early 1960s (Figure 3). These sites provide historical data and are designed to measure long term vegetation condition, vegetation trend, soil stability, and soil trend. Vegetation trend usually refers to vegetative conditions based on available forage for livestock. Data at these sites were collected at various intervals between 1956 and 2014.

Figure 3: Key Area Locations.

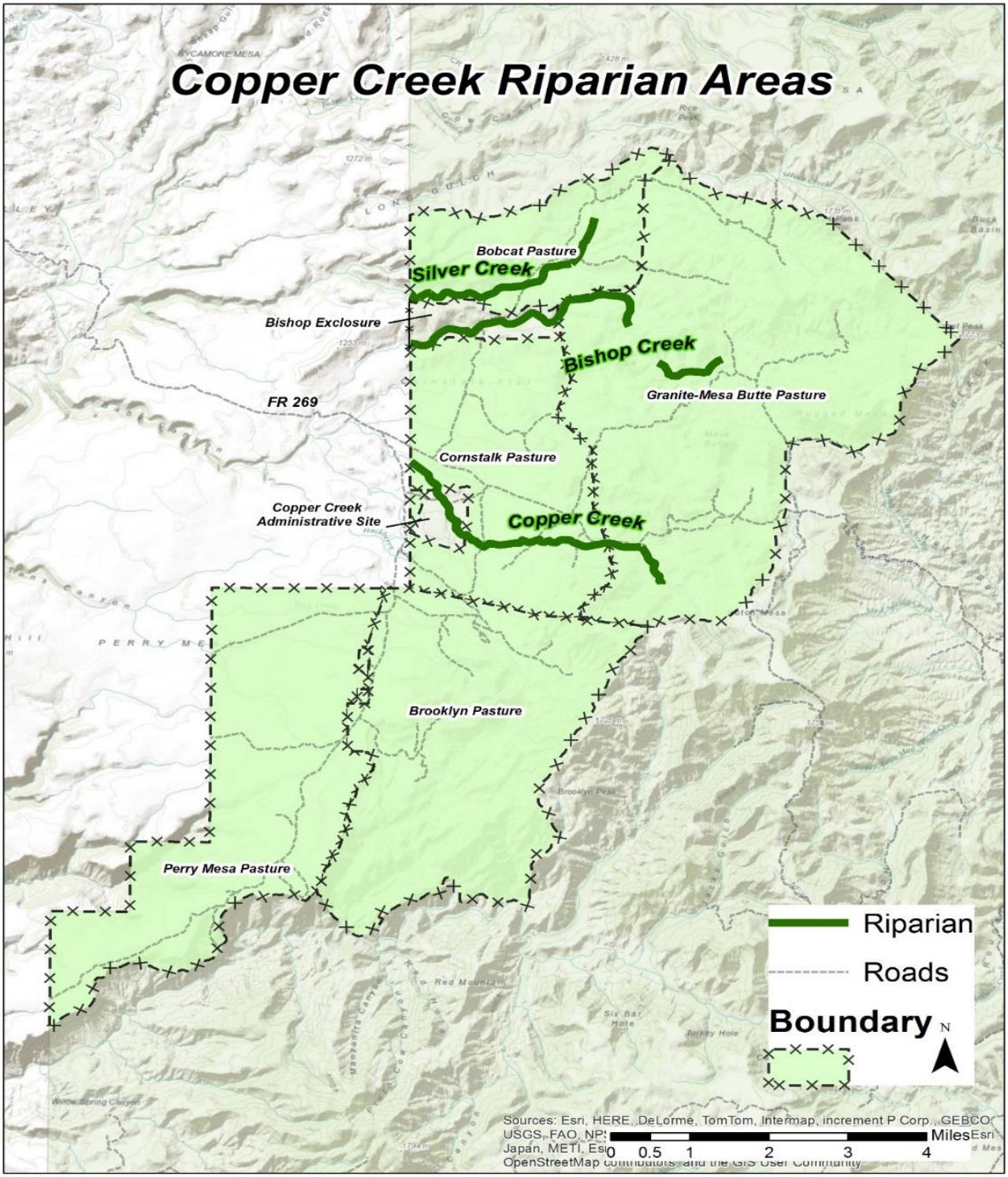


In 2013 the Cave Creek Ranger District began implementation of a relatively new FS monitoring protocol called Common Non-Forested Vegetation Sampling Procedures monitoring protocol (CNVSP). The intent of implementing this protocol was to collect additional rangeland data to better describe key areas. The CNVSP protocol combines several monitoring methods from the "Sampling Vegetation Attributes" and "Guide to Rangeland Monitoring and Assessment" to capture information on a variety of attributes including ground cover and vegetative species index/frequency list (ITT 1996a and Smith et al. 2005). CNVSP was implemented at key areas so legacy data from historic Parker Clusters could be assessed at the same locations. Because the CNVSP data has been collected a single time, there is insufficient data for analysis. However, these data may be used with future monitoring for better analysis.

Hydrology, Riparian, and Watershed

The existing condition of riparian areas can be affected by many factors, including historic and recent livestock grazing, roads, mining, fire suppression, wildfire, recreational activities, drought, and floods. The Complex fire occurred in June and July 2005 and burned most of the Copper Creek Allotment (USDA 2007). The upland soils of the watershed associated with the three creeks; Silver, Bishop, and Copper (Figure 4) developed from granitic parent material. When these soils are exposed as result of the referenced fire they erode into sand size particles. Post fire the sand particles were mobilized by high energy runoff events depositing into the creek channels. The upland watershed conditions have now improved and are stable. There will be a period of transition before the sand is displaced and the pre-fire channel morphology of cobble boulder returns.

Figure 4: Copper Creek Riparian Areas



Silver Creek

Silver Creek is an intermittent stream supporting 3.1 miles of riparian habitat across Bobcat pasture. The creek flows from east to west leaving the allotment and entering the Agua Fria National Monument (BLM). In 2015 the stream reach from FR 677 to the Agua Fria National Monument boundary was walked with conditions observed. There were pools present over approximately 5% of the reach length. The channel was embedded with sand size particles but the stream corridor was well vegetated with Arizona sycamore, Arizona ash, Fremont cottonwood, deergrass, Bermuda grass, and others including small areas of tamarisk. The riparian vegetation exhibited various age classes and recruitment is occurring. The vegetation is providing stability with recent flood debris deposited several feet up in the vegetation. This reach is functioning properly (Prichard et al. 1998) in relation to dissipation of stream energy.

Figure 5: Silver Creek downstream of the FR 677 crossing (March 2016)

Figure 6: Silver Creek looking downstream at Forest Service and Agua Fria National Monument boundary (February 2015).

Bishop Creek

Bishop Creek is an intermittent stream supporting 5.8 miles of riparian habitat starting in the Granite-Mesa Butte pasture and continuing through the Bishop Creek exclosure. The creek flows from east to west leaving the allotment and entering the Agua Fria National Monument. In 2015 the reach above the FR 677 crossing and the reach above the FR 1981 crossing were walked with conditions observed. The upper reach was flowing and there were intermittent pools in the lower reach. Much of the channel length is embedded with sand size particles but appeared to be stable. The riparian vegetation present includes Arizona sycamore, Arizona ash, Fremont cottonwood, deergrass and others supported in quantity by the intermittent system. The reaches were functioning properly (Prichard et al. 1998) in relation to dissipation of stream energy.

Figure 7: Bishop Creek upstream of FR 677 within livestock exclosure looking downstream (February 2015).

Copper Creek

Copper Creek is an intermittent stream supporting 4.5 miles of riparian habitat originating at Copper Spring in the Granite-Mesa Butte pasture and continuing into the Cornstalk pasture and eventually across the administrative site exclosure. The creek flows from east to west leaving the allotment and entering the Agua Fria National Monument. Much of the lower channel length is embedded with sand size particles but appeared to be stable. In the upper reach, in the vicinity of Copper Spring and below, the sand has scoured out returning the channel to a cobble boulder substrate. The riparian vegetation present includes Arizona sycamore, Arizona ash, Fremont cottonwood, deergrass and others supported in quantity by the intermittent system. The reaches are functioning properly (Prichard et al. 1998) in relation to dissipation of stream energy.

Figure 8: Copper Creek upstream of FR 586 looking upstream (February 2015).

Soils

The Copper Creek Allotment contains variable soil types due to the variety of parent materials, landforms, and natural processes which form them. Soils in the higher eastern portions of the allotment like the Rugged Mesa area have developed in basalt parent material. In the center of the allotment the soils in a strip trending north to south have developed from granitic sources exposed as result from erosion of the basalt. The western portion grasslands adjacent to the Agua Fria National Monument have developed from basalt.

The soils of the allotment were originally mapped and described in the North Tonto National Forest Terrestrial Ecosystem Survey (TES) Report (USDA 1985). The soils of the allotment are being updated to current standards in the Tonto's Terrestrial Ecological Unit Inventory (TEUI).

Soil Condition Monitoring

Soil quality assessment and monitoring (soil condition) is necessary to determine watershed condition and long-term soil productivity (FSH 2509.18-99-1). Soil condition monitoring is completed during the TEUI mapping process. It is an evaluation of soil quality based on an interpretation of factors which effect vital soil functions. These functions are: the ability of the soil to hold and release water (hydrologic function),

the ability of the soil to resist erosion and degradation (soil stability), and the ability of the soil to accept, hold and release nutrients (nutrient cycling).

Soils are evaluated and assigned a soil condition category, (satisfactory, impaired, or unsatisfactory), which is a reflection of soil function. These categories are defined as:

- Satisfactory – The soil indicators (hydrologic function, soil stability, and nutrient cycling) signify that soil function is being sustained and the soil is functioning properly and normally. The ability of the soil to maintain resource values and sustain outputs is high.
- Impaired – The soil indicators (hydrologic function, soil stability, and nutrient cycling) signify a reduction of soil function. The ability of soil to function properly has been reduced and/or there exists an increased vulnerability to degradation. An impaired category should signal land managers that there is a need to further investigate the ecosystem to determine causes and degrees of decline in soil functions. Changes in management practices or other preventative actions may be appropriate.
- Unsatisfactory - Indicators signify that loss of soil function has occurred. Degradation of vital soil functions result in the inability of soil to maintain resource values, sustain outputs, and recover from impacts. Soils rated in the unsatisfactory category are candidates for improved management practices or restoration designed to recover soil functions.

Soil condition data were collected at five locations on the Copper Creek Allotment in 2009 (Robertson et al. 2014). Forty percent of the sites were in satisfactory condition and sixty percent were in impaired condition. A field review of the allotment was conducted in February 2015. Soil condition was assessed at six of the key areas visited. In April 2015, soil condition assessments were completed at six additional representative locations on the allotment (Table 2). Soil condition was satisfactory at ten of the twelve sites, or approximately 83 percent. The sites in satisfactory condition were stable, had good soil structure, and had good cover of perennial grass. The sites at C4 and S1 were in impaired condition. The impaired ratings were a result of lack of soil stability and a reduction in nutrient cycling.

Table 2: Soil Condition Ratings

Location	Date	Pasture	TEUI Unit	Condition
C1	2015	Bobcat	435	Satisfactory
S6	2015	Bobcat	432	Satisfactory
C2	2015	Cornstalk	429	Satisfactory
C3	2015	Cornstalk	429	Satisfactory
C4	2015	Cornstalk	380	Impaired
T1	2009	Cornstalk	450	Satisfactory
T2	2009	Cornstalk	424	Impaired
C6	2015	Perry Mesa	380	Satisfactory
C7	2015	Perry Mesa	380	Satisfactory
T3	2009	Perry Mesa	380	Satisfactory
S1	2015	Brooklyn	435	Impaired
S2	2015	Brooklyn	381	Satisfactory
S5	2015	Brooklyn	426	Satisfactory
T4	2009	Granite-Mesa	429	Impaired

Location	Date	Pasture	TEUI Unit	Condition
T5	2009	Granite-Mesa	432	Impaired
S3	2015	Granite-Mesa	468	Satisfactory
S4	2015	Granite-Mesa	424	Satisfactory

Desired Conditions

Desired Conditions for the Copper Creek Allotment are based on Forest Plan guidance and site-specific knowledge of the allotment and are tied to the existing conditions described earlier in this chapter: range vegetation; soils; riparian areas; watersheds; and wildlife.

The Forest Plan identifies management prescriptions and management emphasis for particular management areas across the Tonto National Forest. The Copper Creek Allotment is entirely within Management Area 1F (USFS, 1985). Management emphasis for area 1F is to manage for a variety of renewable natural resources with primary emphasis on wildlife habitat improvement, livestock forage production, and dispersed recreation.

Vegetation

According to the Forest Plan, the Tonto National Forest should manage vegetation types such as: chaparral, semi-desert grasslands, and desert scrub to meet the needs of both livestock and wildlife (pp. 66-68) More specific to range management, the desired condition is to manage for maintenance or improvement of preferred herbaceous and browse species for cattle and native ungulates, as well as maintenance or improvement in canopy and basal cover for soil protection. Areas that are less than satisfactory condition will be treated with improved grazing management along with the installation of structural and nonstructural improvements.

Soils

Recovery times for soils in desert ecosystems can be extremely slow. This is attributed to the fact that deserts are generally considered to have both low resistance and resilience to disturbance. Though, it is expected that resistance and resilience to disturbance can vary among deserts and among ecosystems in general (Belnap, 2002). Rates of recovery will differ depending on several factors such as magnitude of past soil loss, inherent soil properties, current vegetation ground cover, and the type of ecosystem.

According to Forest Service Manual 2550.2, the desired conditions for soils are to "maintain or restore soil quality on National Forest System lands. Manage resource uses and soil resources on NFS lands to sustain ecological processes and condition so that desired ecosystem services are provided in perpetuity." Further, the Forest Plan indicates that projects should improve soil productivity (p. 19).

Ecological land units are assigned a soil condition category which is an indication of the status of soil functions. Soil condition categories reflect soil disturbances resulting from both planned and unplanned events. Current management activities provide opportunities to maintain or improve soil functions that are critical in sustaining soil productivity (USDA Forest Service, 2012).

It would be desirable for all soils within the allotment to be in satisfactory; however, soil improvement may take longer than the anticipated ten years for this authorization. Therefore, the desired condition would be to maintain soils currently in satisfactory condition for soils within the allotment to maintain

their current condition and to manage for upward trend of the soils that are in impaired condition within grazing management practices.

Riparian

The most common conditions limiting proper functioning condition of stream channels in the project area are high width-depth ratios, excessive erosion or deposition, and lack of riparian vegetation (elements of Mason and Johnson, 1999). Restoration and recovery of stream channel stability and proper functioning condition is dependent upon restoration and recovery of riparian vegetation. Stream channel recovery requires a longer time horizon than that considered in this management proposal. General desired conditions for stream channels and riparian vegetation can be found in the Forest Plan (Pages 19-20, 41-44). Riparian improvement and recovery can occur within the time frame of this plan. Consequently, the desired condition statements identified below are developed for riparian vegetation rather than stream channel stability:

- Manage riparian areas to protect the productivity and diversity of riparian-dependent resources
- Maintain or improve riparian vegetation to move toward satisfactory conditions of natural shade over water surfaces, natural stream bank protection, and woody plant age class diversity.
- Avoid channel changes or disturbance of stream channels and minimize impacts to riparian vegetation.

Wildlife

General wildlife resource goals for the forest are outlined in (Forest Plan, p. 20) and include providing for species diversity in the ecosystem, maintaining or improving wildlife and fish populations through improvement of habitat, ensuring that fish and wildlife habitats are managed to maintain viable populations of existing species, preventing adverse modification of critical habitat for threatened and endangered species, and managing to improve threatened, endangered, and sensitive (TES) species with a goal of increasing population levels that would remove them from the lists.

PROPOSED ACTION

The proposed action consists of four components: authorization, improvements, monitoring, adaptive management, and management practices. The proposed action follows current guidance from Forest Service Handbook 2209.13, Chapter 90 (Grazing Permit Administration; Rangeland Management Decision making). Additionally, the proposed action would require a Forest Plan amendment to align the Forest Plan with the current Southwestern Region Programmatic Agreement (PA).

Authorization

The Cave Creek Ranger District of the Tonto National Forest, proposes to authorize livestock grazing in the Copper Creek Allotment under the following terms:

Permitted Livestock Numbers

Proposed permitted use numbers would vary from 2,400 to 6,000 Animal Unit Months (AUMs[2]), year-long and up to 250 yearlings (845 AUMs) for natural increase (last year's calves) from January 1 to May

[2] The amount of forage needed by an "animal unit" (AU) grazing for one month. The quantity of forage needed, based on the cow's weight, and the animal unit is defined as one mature 1,000 pound cow and her suckling calf. It is assumed that such a cow nursing her calf will consume 26 pounds of dry matter of forage per day. A conversion rate of 3/4 is used to calculate AU's for yearlings.

15, annually. The proposed stocking numbers are based on the currently permitted stocking rate and the results of monitoring data. Table 3 shows the proposed permitted numbers for Copper Creek.

Table 3: Proposed Stocking Numbers

Class of animal	Current Stocking / Animal Unit Months (AUMs)	Begin Date	End Date	Maximum Stocking – Upper Limit (cow/calf pairs)	Maximum Stocking Animal Unit Months (AUMs)
Cow/Calf pairs	284/ 3,408 AUMs	1-Mar	28-Feb	200-500	2,400 to 6,000
Yearlings	N/A	1-Jan	5-May	Up to 250	Up to 845

Grazing System

Livestock would be grazed using a flexible livestock rotational system with a selective rest-rotation strategy. A selective rest-rotation strategy is comprised of two components. The selective component uses current climatic and on the ground monitoring data along with utilization triggers to prompt livestock rotations. The rest component is a period of no grazing, or deferment, within a pasture to allow for the physiological needs of plant recovery and reproduction after grazing has occurred within that pasture.

Annual authorized livestock numbers may be adjusted from initial stocking levels. A stock and monitor approach, consistent with regional Forest Service direction R3 Supplement to FSH 2209.13 chapter 90, would be used to establish grazing capacity over the long term (five to ten years). Actual permitted levels of grazing would be determined annually by the Cave Creek District Ranger with the permittee based on the results of monitoring and successful implementation of management practices. Additionally annual authorized use would vary based on current range conditions, including forage availability, water availability, current growing conditions, and resource monitoring. Scheduling of pasture use would vary from year to year as detailed in Copper Creek annual operating instructions (AOI). Pasture rotation schedules provide the basis for scheduled use, rest, and recovery periods after scheduled grazing to maintain or improve range and watershed conditions. The length of the grazing period within each pasture will also be considered and managed for the desired grazing intensity and utilization guidelines.

Grazing intensity would be measured using forage utilization. Forage utilization would be managed at a level corresponding to light to conservative grazing intensity in order to provide for grazed plant recovery, increases in herbage production, and retention of herbaceous litter to protect soils. Conservative use equates to 30 to 40 percent on herbaceous species and up to 50 percent use on browse. Consistent patterns of utilization in excess of 40 percent on key species in key areas would be used as a basis to modify management practices or take administrative actions necessary to reduce utilization in subsequent grazing seasons. It is inherent in the term “conservative use” that watershed conditions and vegetative ground cover will be optimized as appropriate to various range sites. Allowable use for riparian and upland vegetation is summarized in Table 4.

Table 4: Upland and Riparian Utilization Guidelines

Vegetation	Use Threshold
Upland Herbaceous Use	30-40% of current year's growth
Upland Browse Species	50% of current year's growth
Riparian Herbaceous Use	Limited to 40% of plant species biomass (deergrass) and maintain 6-8 inches of stubble height for emergent species such as rushes, sedges, cattails, and horsetails; measured during grazing season.
Riparian Woody Species	Limited to 50% of leaders browsed on upper 1/3 plants up to 6 feet tall

The goal is to achieve conservative use in the uplands over successive years. This strategy recognizes the importance of the annual operating instructions in allowing for modification of management. These actions include, but are not limited to; adjustments of timing, intensity, frequency, and duration of grazing to reach resource objectives (FSH 2209.13 - Chapter 90)[3].

When pasture rotation schedules are determined for the upcoming grazing year, the permittee would be required to follow the prescribed pasture rotation or develop alternative plans with the Forest Service if resource or livestock management concerns arise. Concurrent with this project, the Bureau of Land Management is also evaluating the reauthorization of livestock grazing on the adjacent Horseshoe Allotment. If grazing is authorized on both allotments, pasture use could be scheduled to rotate livestock among the pastures on both the Horseshoe and Copper Creek Allotments. This strategy would maximize management flexibility to respond to resource conditions. In this case, the Cave Creek District Ranger, the BLM Monument Manager, and the permittee would collaborate to schedule pasture use across both allotments.

Management systems would be designed to incorporate at least one growing season of rest or deferment in order to provide grazed plant recovery. Timing of pasture moves would be determined by forage utilization monitoring and resource management objectives specified in the Copper Creek annual operating instructions (AOI) with the following design criteria.

Actual rotation of cattle would be determined annually through the Copper Creek AOI. Modifications to these documents may be implemented at any time throughout the grazing season in response to unforeseen environmental or management concerns. Such changes may be in response to resource conditions including but not limited to: water availability, forage conditions, drought, fire, and management objectives. This includes using monitoring results to continually modify management in order to achieve desired conditions. This would provide the flexibility to adapt management to current conditions. Such changes may include annual administrative decisions to adjust the number of livestock,

[3] For more information on how this strategy would be monitored, see the Monitoring section below.

dates for grazing (season of use), class of animal, or pasture rotation. These changes would not exceed the limits for timing, intensity, duration, and frequency as defined in the grazing permit.

Management Tools

If monitoring indicates that desired resource conditions mentioned below are not being achieved, in the desired time frame or areas for this allotment, there are tools, or administrative actions that would be used to modify management. Such changes may include annual administrative actions to adjust the specific number of livestock and/or animal unit months, specific dates for grazing, class of animal, or pasture rotations. These changes would not exceed limits for timing, intensity, duration, and frequency, as described in the proposed action.

Necessary changes would be implemented through AOIs, which would adjust use to be consistent with current productivity and resource conditions. The AOI would also include mitigation measures and Best Management Practices (BMP) to avoid or minimize effects to wildlife, soil, and water quality. Modifications to the AOI may be implemented at any time throughout the grazing season in response to unforeseen environmental concerns such as drought, fire, flood, etc., or management and livestock operation concerns.

The following is a list of when administrative actions would be necessary in the management of this allotment:

- Monitoring shows management objectives have not been achieved or that trend toward achieving desired conditions is not improving or improving at an adequate rate.
- Annual indicators of grazing use or grazing guidelines are not met.
- Climatic events, fire, flood, or uses and activities detrimentally impact resource conditions and a modification of grazing use is needed to provide for recovery of the site.

There are several types of administrative actions that could take place within the allotment. These actions would comply with the Forest Plan and mitigations detailed later in this section. The following list includes some of these actions:

- Extending or shortening time in a pasture based on utilization levels in uplands and riparian areas;
- Assessing the readiness of a pasture and changing its position in the rotation for the season;
- Time or season of pasture use;
- Resting a pasture for one or more growing seasons;
- High intensity, short duration, or other grazing system;
- In the event of extended drought, severe fire, or depleted rangelands, complete removal of livestock until rangelands have recovered;
- Decrease or increase herd size within the limits of the permitted numbers;
- Temporarily closing off water in a portion of a pasture to manipulate grazing pressure and intensity of use;
- Use of salt and mineral blocks to aid in distribution, especially away from critical areas such as riparian areas;
- Excluding livestock from specific areas temporarily or permanently for other resource objectives;
- Changing or limiting season of use to minimize impacts to riparian vegetation and water quality.

If monitoring indicates desired conditions are not being met, the District rangeland management specialist, in consultation with the permittee and resource specialists, as appropriate, would:

- Evaluate the potential cause for not meeting desired condition or indicator such as utilization;
- Evaluate the need to implement alternative strategies;
- Generate documentation necessary in the AOI and/or permit and allotment files for the action to be implemented; and
- As necessary, conduct additional site specific surveying, such as for cultural resources.

Improvements

Adding fencing, constructing livestock handling facilities, protecting springs, and developing additional watering sources would be beneficial to livestock management, facilitate better livestock distribution, reduce undesirable effects to riparian vegetation and wildlife habitat, or otherwise improve the rangeland resource.

The effects of adding infrastructure such as fencing or waters to achieve resource objectives in the future will be disclosed and tiered to this environmental analysis. All new structures that are expected to be implemented during the first two years of this project would have heritage clearances prior to any decision to reauthorize grazing on the allotment. All other structures would have heritage clearances prior to implementation. Additional sideboards include the following:

Stock Water Development Standards: Troughs, Water Systems, and Stock Ponds

- All spring source facilities should be adequately protected or fenced and fences maintained to prevent livestock from getting into the source box. Once fenced, water would be piped to a trough located outside the exclosure to provide livestock water.
- Head box lids or covers shall be in place to prevent dirt or other refuse from getting into the head box and prevent wildlife entrapment.
- All outlet pipes and valves from head boxes should be functioning and any leaking should be kept to a very minimum.
- Water troughs should be kept at heights that make them useable to livestock. Troughs which become elevated from trampling livestock should be periodically backfilled to maintain a useable height.
- Troughs which become uneven due to settling should be reset and leveled.
- Bottoms of troughs should be kept clear of the ground with at least 2” to 4” of clearance under the bottom of the trough to prevent rusting or decomposition.
- Water should not be allowed to overflow the sides of the troughs. Overflow pipes must be kept clear. Overflow water would be piped away from troughs at least 50 feet. The end of the overflow pipe must be protected from trampling by livestock. Water from overflow pipe must be directed away from the trough area and returned to its source.
- Inlet and outlet pipe shall be protected by anchoring to the trough with a single post next to the vertical pipe and a brace or pole supporting the horizontal pipe. Inlet and outlet pipeline would be buried as much as possible for their protection.
- All troughs would be equipped with wildlife access and escape ramps built to specifications provided by the Forest Service to allow wildlife to access water and to prevent entrapment.
- Troughs, storage tanks, and pipelines would be drained and cleaned periodically to prevent moss and debris buildup and damage from freezing.

- Poles, posts, and trough framing materials used in the construction of the water development would be maintained, repaired, or replaced as needed. Open pipe posts would be capped to prevent wildlife entrapment.
- All above ground pipeline support structures would be maintained to keep the pipes at gradient and prevent sagging.
- Pipelines with air and drain valves would be covered with fine screen to prevent rodents and dirt from entering the pipe. Screens would be replaced as needed.
- Pipeline leaks would be repaired or the damaged section would be replaced with materials similar to the original construction materials
- Pipelines with valve covers boxes would be kept covered and repaired when needed.
- Stock water ponds would be kept clear of debris, dead animals, etc. Spillways would be cleaned and maintained to prevent washing out or becoming plugged.
- Stock water development components (e.g., rusted out troughs, broken sections of pipe, etc.) replaced during maintenance or reconstruction would be removed and properly disposed of.
- New spring developments would be constructed with the spring box designed so that residual flow is left at the spring head to prevent dewatering.
- Open water surface of troughs will be left unobstructed, no cross-braces or wire, to allow bats a "swoop zone" to obtain water while in flight.

Fence and Corral Standards

- All broken fence wire would be spliced and repaired in such a manner that tension on a wire can be maintained. Wire splices would be made with 12 gauge size tie wire or type of wire used in initial construction.
- Broken or rotten posts, broken braces and missing staples would be replaced where and when needed to maintain the fence.
- Wires would be re-stretched where needed.
- Broken or missing stays would be replaced where needed.
- New fencing would be constructed using a "wildlife friendly" design which includes; upper three strands barbed wire, top wire not to exceed 42 inches and lowest strand smooth wire set at 18 inches to allow wildlife to safely pass under.
- Staples should not be driven so deep into the post that they scar or create a weak spot in the wire.
- All gates should be closed before livestock enter the grazing units and opened and tied back after livestock leave the allotment.
- Wire gate tension should be sufficient to prevent the gate from sagging and still be easily opened and closed. Gate loops should be made from smooth wire, not barbed wire.
- Trees which fall on fences would be cut and removed when and where needed; wire, if broken, would be spliced and re-stretched; poles if broken would be replaced.
- Broken or rotten sections of log or pole fences and corrals would be replaced as needed.
- Corrals would be kept clean of litter, in good repair, and in useable condition.
- Metal components of range fences and corrals (e.g., wire, stays, t-posts, gates, etc.) replaced during maintenance or reconstruction would be removed from the Forest and properly disposed of.

The following improvements (Tables 5 and 6) would be constructed in order to facilitate livestock distribution throughout the allotment and assist in achieving the desired conditions and management

objectives set forth in this analysis. It is not necessary for the proposed additional water developments to be completed in a specific order. Implementation of the proposed range improvement infrastructure would be based on available funding and management objectives and include Range Betterment funds, permittee contributions and potential grant opportunities.

Table 5: Proposed Fencing Projects on the Copper Creek Allotment

Pasture	Legal Location	Description
Brooklyn	T9.5N, R3E, Sec.36	Installation of range fence at south end of FR 14 to protect heritage resource from unauthorized vehicular traffic
Granite Mesa	T10N, R4E, Sec. 26	Develop a ~75' x 125" fenced cattle holding area. This would allow the permittee to gather and hold cattle which would improve livestock management. This fence is proposed to be installed within the first two years following a decision.

Table 6: Proposed Water Developments on the Copper Creek Allotment.

Pasture	Legal	Description
Granite Mesa	T10N, R4E, Sec. 26, 27, 34	Addition of a pipeline, water storage (≤ 10,000 gallons) and drinker. This would increase water availability in the uplands and better distribute cattle.
Perry Mesa	T9.5N, R3E, Sec.36, 35	Addition of livestock drinker, pipeline, and water storage (≤ 10,000 gallons) on west end near Forest boundary. This would increase water availability in the uplands and better distribute cattle.
Perry Mesa	T9.5N, R3E, Sec.25	Installation of a pipeline from an existing storage tank to a drinker. This would increase water availability in the uplands and better distribute cattle.
Perry Mesa	T9N, R3E, Sec.16,21	Addition of a drinker and pipeline from the existing Point Extreme well. This would increase water availability in the uplands and better distribute cattle.
Perry Mesa	T9.5N, R3E, Sec.36	Development of a new well and addition of water storage (≤

Pasture	Legal	Description
		10,000 gallons) tank. This would increase water availability in the uplands and better distribute cattle.
Perry Mesa	T9.5N, R3E, Sec.25	Addition of a drinker near the South Campbell stock tank. This would increase water availability in the uplands and better distribute cattle.
Brooklyn	T9.5N, R3E, Sec. 31	Addition of a drinker and water pipeline from an existing well. This would increase water availability in the uplands and better distribute cattle.
Brooklyn	T9.5N, R3E, Sec. 20, 19 T10N, R4E, Sec. 31	Addition of a drinker from the Cornstalk solar well. This would increase water availability in the uplands and better distribute cattle.
Granite Mesa	T10N, R4E, Sec. 33, 34	Addition of a water line from Copper Spring to a new drinker and water storage (≤ 10,000 gallons). Development would include new well, drinker, and storage at north end of sec. 33. This would increase water availability in the uplands and better distribute cattle.
Granite Mesa	T10N,R4E, Sec.14	Addition of water pipeline from Rugged Windmill drinker and existing storage. This would increase water availability in the uplands and better distribute cattle.
Bobcat	T10N, R4E, Sec. 9, 10	Addition of a drinker and pipeline from Old mine Windmill. This would increase water availability in the uplands and better distribute cattle.
Brooklyn	T9.5N, R3E, Sec.28, 33	Addition of a water line from Rosalie Spring to a new drinker and water storage (≤ 10,000 gallons). This would increase water availability in the uplands and better distribute cattle.
Bobcat	T10N, R4E, Sec. 4, 5	Development of a new well, two drinkers (one wildlife only, one livestock), and storage (≤ 10,000 gallons). This would increase

Pasture	Legal	Description
		water availability in the uplands and better distribute cattle (Figure 8).

Adaptive Management: Fish Introductions

Forest Plan and Forest Manual standards and guidelines direct the Tonto National Forest to work with other federal, state, and local agencies to manage for the persistence of native fish and wildlife species habitat on the Forest (USDA 1985). USDA National Forest directives also include managing lands and resources for the benefit of both U.S. Forest Service sensitive and federally protected fish and wildlife populations and their habitats (listed, candidate, and critical habitat under the Endangered Species Act), establishing objectives for habitat management that provides for recovery of these populations, and placing top priority on conservation and recovery of these species (USDA 2005).

The Tonto National Forest currently works cooperatively with the AGFD and the USFWS to complete recovery actions for federally protected species and their habitats located on forest lands (see USDA 2010). Recovery projects for native and protected species are conducted as a partnership between the federal government and the Department through the Arizona Native Fish Coordination Team (NFCT). Currently, The NFCT is actively seeking out streams and watered areas to introduce or reintroduce native fish populations to habitable areas on the Forest, potentially including areas within active grazing allotments. Currently, suitable fish introduction areas have not been identified on the Copper Creek Allotment due to habitat loss and degradation from fires. However, there are streams within the Allotment that may become suitable habitat in the future depending on how resource conditions are influenced by weather and climate. Each situation would be evaluated under the federal-state partnership and the forest would work to take all reasonable and prudent measures to protect listed species habitats for recovery. The Forest Service would consult with the USFWS on the effects of livestock grazing and management prior to any recovery actions taking place on the ground.

Adaptive management is a concept for dealing with uncertainty in environmental management and is used where the Forest Service is uncertain of any outcome but fairly certain of the direction they would pursue if a change were necessary (36 CFR 220.7(b). If the Native Fish Coordination Team were to identify suitable habitat for native fish introduction within the Copper Creek Allotment, grazing management would adapt in the following ways:

- If the identified habitat occurs in an area already excluded from grazing, either by existing infrastructure or by natural barriers, then no change in management would be necessary.
- If the identified habitat occurs in an area which is accessible to livestock, and livestock use is anticipated to affect the introduced species, then certain management actions, such as those listed in the Management Practices section, would be taken to reduce or eliminate those effects. In areas where livestock use is minimal, this may be accomplished by herding or salting to further discourage cattle's use of the reintroduction area.
- If herding, salting, or other management practices are not effective to mitigate the effects on the introduced fish, or if introductions occur in areas more heavily used by livestock, fencing would be constructed to exclude livestock from the reintroduction area.

Monitoring

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

Effectiveness Monitoring

Effectiveness monitoring includes measurements to track long-term condition and trend of upland and riparian vegetation, soil, and watersheds. Examples of effectiveness monitoring indicators include, but are not limited to pace transects, pace quadrat frequency, dry weight rank, ground cover, Parker 3-step, repeat photography, and Common Non-forested Vegetation Sampling Procedures which measures; frequency, fetch, dry-weight rank, production, and utilization. Monitoring would occur at established permanent monitoring points. Both qualitative and quantitative monitoring methods would be used in accordance with the Interagency Technical References (ITR, 1996, revised 1999), Region 3 Rangeland Analysis and Management Training Guide (USDA-FS, 1997), and the Region 3 Allotment Analysis Guide. These data are interpreted to determine if management is achieving desired resource conditions, if changes in resource condition are related to management, and to determine if modifications in management are necessary.

Implementation Monitoring

Implementation monitoring will occur yearly and would include such things as inspection reports, forage utilization measurements in key areas, livestock counts, and facilities inspections. Utilization measurements are made following procedures found in the Interagency Technical Reference (ITR, 1996, revised 1999), or the most current acceptable method, and with consideration of the Principles of Obtaining and Interpreting Utilization Data on Southwest Rangelands. The purpose of implementation monitoring is to determine if grazing meets conservative use guidelines in upland and riparian areas.

Utilization would be monitored on key forage species, which are native perennial grasses or browse species that are palatable to livestock. At a minimum monitoring would include use in key areas, but may include monitoring outside of key areas. The Cave Creek Ranger District range personnel, permittee, and cooperators would be responsible for monitoring livestock grazing utilization. Over time, changes in resource conditions or management may result in changes in livestock use patterns. As livestock use patterns change, new key areas may be established and existing key areas may be modified or abandoned in cooperation with the permittee and cooperators.

Information would be collected through routine pasture inspections and end of season utilization monitoring. Specific schedules for monitoring would be flexible from year to year based upon resource needs, which could change with climatic variations and management changes. Monitoring for plant cover, vigor, recruitment, and diversity, using techniques described in aforementioned publications, would ensure that wildlife needs and riparian and watershed conditions were moving toward desired conditions.

Monitoring methods could include, but are not limited to, utilization and stubble height monitoring, annual riparian monitoring, and photo point protocols. Data would be used, along with supporting information to determine when livestock must be moved from one pasture to another and to make any necessary adjustments to livestock numbers and/or season of use (determined in AOI).

Key areas are described in “sampling vegetation attributes” (ITR, 1996) 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 an area representative of the range as a whole, an area where livestock use occurs, located within a single ecological site and plant community, and be a minimum of 100 yards from fence lines, exclosures, roads, and trails. Key areas may be identified in the allotment management plan.

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.

Riparian Utilization Monitoring
Riparian components in key reaches would be monitored using riparian utilization measurements (implementation monitoring) following methods in *Sampling Vegetation Attributes and Utilization Studies and Residual Measurements* (ITR, 1996, revised 1999) or the most current acceptable method.

In order to achieve Forest Plan Standards and Guidelines the following use guidelines for riparian components are as follows: *obligate riparian tree species* – limit use to less than 50 percent of terminal leaders (top one third of plant) on palatable riparian tree species accessible to livestock (usually less than 6 feet tall); *deergrass* – limit use to less than 40 percent of plant species biomass; *emergent species* (rushes, sedges, cattails, and horsetails) – maintain six to eight inches of stubble height during the grazing period.

The Forest Plan limits use to 20 percent of tree and shrub annual production *by volume*. The percent of leaders browsed was chosen as a surrogate guideline in place of percent volume because volume is an extremely difficult parameter to assess on an annual basis. The method employed for determining the percent of leaders browsed is an expedient and repeatable sampling technique. Mathematical relationships between the number of twigs browsed and percent of current annual growth removed have been established in previous studies (Stickney, 1966).

Utilization limits for herbaceous riparian vegetation are intended to do two things: 1) protect plant vigor and 2) provide physical protection of streambanks or the sediment on the greenline that could develop into a bank feature. Deergrass was selected as the key species to monitor because it is the most common obligate, riparian, native, perennial grass on the Tonto National Forest. Additionally, deergrass exhibits a number of traits that make it an ideal stream-stabilizing plant. The above ground attributes of deergrass aid in preventing soil loss through decreasing flow velocity, they also trap sediment which aids in the rebuilding of stream banks. Furthermore, deergrass is a bunchgrass with an extensive root system which acts to stabilize streambanks (Cornwall, 1998; Clary and Kruse, 2003).

Monitoring short-term indicators, such as stubble height and woody utilization, during the grazing season, can help determine if grazing use criteria is moving riparian conditions toward management objectives over time (Burton, *et al*. 2011). The document, *Principles of Obtaining and Interpreting Utilization Data on Southwest Rangelands* (Smith *et al.*, 2005), will provide guidance for utilization data collection and interpretation.

If utilization reaches limits of recommended allowable use, livestock would be moved from the critical area or pasture considering time of year and extent of area involved. Actual use records in combination

with utilization measurements will inform if it may become necessary to minimize or remove access to riparian habitat, if grazing pressure becomes a limiting factor in the use of pastures

Heritage Resource Monitoring
In accordance with Appendix H, the Standard Consultation Protocol for Rangeland Management of the First Amended Programmatic Agreement Regarding Historic Property Protection and Responsibilities between the 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 December 24, 2003, monitoring would 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 would 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 would be reported, and the archaeologists would draw upon the protection measures outlined in the Protocol to ensure that the effects are avoided or minimized.

Noxious Weed Monitoring
Noxious weeds located on this allotment would be treated as necessary. Permittee and Forest Service would coordinate weed inventory and treatment. Noxious weed monitoring would be carried out at the same time allotment inspections are conducted. As noxious weed populations are found they are mapped, monitored, and treated. Treatment of invasive species would be carried out in accordance with practices established in Tonto's Environmental Assessment of Integrated Treatment of Noxious or Invasive Weeds as detailed in the decision notice and finding of no significant impact, pages three and four (USFS 2012).

Management Practices and Mitigation Measures

Range
Livestock management practices such as herding and salting are critical to achieve proper livestock distribution within each unit/pasture. The permittee would be required to furnish sufficient riders or herders for proper distribution, protection, and management of cattle on the allotment. Tonto National Forest Grazing Practices are as follows:

- Forest Plan Standards and Guidelines applicable to livestock grazing would be followed (Forest Plan, p. 24).
- Salt and/or supplements would be placed where forage is abundant and current grazing use levels are low. Salt and/or supplements would not be placed any closer than one quarter mile from available water, recreation sites, or designated trails except where prior written approval had been obtained from the District Ranger.
- No salting would occur within or adjacent to identified heritage sites. Salt would be removed from pastures when cattle have left an area, and not placed within a pasture until the cattle arrive. Additionally, salt will not be placed in the same location(s) each year.
- Troughs would be left full of water and operational year round for wildlife accessibility, unless in limited circumstances where extreme freezing conditions may damage facilities.
- When entering the next scheduled pasture, all livestock would be removed from the previous pasture within two weeks (dependent on terrain).

- Permittee would ensure that enough time is allowed to remove livestock to meet the pasture move date(s) and avoid unauthorized and excess use.
- Permittee would ensure all infrastructure is in functioning condition prior to entering the next scheduled pasture.

Travel Management

Tonto National Forest is currently planning the implementation of the Travel Management Rule. The Travel Management Rule is aimed at reducing non-essential roads for watershed and resource protection and designates a system of roads and trails for motorized vehicle use on the forest. In general, the permittee would be required to follow Travel Management policies and limit the use of motorized vehicles to those roads and trails designated on the Motor Vehicle Use Map after the final travel management decision is signed and the Motor Vehicle Use Map is published.

According the final Travel Management Rule, motor vehicle use exempted from designation includes "Motor vehicle use that is specifically authorized under a written authorization issued under Federal law or regulations" (36 CFR 261.13(H)). Grazing permits fall under this exemption. In compliance with R3 Supplement to Forest Service Handbook 2209.13 15.13b, legitimate motorized use, including cross-country access, needed for conducting activities required under term grazing permits would be authorized unless compelling natural and/or heritage resource issues require postponement or modification of the activity.

Certain management activities on the Copper Creek Allotment (e.g. fence repair, water developments) may require the use of motorized vehicles off of the designated road and trail system. In the event significant deviations from the "current access needs" authorized in the Grazing Permit become necessary, additional site-specific environmental analyses may be required. Road maintenance to improve access for range management activities must receive a road use permit.

Road maintenance that is required to access range improvements or livestock management must receive a road use permit for any road work. In the event of significant future deviations from "current access needs" for motorized use as authorized by a Grazing Permit, there may be the requirement for additional environmental analysis on a site-specific basis, to comply with the National Environmental Policy Act. At this time, very little cross country access has been found to be necessary. Salting, fence repair, and other minor maintenance have traditionally been accomplished with access on horseback. However, cross country travel may become necessary in the future on a project specific basis. The AOI authorizing each year's grazing activity would include a brief discussion of the use of vehicles and OHVs within the designated road system, any single purpose use roads or trails, and a description of the annually anticipated level of cross-country travel and access consistent with Part 3 of the grazing permit and/or AMP.

Wildlife

Since site specific information regarding precise location and timing of all of the various projects described above (water developments, pastures, and fencing) are not available at this time, the Forest Service would implement the following actions to protect listed species:

- The Forest Service would conduct site specific analysis of effects to listed species and/or proposed species or designated and/or proposed critical habitat before projects are implemented.

- If the Forest Service determines that projects "may affect" any listed and/or proposed species or designated and/or proposed critical habitat, section 7 consultation with the Service would be initiated.
- All water developments would include wildlife access and escape ramps. When possible, waters would be kept available to wildlife year round.
- All fencing would be built to Forest Service standards to provide for wildlife passage through the fence. At a minimum, this would be a four-strand fence with smooth bottom wire 18 inches off the ground and a total height of 42 inches or less.
- Improvements proposed within Sonoran desert tortoise habitat, would require pre-construction surveys and monitoring to ensure that individual tortoises are not present within the action area.

Riparian

The following are riparian mitigation measures:

- All existing and new developed springs will be fenced to exclude livestock access. A trough(s) would be located outside of the exclosure to provide water for wildlife and livestock.
- Livestock would not be trailed through riparian areas.
- Salt and/or mineral supplements would be placed at least .25 miles from riparian areas.
- New spring developments would be constructed with the spring box designed so that residual flow is left at spring head to prevent dewatering.
- New troughs would be placed in the uplands, at least 400 feet away from riparian areas.
- Improvements proposed within Sonoran Desert tortoise habitat, would require pre-construction surveys and monitoring to ensure that individual tortoises are not present within the action area.

Wildlife Existing Condition and Analysis

These various vegetation types support a variety of game and non-game species. Wildlife species that occur on the allotment include but are not limited to pronghorn, elk, desert mule deer, Coues white-tail deer, mountain lion, black bear, javelina, coyote, gray fox, bobcat, raccoon, desert cottontail, various rodents, various bats, common black hawk, zone-tailed hawk, red-tailed hawk, turkey vulture, Gambel's quail, various neotropical migratory birds, western diamondback rattlesnake, speckled rattlesnake, gopher snake, black-necked garter snake, common king snake, striped whipsnake, Sonoran mud turtle, collared lizard, desert spiny lizard, and dove.

The allotment provides habitat for the only population of pronghorn on the Tonto NF, primarily due to desert grassland habitat in the Perry Mesa area. Approximately 50 percent of the allotment is comprised of desert grassland, dominated by tobosa. Pronghorn have no Forest Service special status designation, although management of the habitat and species are key considerations in management of the area. Pronghorn and associated habitat management in the action area has been successful for many years, and provides hunting opportunities for rifle and archery hunters. In 2015 the Arizona Game and Fish Department (AGFD) authorized 13 rifle buck pronghorn tags and 10 archery antelope tags in Game Management Unit 21, which includes the analysis area (AGFD, 2015).

Fuels projects in the analysis area were completed in grasslands and chaparral. Fuels treatment objectives in the grassland included reduction of encroaching juniper in order to maintain grassland and reduce potential conversion to a juniper dominated system. The Complex fire greatly reduced encroaching

juniper within the majority of the analysis area. Much of the chaparral habitat type has not been treated since the Complex fire and has resulted in much of the habitat becoming stagnant and decadent.

Availability of forage, and ground and canopy cover, are essential to sustaining wildlife populations, as is the availability of water. Wildlife not only use "live water" (perennial or intermittent streams), but depend on developed waters (dirt tanks, troughs), especially during times of drought.

Management indicator species (MIS) were selected during the Tonto NF planning process to adequately monitor implementation of project actions on wildlife habitat and species diversity[4]. These indicator species reflect general habitat conditions or habitat components that are of value to these and other species with similar habitat needs. Habitats for a large number of the Forest MIS occur on the Copper Creek Allotment. Because most MIS are not rare species and the allotment contains a variety of vegetation types, it is assumed that at least some individuals of each MIS are present on the allotment. The ten MIS species that were selected for this allotment (Table 7) were done so based on the premise that livestock grazing and management can have an effect on habitat components (ground cover, species diversity, etc.) that can impact Forest-wide habitat and population trends. Those MIS listed in Table 7, have been fully analyzed and are available in the project record.

Table 7: Management Indicator Species

Habitat Type/MIS	Indicator of:
Pinyon/Juniper	
Ash throated flycatcher	Ground Cover
Chaparral	
Rufous-sided (spotted) towhee	Shrub density
Black-chinned sparrow	Shrub diversity
Desert Grassland	
Horned lark	Vegetation aspect
Savannah sparrow	Grass species diversity
Desert Scrub	
Black-throated sparrow	Shrub diversity
Brown (canyon) Towhee	Ground cover
Riparian (low & high elevation)	
Bell's vireo	Well-developed understory
Common black hawk	Riparian streamside
Aquatics	
Macroinvertebrates	Water quality/fisheries

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". Important Bird Areas (IBA) are sites that provide essential habitat for one or more species of bird, including sites for breeding, wintering, and/or migrating birds. No designated IBA's occur within the action area. The Agua Fria National Monument Riparian

[4] The complete MIS list is included in Appendix A

Corridors state ranked IBA is located within the project area, just west of the action area. The IBA includes 26.5 miles of the Agua Fria and its major tributaries containing mature riparian woodland with willows, cottonwoods, sycamores, and mesquite.

Special Status Species are those given status by agencies responsible for managing plants, wildlife, and their associated habitat because of declines in the species' population or habitat. Birds are given provisions under the Migratory Bird Treaty Act (MBTA). An MBTA analysis was completed and is available in the project record. All Forest sensitive species were considered and analyzed[5], however, only Special Status Species that are known to occur, or have suitable habitat on the allotment will be included in this evaluation.

The U. S. Fish and Wildlife Service (USFWS) Information, Planning, and Conservation (IPaC) decision support system were used in identifying listed species which may occur or have suitable habitat within the action area (IPaC Consultation Code 02EAAZ00-2016-SLI-0544). This species lists was reviewed to determine if any of these special status species have the potential to occur in the action area. Additionally, the most recent Region 3, Regional Forester's Sensitive Species List (2013) and the Tonto National Forest Sensitive species list, dated February 2015, were used in determining which, if any, listed species or critical habitat may be affected by the proposed action. These species are listed in Table 8 below. The most current and available data on species, available habitat, survey history, biologists knowledge and experience, and a review of the Arizona Game and Fish Departments (AGFD) Heritage Data Management System (HDMS) and HabiMap were used to determine if any listed species, or their habitats may be affected by the proposed action.

Table 8: Threatened, Endangered (With Critical Habitat), and Sensitive Species

Common Name	Scientific Name	Status
Gila Chub	*Gila intermedia*	ESA Endangered
Gila Chub Designated Critical Habitat	*Gila intermedia*	N/A
Sonoran Desert Tortoise	*Gopherus morafkai*	FS Sensitive
Lowland Leopard Frog	*Lithobates yavapaiensis*	FS Sensitive

Endangered – Federally Listed as Endangered Under ESA
Sensitive – On Regional Forester's Sensitive Species List (2013)

Environmental Consequences by Alternative

Criteria used to evaluate alternatives. The alternatives are contrasted based on the likelihood of riparian vegetation, and stream channels in the key reaches, attaining the short and long-term desired conditions described in the Hydrology/Riparian sections of the EA. Endangered, sensitive, and management indicator species that require riparian and aquatic environments would respond to changes in riparian and aquatic habitats. Similarly, each alternative, and its effects on wildlife and plant species, will be evaluated

[5] Appendix B includes the complete sensitive species list for the Tonto National Forest.

based on the attainment of short and long-term goals, described in the Soils/Range desired conditions section of the EA. Watershed affects from upland and riparian areas will have either positive or negative impacts to aquatic and terrestrial wildlife species. Short-term desired conditions limit the annual impacts of livestock grazing. Long-term desired condition is measured through effectiveness monitoring. Although upland livestock use levels, and associated wildlife habitat are important to wildlife; riparian and aquatic habitat condition is of higher value due to limited habitat availability and the importance of that habitat to threatened, endangered, and sensitive wildlife and management indicator species.

Alternative A – Proposed Action

The proposed action for the Copper Creek Allotment is to authorize livestock grazing in a manner that is consistent with Forest Plan standards, guidelines, and objectives and maintains or improves natural resource conditions. Livestock would be grazed using a flexible livestock rotational system with a selective rest-rotation strategy. Proposed permitted use numbers would vary from 2,400 to 6,000 Animal Unit Months (AUMs), year-long and up to 250 yearlings (845 AUMs) for natural increase (last year's calves) from January 1 to May 15, annually.

The multiple water developments and fence projects proposed are designed to improve livestock distribution and protect riparian and wildlife habitat on the allotment.

Direct and Indirect Effects

General Wildlife

Implementation of the riparian utilization guidelines are intended to maintain or increase existing riparian vegetation. If riparian area utilization guidelines are followed and cattle are moved when use guidelines are met, the negative, direct effects of grazing will be minimized, and riparian area and stream channel condition should be maintained or improved. This mitigation measure should be effective for all of the key reaches in grazed pastures. Recruitment of woody and herbaceous riparian species, including deergrass, is expected. Over time, structural and age class diversity in these riparian areas would continue to improve under this alternative, although to a lesser degree than under Alternative B. Other selected key riparian reaches are also expected to improve through adherence to the stated utilization guidelines.

Overall, it is expected that watershed and soil conditions across the allotment would continue to improve under this alternative, although improvement would be slower than the 'No Grazing' alternative.
Over time, upland habitat capability for game species such as deer and quail may slowly improve due to an increase in herbaceous vigor and density in the openings as a result of conservative use under this alternative. Small game and non-game species numbers would generally increase over time with an increase in herbaceous cover and probable increase in grass species diversity, although at slower rates than Alternative B.

Management Indicator Species

The addition of the proposed water developments and adherence to riparian utilization guidelines are expected to improve habitat conditions for riparian (Bell's vireo and common black hawk) and aquatic species (macroinvertebrates).

With an improvement in soils and vegetation, wildlife habitat is expected to improve over time, although at a slower rate and to a lesser degree than Alternative B.

Species that are indicators of chaparral vegetation type (rufous-sided towhee/black-chinned sparrow), and desert scrub species (black-throated sparrow, brown towhee) would likely experience a smaller habitat gain under this alternative than under the 'No Grazing' alternative.

Alternative B – No Grazing

Direct and Indirect Effects

The most rapid rates of riparian recovery, from past grazing impacts, normally occur with complete protection from grazing (Clary and Kruse 2003). Riparian areas are generally regarded as having high inherent potential for recovery from disturbance (Milchunas 2006). The potential for recovery is highly variable, dependent on biotic and abiotic factors, including flow regime, channel gradient, dominant channel substrate, past disturbance history, watershed area, and cover and diversity of riparian vegetation (Kindschy 1987).

General Wildlife

With discontinuation of grazing, wildlife habitat conditions would likely improve. Riparian habitat not currently excluded from livestock use would likely occur more rapidly, as compared to the action alternative. Riparian areas would continue to recover from past grazing. Riparian canopy cover, vegetative cover, recruitment of woody and herbaceous riparian species, including deergrass, would likely increase. It is expected that, over time, structural and age class diversity in riparian areas would improve, resulting in increased potential for riparian dependent wildlife species to occur on the allotment.

With the exclusion of livestock grazing, it is expected that, herbaceous plant vigor and diversity in upland key areas, overall watershed, and soil conditions across the allotment would continue to improve. Upland habitat for game species such as deer, pronghorn, and javelina would generally increase in vigor and density. Small game and non-game species would 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 the grazing alternative.

One effect of the 'No Grazing' alternative to wildlife would be the removal or lack of maintenance of water developments. Developments such as dirt stock tanks, developed springs, and troughs that provide water to livestock also provide water to wildlife. Livestock permittees are responsible for developing and maintaining water improvements. Under the no grazing alternative, these improvements would not be maintained. Wildlife may rely on these developed waters for survival in areas without alternate water sources (i.e. seeps, springs).

Management Indicator Species

Habitat conditions for these species would be expected to improve with cessation of livestock grazing on the allotment. Improvement in soil and vegetation conditions would benefit wildlife habitat in all vegetation types. Improvements to terrestrial habitat are as described under the general wildlife discussion

above. The elimination of livestock from stream courses should result in overall improvements in water quality. As compared to the grazing alternative, an improvement in water quality and aquatic conditions is anticipated with the elimination of bank trampling and trailing from livestock in riparian areas not currently excluded.

Species that are indicators of chaparral vegetation type (rufous-sided towhee/black-chinned sparrow), and desert scrub species (black-throated sparrow, canyon towhee) would likely experience a greater habitat gain under this alternative.

Threatened, Endangered, and Sensitive Species (TES)

The 'No Grazing' alternative would result in a "No Effect" determination for Gila chub and designated chub critical habitat as no livestock grazing or livestock management activities would occur within or near chub habitat. This alternative would promote improved riparian habitat (in areas not currently excluded), water quality, aquatic habitat, and upland conditions. Although other factors such as; flooding regime, drought, and recreational impacts play a role in the quality of the habitat for species on the allotment, it is anticipated that non-use would result in greater improvement of upland and riparian areas to that of the grazing alternative. General habitat conditions for sensitive species would also improve with discontinuation of livestock grazing. Direct and indirect effects of livestock grazing would not impact individuals or population viability.

Decisions by the NFCT to reintroduce fish into an area could be made whether or not cattle are present on an allotment. Under this alternative, if the NFCT were to identify suitable habitat for native fish introduction within the Copper Creek Allotment, the effects of grazing management would not be a consideration. The maintenance or removal of any existing infrastructure surrounding a selected reintroduction area would be the responsibility of the Tonto National Forest. However, if maintenance or removal of that infrastructure would be necessary, it would not be for purposes of excluding cattle.

Implementation of the 'No Grazing' alternative would begin to reverse some of the impacts resulting from past overgrazing practices on the allotment and move the area toward the stated desired conditions. This alternative would provide the greatest benefit to TES, MIS, and general wildlife species. Wildlife populations in the area, including endangered and sensitive species dependent on riparian habitat would benefit from improved habitat conditions.

Species Accounts, Status of Sensitive Species in the Action Area, Effects, Determination, and Rationales

Sonoran Desert Tortoise (*Gopherus morafkai*) – Forest Service Sensitive

Life History

The distribution of the desert tortoise covers the broadest range of latitude, climate, habitats, and biotic regions of any North American tortoise. The tortoise ranges from northern Sinaloa north to southern Nevada and southwestern Utah, and from south central California east to southeastern Arizona. The desert tortoise is divided into 2 populations for purposes of the Endangered Species Act: the threatened Mojave

population occurs north and west of the Colorado River, and the candidate Sonoran population occurs south and east of the Colorado River.

In Arizona the Sonoran Desert tortoise (SDT) population includes those tortoises south and east of the Colorado River, from locations near Pearce Ferry in Mohave County, to the south beyond the International Boundary, and at many scattered locations in between. The northeastern-most SDT records in Arizona occur along the Salt River near Roosevelt Lake in Gila County, although populations here have not been confirmed with recent observations. The middle San Pedro River drainage in Cochise County harbors the eastern-most substantial SDT populations. Desert tortoise observations have been confirmed in extreme southeastern Cochise County, but most probably represent released captives (pets). Sonoran Desert tortoises have been found as far southwest as the Barry M. Goldwater Range, Yuma Proving Ground, and the Cabeza Prieta National Wildlife Refuge.

Sonoran Desert tortoises are herbivores, with their diet largely consisting of various annual and perennial grasses, forbs, and succulents. Numerous other items such as various trees, shrubs, and woody vines are also eaten.

Densities of SDT populations vary dramatically from 15 to 150 individuals per square mile across the 18 plots that are regularly surveyed in Arizona. These surveys also indicate that populations are mostly stable or increasing; 17 populations were stable or increasing, while only one population decreased dramatically (AGFD 2010).

The SDT occurs primarily on rocky slopes and bajadas of Mojave desert-scrub and Arizona Upland and Lower Colorado River Valley subdivisions of Sonoran desert scrub. They most often occur in paloverde-mixed cacti associations, but have been documented in semi-desert grassland, interior chaparral, oak woodland, ponderosa pine-dominated coniferous forests, and thorn-scrub habitats.

Adequate shelter is one of the most important habitat features of tortoises in the Sonoran desert (Averill-Murray et al., 2002). Tortoises escape extreme temperatures in shelters, which stay cooler in the summer and warmer in winter than outside temperatures. Tortoises require loose soil in which to excavate (usually shallow) burrows below rocks and boulders, but they may also use rock crevices which they may or may not be able to modify. Tortoises occasionally burrow under vegetation, less often dig soil burrows on more or less open slopes, and also use caliche caves in incised wash banks. They will also rest directly under live or dead vegetation without constructing a burrow.

Activity begins in the spring as temperatures warm, and then decreases as the season moves into the summer drought in May and June (Averill-Murray et al., 2002). Much more time is spent inactive in shelters where they conserve water and energy. The onset of the summer monsoon season signals the beginning of peak tortoise activity, with tortoises responding to summer rains to rehydrate and establish positive moisture and energy balances, dramatically rising in early August and peaking during August-September (Averill-Murray et al., 2002). Activity decreases sharply after mid-October, as tortoises withdraw to winter hibernacula, which are similar shelters to those they use during activity seasons (Averill-Murray et al., 2002). Even during the winter, some individuals may bask, move, or even forage on warm winter days. Females may terminate hibernation as early as late February, while some males may remain inactive through the entire spring (Bailey 1992; Martin 1995; Vaughan 1984). Males

typically reach larger sizes than females throughout the Sonoran Desert and sexual maturity is attained at sizes as small as 176 mm.

Mating occurs during the summer monsoon season. Females begin laying eggs, which are fertilized by sperm stored from the previous summer's mating, just before or during the onset of the summer rains, in late June or early July (Averill-Murray and Klug 2000). They lay only one clutch of about 6 eggs, but 3-12 eggs in a clutch have been reported. The proportion of females reproducing is related to the amount of recent rainfall and vegetation available for forage. Females usually lay their eggs inside burrows with adequate soil development, and many remain at and defend their nests against predators.

Various carnivores, including mountain lion (*Puma concolor*), coyote (*Canus latrans*), kit fox (*Vulpes macrotis*), and bobcat (*Felis rufus*), may prey on hatchlings, juveniles, or eggs, or kill adults by chewing exposed limbs. Other potential predators of smaller tortoises include golden eagle (*Aquila chrysaetos*) and the common raven (*Corvus corax*).

Status Within The Action Area

There are no site specific occurrence records of Sonoran desert tortoise within the action area found in the HDMS database, however this species occurrence is identified in HabiMap, and habitat does exist within their preferred Sonoran desert scrub habitat in the southern portion of the Perry Mesa pasture and southwestern most portion of the Brooklyn pasture. As previously mentioned, this species may also occasionally be found in semi-desert grassland communities, however to a lesser extent.

Conservation Measures

- The proposed action includes a rotational grazing strategy that provides annual and seasonal rest. This management strategy would allow for plant growth and reproduction throughout the allotment. Additionally, conservative utilization guidelines would ensure adequate residual vegetation to support tortoise forage requirements.
- Improvements proposed within Sonoran desert tortoise habitat, would require pre-construction surveys and monitoring to ensure that individual tortoises are not present within the action area.
- When practicable, livestock would be moved using established trails, roads, travel routes, and channel crossings.
- Implement grazing management practices to improve vegetation diversity and structure thereby achieving or making significant progress toward meeting desired conditions within SDT habitat (CCA, 2015).

Effects Analysis

In May 2015 a multiagency cooperative effort developed a *Candidate Conservation Agreement (CCA) for the Sonoran Desert Tortoise*. The CCA was created to provide effective conservation of this previously listed candidate species (2009 – 2015) in Arizona.

Primary threats to SDT populations in Arizona are habitat destruction, fragmentation, and degradation. Causes of these threats include, but are not limited to: human-constructed barriers to movement, invasive nonnative plant establishment, off-highway vehicle use, livestock grazing, and altered fire regimes. According to the CCA, livestock grazing is not currently thought to affect SDT populations in Arizona,

given that there is little overlap in the habitat shared with livestock, and livestock management practices such as; managing for conservative use, balancing stocking levels with range capacity, and livestock distribution practices (salting, water) allow for improvement in overall ecosystem health.

Although SDT prefer rocky, boulder-covered hills and mountains, they also inhabit desert washes and canyon bottoms where their forage areas may overlap with areas used by livestock. Therefore, the potential exists for seasonal competition for forage between tortoises and livestock. Additionally, livestock may directly impact SDT through trampling individuals or burrows; however these incidents would be considered rare (Carrier 1996; Grover 1995; and Schmid 1988).

The proposed utilization levels, management practices (rotational grazing, rest), monitoring, mitigation measures, and conservation measures are intended to minimize any direct or indirect effects to individual SDT and/or their habitat.

No other effects are expected to occur.

Determination of Effects

Based on the following, it is my determination that the proposed action on the Copper Creek allotment, **may affect individual Sonoran desert tortoise, but will not result in a trend toward federal listing or loss of viability.**

- Conservative utilization levels throughout the allotment, where habitat overlap may occur, will insure adequate residual forage remains to support SDT.
- The proposed action includes numerous mitigation and conservation measures to remove and/or minimize direct or indirect effects of livestock grazing on SDT.

Lowland Leopard Frog (*Rana yavapaiensis*) – Forest Service Sensitive

Life History

The historical geographic range of lowland leopard frogs included areas mostly below the Mogollon Rim from northwestern to southeastern Arizona, southwestern New Mexico, along the lower Colorado River, the Coachella Valley of southern California, and Sonora, Mexico. The current geographic range of lowland leopard frogs has contracted substantially, as the species is considered extirpated from the lower Colorado River and the Coachella Valley (AGFD 2006a).

Lowland leopard frogs are most similar to the Chiricahua leopard frog (*Rana chiricahuensis*), from which it differs by having a less prominent vocal sac and thighs with dark network coloration (Stebbins 2003). Lowland leopard frogs and Chiricahua leopard frogs sometimes hybridize in areas where the two species coexist (AGFD 2006a). On the Tonto NF, Chiricahua leopard frogs generally occur above 3,500 feet elevation, while lowland leopard frogs occur below 3,500 feet.

Lowland leopard frogs are habitat generalists that inhabit various natural and man-made aquatic systems. The species is mostly restricted to permanent waters with aquatic and herbaceous vegetation, but it sometimes also inhabits semi-permanent aquatic systems, where it survives by retreating into mud cracks and other protective features when surface waters are absent (AGFD 2006a). The frogs breed primarily

from January through April, and then again in late summer or early fall, with eggs deposited on submerged vegetation, bedrock, or gravel. The larvae are herbivorous, while the adults eat arthropods and other invertebrates. Adults appear to live up to 3 years (Jennings 1987).

Population trends for lowland leopard frogs vary across their geographic range. Populations appear to be stable in central Arizona, whereas they have declined substantially in southeastern Arizona. Sredl (1997) commented that the lowland leopard frog is the most stable native ranid in Arizona, and its status in central Arizona seems good. The primary threats to lowland leopard frogs are habitat alteration and fragmentation, decline of perennial water sources, water pollution, grazing, and the introduction of various fish, crayfish, and frogs (mainly bullfrogs) (AGFD 2006a). Populations on the Tonto NF are also susceptible to climatic events such as severe floods and droughts.

The effects of livestock grazing on vegetative structure and species composition in riparian areas could be detrimental to amphibian and reptile habitat within these areas. However, aquatic and riparian habitat for reptiles and amphibians will be managed indirectly if watershed, riparian, and water quality objectives are being met in the analysis area. With conservative use, riparian conditions are expected to improve. Improving upland soil and watershed conditions may reduce the chance for sedimentation into streams and suitable habitat for these riparian dependent species.

Status within the Action Area

Lowland leopard frogs have been recorded in multiple locations on the allotment including; Hutch tank, Copper Spring, and Silver Creek (HDMS 2013, HabiMap). This species likely occurs within other unsurveyed riparian habitat on the allotment.

Conservation Measures

- New spring developments would be fenced to exclude livestock access to the spring source. A trough would be placed outside of the exclosure to provide water for livestock.
- Conservative upland utilization levels would ensure maintenance of herbaceous cover, thereby increasing infiltration rates and reducing erosion and sediment loss which would help maintain water quality within the springs.
- Livestock would not be trailed through riparian areas.
- Salt and/or mineral supplements would be placed at least .25 miles from riparian areas.
- New spring developments would be constructed with the spring box designed so that residual flow is left at spring head to prevent dewatering.

Analysis of Effects

The existing exclosures on Copper and Bishop Creeks would remove any direct and indirect effects of livestock grazing on lowland leopard frogs. Furthermore, conservative riparian utilization guidelines are expected to maintain or improve leopard frog habitat over the term of the permit. The proposed action would require that all new and existing spring developments be fenced to exclude livestock; thereby protecting riparian habitat. Individuals which occur within riparian habitats not excluded from livestock may be directly affected and/or reproductive efforts and egg masses laid during the winter breeding season may experience some direct mortality through trampling; however these impacts are expected to be minimal.

Determination of Effects

Based on the above discussion it is my determination that implementing the proposed grazing strategy ***may impact individuals, but is not likely to result in a trend toward federal listing or loss of viability for these species.***

Cumulative Effects Common to Both Alternatives

Motorized and nonmotorized recreation, and illegal cross country travel, negatively impact wildlife resources and or habitat through removal, destruction or degradation of herbaceous/woody vegetation and aquatic emergent vegetation and associated stream habitats. Traffic impacts to wildlife may be realized by avoidance of the area by some wildlife due to dust and/or presence of vehicles and people, wildlife/vehicle collisions, and poaching from vehicles. Secondary roads may have similar impacts to wildlife, although traffic volume and speed would generally be lower, impacts to wildlife would still exist, but at reduced levels.

Illegal cross country travel also has negative effects to wildlife and habitat through proliferation of wildcat trails, use of motor vehicles through washes, riparian corridors, and uplands. Wildlife habitat becomes fragmented and often damaged for the long term as a result of illegal, cross country, motorized travel.

In general, the presence of people and associated noise and disturbance of habitat in dispersed areas and on nonmotorized trails has negative effects on wildlife. Impacts to wildlife include: total avoidance of areas that regularly receive high recreational use, habitat destruction or modification, and avoidance of critical riparian areas where yearlong recreation use occurs.

Maintenance of roads and trails may also have a temporary negative effect on wildlife. Workers, heavy equipment, and noise may lead to wildlife avoidance during maintenance activities. On the Copper Creek Allotment, road maintenance affects to wildlife are expected to be minimal due to the infrequent maintenance cycle (annual) of FR 269, which are the only maintained road on the allotment.

Wildfire and suppression activities can negatively affect wildlife and associated habitat by direct loss of habitat to fire or suppression activities (brush removal, line construction, black-line construction, aerial application of retardant, and drafting from streams), and indirect effects such as fire support aircraft noise, sedimentation in aquatic systems, and avoidance of areas with fire suppression activities.

Recreational shooting also has negative impacts on wildlife as a result of noise and the presence of people. Trash and debris shooters often leave behind may pose hazards to wildlife and actually attract other shooters, due to available target material. Hunting may have negative impacts on wildlife including: high concentrations of hunters, illegal off-road travel, littering, increased presence of people/vehicles, and poaching.

The Copper Creek Allotment is bounded to the west by the Horseshoe Allotment (BLM land), to the east and southeast by the Red Creek and Six Bar Allotments respectively, and to the north by the Prescott National Forest. The Red Creek and Six Bar Allotments are conservatively stocked and monitored to ensure conservative utilization standards are being met. As a result, cumulative watershed effects for these allotments are anticipated to be minimal in contrast to the size and complexity of the watersheds themselves.

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Appendix A

Management Indicator Species

Management Indicator Species	Potential Natural Vegetation Crosswalk w/ Forest Plan Vegetation	Indicator of	Habitat Trend	Population Trend
Elk	PPM, MCA	general forest conditions	Static	Stable
Turkey	PPM, MCA	vertical diversity – forest mix	Static	Stable
Pygmy Nuthatch	PPM	Old growth pine	Static	Decrease
Violet-green swallow	PPM, MCA	Cavity-nesting habitat	Static	Decrease
Western Bluebird	PPM, MCA	Forest openings	Static	Stable
Hairy Woodpecker	PPM, MCA	Snags	Static	Stable
Goshawk	PPM, MCA	Vertical diversity	Static	Decrease
Abert Squirrel	PPM, MCA	Successional stages of pine	Static	Decrease
Ash-throated Flycatcher	PJC, PJG,	Ground cover	Static	Stable
Gray Vireo	PJC, PJG	Tree density	Static	Decrease
Townsend's Solitaire	PJC, PJG	Juniper berry production	Static	Stable

Management Indicator Species	Potential Natural Vegetation Crosswalk w/ Forest Plan Vegetation	Indicator of	Habitat Trend	Population Trend
Juniper Titmouse	PJC, PJG	General woodland conditions	Static	Decrease
Northern Flicker	PJC, PJG	Snags	Static	Stable
Spotted Towhee	PJC, PJG	Successional stages of pinyon-juniper	Static	Stable
Spotted Towhee	IC	Shrub density	Static	Stable
Black-chinned Sparrow	IC	Shrub diversity	Static	Stable
Savannah Sparrow	CPG, PJG	Grass species diversity	Upward/static	Stable
Horned Lark	CPG, PJG	Vegetation aspect	Upward/static	Decrease
Black-throated Sparrow	DC	Shrub diversity	Downward/static	Stable
Canyon Towhee	DC	Ground cover	Downward/static	Decrease
Bald Eagle	CWRF	General riparian	No change	Stable
Bell's Vireo	CWRF	Well-developed understory	No change	Decrease

Management Indicator Species	Potential Natural Vegetation Crosswalk w/ Forest Plan Vegetation	Indicator of	Habitat Trend	Population Trend
Summer Tanager	CWRF	Tall, mature trees	No change	Decrease
Hooded Oriole	CWRF	Medium-sized Trees	No change	Stable
Hairy Woodpecker	MBDRF	Snags, cavities	No change	Stable
Arizona Gray Squirrel	MBDRF	General riparian	No change	Stable
Warbling Vireo	MBDRF	Tall overstory	No change	Stable
Western Wood Pewee	MBDRF	Medium overstory	No change	Decrease
Common black-hawk	MBDRF	Riparian streamside	No change	Decrease
Marcro-invertebrates	Aquatic	Water quality	N/A	N/A

CPG - Colorado plateau grassland, CWRF - cottonwood willow riparian forest, DC - desert communities, IC - interior chaparral, MBDRF - mixed broadleaf deciduous riparian forest, MCA - mixed conifer w/ aspen, MWRF- montane willow riparian forest, PJC - PJ chaparral, PJG - PJ grassland, PPM - ponderosa pine – mild, SDG - semi-desert grassland.

Appendix B

Sensitive Species Identification and Evaluation

The most recent Region 3, Regional Forester's Sensitive Species List (2013) and the Tonto National Forest Sensitive species list, dated February 2015, were used in determining which, if any, listed species or critical habitat may be affected by the proposed action. The most current and available data on species, available habitat, survey history, biologists knowledge and experience, and a review of the Arizona Game and Fish Departments (AGFD) Heritage Data Management System (HDMS) and HabiMap were used to determine if any listed species, or their habitats may be affected by the proposed action.

The table below lists the species key habitat elements, their status within the project area, proposed mitigation/conservation measures, and a determination of impacts for designated sensitive species.

Common Name *Scientific Name*	**Key Habitat Elements**	**Status within Action Area**	**Mitigation/Conservation Measures**	**Determination of Impacts**
BIRDS				
Clark's grebe *Aechmophorus clarkia*	Marshes, lakes and bays. In migration and winter also sheltered seacoasts, less frequently along rivers. Nests among tall plants growing in water on edge of large areas of open water.	No suitable habitat within the action area.		No impact

American peregrine falcon *Falco peregrinus anatum*	Potential to Occur. Mountain cliffs and river gorges; eyries exist on dominant cliffs that generally exceed 200 feet in height; nests are usually situated on open ledges. Preferred hunting habitats include cropland, meadows, river bottoms, marshes, and lakes.	Not known to occur within the project area.		No impact
Northern goshawk *Accipter gentiles*	No Potential to Occur. Forest habitat generalist that uses a variety of forest types, ages, structural and success ional stages; primarily occupies ponderosa pine, mixed conifer, and spruce-fir habitats and prefers mature conifer stands with dense canopies for nesting; preys on small to medium sized birds and mammals.	No suitable habitat within the action area.		No impact
Bald Eagle *Haliaeetus leucocephalus*	No Potential to Occur.	No suitable habitat within the action area.		No impact
Yellow-eyed junco *Junco phaeonotus*	No Potential to Occur Inhabits coniferous forest clad mountains and canyons of SE AZ, most abundant in forests that are cooler, wetter and shaded. Commonly nesting from 5900 to 10,000 feet. Northern most populations from Pinal Mts (Gila Co.), higher elevations of Pinaleno, Santa Catalina, Rincon, Santa Rita and Chiricahua mountains, and eastern slopes of Huachuca Mountains. recently found nesting in Mule Mts. (Corman and Wise-Gervais 2005).	No suitable habitat within the action area.		No impact

Sulphur-bellied flycatcher *Myiodynastes luteiventris*	No Potential to Occur Sycamore-walnut canyons. On the Tonto NF, found mainly in lower parts of canyons in the mountains, where tall sycamores and other trees grow along streams through pine-oak forest. Also locally in sycamores and cottonwoods along streams at lower elevations. In the tropics, found in open woods, groves, and forest edges.	No suitable habitat within the action area.		No impact
REPTILES				
Sonoran desert tortoise (Sensitive/ Candidate) *Gopherus morafkai (Sonoran population)*	Potential to Occur. This species occurs across much of southwestern Arizona's Sonoran desert, principally in rocky foothills and less often on lower bajadas and in semi desert grassland; 510-5,300 ft.	Known to occur within the action area.	Conservative utilization levels are expected to provide adequate forage for both livestock and tortoises where habitat overlaps.	May affect individual Sonoran desert tortoise, but will not result in a trend toward federal listing or loss of viability. See biological evaluation.

Bezy's night lizard *Xantusia bezyi*	Potential to Occur. This Arizona endemic is found in a small chain of mountain ranges in central Arizona at elevations ranging from 730 m (2,400') to about 1,770 m (5,800'). Rugged, rocky slopes and boulder fields within the Arizona Upland Sonoran Desertscrub and Interior Chaparral communities are home to this lizard. Patches of Great Basin Conifer Woodland also occur within its range. This crevice-dweller frequents large outcroppings and large boulder clusters and is occasionally encountered in and under plant debris such as dead Dasylirion.	Not known to occur within the action area.		No impact
AMPHIBIANS				
Northern leopard frog *Rana pipiens*	No Potential to Occur. Variety of habitats including grassland, brush land, woodland, and forest ranging high into mountains, usually in permanent waters with rooted aquatic vegetation; also frequents ponds, canals, marshes, springs, and streams; 2,640-9,155 ft. Extirpated on the Tonto National Forest	Not known to occur within the action area.		No impact

Western barking frog *Craugastor augusti cactorum*	No Potential to Occur. Terrestrial; in Arizona, found within Madrean evergreen woodlands, yucca-covered hills, brushy woodlands, open pine forests, juniper-live oak woodland, and low dense clumps of cactus; 4,200 –6,200 ft.	Not known to occur within the action area. Known from Cochise and extreme southern Pima and Santa Cruz counties, including Quinlan, Santa Rita, Patagonia, Huachuca, and Pajarito Mts. Unconfirmed report from Sierra Ancha in Gila County.		No impact
Lowland leopard frog *Lithobates yavapaiensis*	Potential to Occur. Generally occurs below 3,500 feet on the TNF; generally restricted to permanent waters with aquatic and herbaceous vegetation.	Known to occur within the project area; Hutch tank, Copper Spring, and Silver Creek. Likely occurs within other riparian habitat within the action area.	The grazing alternative includes a rotational grazing system and riparian utilization guidelines which will allow for species establishment and recruitment. Proposed fencing of Silver Creek and springs within the action area will further protect this species from direct and indirect impacts from livestock grazing.	May impact individuals, but unlikely to lead to listing or loss of viability. See biological evaluation.
FISH				
Round tail chub *Gila robusta*	No Potential to Occur. Found in lotic riparian systems; occupies cool to warm water, mid-elevation streams and rivers where typical adult microhabitat consists of pools to 8 feet deep adjacent to swifter riffles and runs; cover is usually present and consists of large boulders, tree root wads, submerged large trees and branches, undercut cliff walls or deep water.	Not known to occur within project area. On TNF, it occurs in the Verde and Salt rivers and many of their larger tributaries.		No impact

Desert sucker *Catostomus clarkii*	Potential to Occur. Found in rapids and flowing pools of streams, primarily over bottoms of gravel-rubble with sandy silt in the interstices; 1,000-6,000 ft.	Not known to occur within action area.		No impact
Headwater chub *Gila nigra*	No Potential to Occur. Medium-sized streams in large, deep pools often associated with cover such as undercut banks or deep places created by trees or rocks. 3,000-6,700 ft.	Not known to occur within the action area.		No impact
Sonora sucker *Catostomus insignis*	Potential to Occur. Gravelly or rocky pools of creeks and rivers; found in a variety of habitats from warm water rivers to trout streams; 1,000 and 6,500 ft.	On TNF, it is found in the Salt and Verde rivers and larger tributaries below about 6,500 feet. It is not known to occur within the action area.		No impact
PLANTS				
Pima Indian mallow *Abutilon parishii*	Potential to Occur. Mesic situations in full sun in higher elevation Sonoran desert scrub, desert grassland, and Sonoran deciduous riparian forest; typical localities are on rocky hillsides, cliff bases, lower side slopes and ledges of canyons among rocks and boulders; in riparian zones, can occur on flat secondary terraces but typically not in canyon bottoms; 3,000 -4,800 ft.	Action area is within the elevation range for this species; however, it is not known to occur on this allotment.		No impact

Tonto basin agave *Agave delamateri*	Potential to Occur. South and southwest facing slope edges and atop benches, occasionally on northeast facing gentle slopes; occupies cobble and gravelly, deep and well-drained soils and is often associated with prehistoric sites; 2,300-5,100 ft.	Not known to occur within the action area. Action area is within the elevation range for this species. The greatest concentration of sites occurs along the south end of Tonto Creek near the northwest end of Roosevelt Lake in Tonto Basin, outside of the action area.		No impact
Hohokam agave *Agave murpheyi*	Potential to Occur. South-central Arizona in Sonoran Desert; found on gentle bajada slopes, benches or terraces above major drainages with prehistoric habitations and/or agricultural sites (that suggest tending); requires well-drained soil; 1,300-2,400 ft.	Not known to occur within the action area.		No impact
Mt. Dellenbaugh sandwort *Arenaria aberrans*	No Potential to Occur. Occurs mainly in oak and pine forests; also in open pine and pine-pinyon woodlands, and among junipers; south, north and northeast facing aspects; 5,500 to 9,000 ft.	Not known to occur in the action area. Known from north and north-central Arizona in Coconino, Mohave, and Yavapai counties, and possibly Gila County.		No impact

Chihuahuan sedge *Carex chihuahuensis*	No Potential to Occur. North and northwest-facing slopes in wet soils in streambeds, wet meadows, cienegas, marshy areas, shallower draws in pine-oak forest and riparian woodland in southeastern Arizona; 1,100-8,000 ft .	Not known to occur in the action area. Known to occur in the Chiricahuas, Huachucas, Pinalenos, Santa Catalinas, San Luis Mountains, Rincons, Atascosas, Santa Ritas, and along the Santa Cruz River and San Bernardino Valley.		No impact
Cochise sedge *Carex ultra (=C.spissa var. ultra)*	No Potential to Occur. Southeast-facing, often shaded exposures in moist soil near perennially wet springs and streams; typically found in wet alluvial soil, sand and gravels, associated with aquatic/riparian woodlands or oak-pinyon woodlands in southeastern Arizona; 2,000 to 6,000 ft.	Not known to occur in the action area. It is not known to occur on the TNF. Occurs in single patches in the Chiricuahuas, Dragoons, Galiuros, Santa Ritas, Atascosa Mountains, Hieroglyphic Mountains, Aravaipa Canyon, and the Huachucas (several patches).		No impact
Arizona bugbane *Cimicifuga arizonica*	No Potential to Occur. Moist, forested areas near perennial streams, intermittent streams or seeps; rich fertile soils, high in humus are typical; surrounding vegetation is generally mixed conifer with an under story of deciduous shrubs and trees that is often dense and shady; 6,000 -8,300 ft.	No suitable habitat present within action area.		No impact

Mogollon fleabane *Erigeron anchana*	No Potential to Occur This plant is a central Arizona endemic limited to the Sierra Ancha and Mazatzal mountains in Gila County. It grows in limited habitat of granite cliff faces in chaparral through pine forests. These communities can produce very hot fires. The potential effects for this plant are unknown. There are possible impacts to this plant from trail building and recreation.	Not known to occur in the action area		No impact
Fish creek fleabane *Erigeron piscaticus*	Potential to Occur. Sandy alluvium substrates in canyon bottoms associated with riparian habitats near perennial streams; 2,250-3,500 ft.	Not known to occur in the project area.		No impact
Ripley wild buckwheat *Eriogonum ripleyi*	No Potential to Occur. Inhabits heavily calcareous soils in Sonoran desertscrub and pinyon-juniper woodland; 2,000-6,000 ft.	Not known to occur in the project area.		No impact
Eastwood alum root *Heuchera eastwoodiae*	Potential to Occur. This species grows in rocky areas on hillsides and along streams from chaparral up to ponderosa pine forest. It is known only from central Arizona. It may be vulnerable to fire, particularly in chaparral habitats.	Not known to occur in the project area.		No impact

Arizona alum root *Heuchera glomerulata*	No Potential to Occur. North-facing shaded rocky slopes, near seeps, springs and riparian areas, often in humus soil; typically associated with oak and pine woodlands, ponderosa pine, and mixed conifer vegetative communities; 4,000-9,000 ft.	Not known to occur in the action area. Known to occur in one locality on the TNF, in the Pinal Mountains south of Globe, Arizona.		No impact
Horseshoe deer vetch *Lotus mearnsii var. equisolensis*	No Potential to Occur. White powdery gypsum limestone soils within the Sonoran Desert.	Not known to occur within the action area; only known to occur near Horseshoe Reservoir.		No impact
Mapleleaf false snapdragon *Mabrya acerifolia (=Maurandya a.)*	Potential to Occur. Shaded cliffs and rock ledges; stems often hang down from moist rock ledges; 2,000 ft.	Not known to occur within the action area.		No impact
Toumey groundsel *Packera neomexicana var. toumeyi (=Senecio n. var. t.)*	No Potential to Occur. Most commonly found in oak chaparral, and sometimes in pine forest; loose rocky soil in coniferous woodlands; 3,000-9,000 ft.	Not known to occur in the action area. Known from the Chiricahua and Huachuca mountains in Cochise County and reported from the Pinal Mountains in Gila County.		No impact

Verde breadroot *Pediomelum verdiensis*	No Potential to Occur. This plant grows on white powdery gypseous limestone of Tertiary lakebed deposits where it occurs with several other rare plants adapted to this specialized habitat.	Not known to occur in the action area.		No impact
Salt River rockdaisy *Perityle gilensis var. salensis*	No Potential to Occur. Grows near seeps on cliff faces, ledges and rock outcrops; affinity for steep cliff faces and rocky bluffs; 3,000-4,000 ft.	Not known to occur in the action area. Known only from the San Carlos Indian Reservation on the Salt River between Show Low and Globe.		No impact
Fish creek rockdaisy *Perityle saxicola*	Potential to Occur. Cracks and crevices on cliff faces; large boulders and rocky outcrops in canyons and on buttes composed of Barnes conglomerate and Mescal limestone. Habitats are very xeric; plants are often associated with east and northeast exposures in Arizona Upland Division of Sonoran desertscrub; 2,000 - 3,500 ft.	Not known to occur in the action area.		No impact
Arizona phlox *Phlox amabilis*	No Potential to Occur. This plant is a central Arizona endemic. It occurs in open, exposed, limestone or basalt rocky slopes within pinyon-juniper and ponderosa pine-gambel oak communities.	Not known to occur in the action area.		No impact

Hualapai milkwort *Polygala rusbyi*	No Potential to Occur. Limestone dependent; 3,200-5,000 ft	Not known to occur in the action area.		No impact
Blumer's dock *Rumex orthoneurus*	No Potential to Occur. Mid- to high-elevation wetlands with moist, organic soil adjacent to perennial springs or streams in canyons or meadow situations.	Not know to occur in the action area. East-central to southeastern Arizona (depending on taxonomic interpretation). Huachuca Mountains in Santa Cruz County (historic); Chiricahua Mountains in Cochise County; Sierra Ancha Mountains in Gila County. Also reported from the Gila, Baldy and Pecos Wilderness Areas in New Mexico		No impact
Galiuro sage *Salvia amissa*	No Potential to Occur. Shady canyon bottoms near streams; typically occurs on the floodplain in alluvium; Intermittent stream with good overstory and steep canyon walls. associated with oak woodland, deciduous riparian woodlands, and is commonly found where sycamore, ashes and willows grow; 1,500-5,000 ft.	Not known to occur in the action area. The primary range for the species is in southern Arizona including Aravaipa Creek, Santa Catalina, Galiuro and Winchester Mountains.		No impact

Aravaipa woodfern *Thelypteris puberula var. sonorensis*	No Potential to Occur. Moist soil in the shade of boulders in mesic canyons; on riverbanks, seepage areas, and meadow habitats; 2,220-4,500 ft.	Not known to occur within the action area; project area is within the elevation range. Know from Coconino, Maricopa, Pima, Pinal and Yavapai counties.		No impact
Mogollon Fleabane *Erigeron anchana*	No Potential to Occur. Rock crevices and ledges on boulders and vertical rock faces usually in canyons; occurs at various exposures on igneous and metamorphic granites, in chaparral, pinyon-juniper and pine-oak forests; 3,500-7,000 ft. It is closely tied to moist habitats associated with riparian areas; specifically, riparian habitats that support more mesic conditions than the associated uplands, often with perennial water, represent the best suitable habitat.	Not known to occur within action area.		No impact
Arizona Phlox *Phlox amabilis*	No Potential to Occur. Open exposed limestone-rocky slopes within pinyon-juniper woodlands and ponderosa pine-gambel oak communities; 3,500-7,800 ft.	Not known to occur within action area. This plant is endemic to central Arizona, and is known to occur near Prescott and Payson, Arizona.		No impact

Blumer's dock *Rumex orthoneurus*	No Potential to Occur. Wetlands habitat, moist loamy soil adjacent to springs and flowing streams in open meadows or meadows with overstories; surrounding forested areas characterized by mixed conifer. Typically occurs in open, sunny locations, but can occupy more shaded sites; above 6,500 ft.	No suitable habitat within action area.		No impact
Eastwood Alum Root *Heuchera eastwoodiae*	No Potential to Occur. Moist slopes in ponderosa pine forests and canyons; 5,000-8,000 ft.	No suitable habitat within action area.		No Impact
INSECTS				
Parker's cylloepus riffle beetle *Cylloepus parkeri*	Potential to Occur. Permanent, clean, slow moving small streams, with loose gravelly substrate and very little sand; 2,850 - 4,000 ft.	Not known to occur within the action area. Only known occurrences are within Roundtree Canyon and possible Tangle Creek.		No impact
Netwing midge *Agathon arizonicus*	No Potential to Occur. Confined to areas in the immediate vicinity of rapidly flowing streams. Larvae and pupae occur on smoothed-faced rocks and boulders in swiftly moving torrential waters, often in waterfalls; above 6,000 ft.	No suitable habitat within action area.		No impact

A. Caddisfly *Wormaldia planae*	No Potential to Occur A Caribean genus, Wormaldia is more or less restricted to the cooler spring-fed streams in mountainous regions of Middle America. (Flint 1968). This species was originally described from Chiapas, Mexico; but was recently found in Arizona from Gila to Yavapai Cos. (Gila Co.: Line Fossil Creek, Fossil Creek; Yavapai Co.: Beaver Creek, below outlet of Montezuma Well, unnamed stream at Ward Ranch) (Munoz-Quesada and Holzanthal, 2008).	Not known to occur within action area.		No impact
A. Mayfly *Fallceon eatoni*	No Potential to Occur Mexican species that was rediscoverd in 2005 for first time since 19th century collection in Sonora Mexico in 1892, thus proving their continued existence. The discovery took place in Salt River Canyon, Gila County in 2005.	Not known to occur within the action area.		No impact
SNAILS				
Fossil springsnail *Pyrgulopsis simplex*	No Potential to Occur. They are typically found only in the headspring and upper sections of the outflow; requires a perennial source of flowing water; 4,140 - 4,310 ft.	Not known to occur within the action area.		No impact
MAMMALS				

Western red bat *Lasiurus blossevillii*	Potential to Occur. Deciduous riparian and other wooded areas; roosts by day in trees; summer roosts usually in tree foliage, sometimes in leafy shrubs or herbs, often found in trees of fruit orchards; may also roost in saguaro boots and occasionally in cave-like situations; feeds on insects; 1,900-7,200 ft.	Not known to occur within project area.		No impact
Spotted bat *Euderma maculatum*	No Potential to Occur. Found in varied habitats: low desert in southwest Arizona to high desert, riparian habitats in northwest Arizona and conifer forests in northern Arizona; roost singly in crevices on rocky cliffs that several hundred feet vertical with surface water nearby; primarily feeds on moths; 110-8,670 ft.	Not known to occur within project area.		No Impact
Allen's lappet-browed bat (Allen's big-eared bat) *Idionycteris phyllotis*	No Potential to Occur. Primarily roost in caves and abandoned mine shafts within mountainous pine and oak forests; also known to roost in old pine trees and snags; primarily feeds on soft bodied insects; most specimens are at altitudes between 3,500- 7,500 ft.	Not known to occur within the action area.		No impact

Pale townsend's big-eared bat *Corynorhinus townsendii pallescens*	Potential to Occur. Summer day roosts are caves and mines in desert scrub to woodlands and coniferous forests; in winter, they hibernate in cold caves, lava tubes and mines mostly in uplands and mountains from the vicinity of the Grand Canyon to the southeastern part of the state; feeds on small moths; 550-7,520 ft.	Not known to occur within the action area.		No impact