United States Department of Agriculture

Bar X Allotment & Heber-Reno Sheep Driveway Grazing Authorization

Final Environmental Assessment

Forest Service

Tonto National Forest,
Payson & Pleasant Valley Ranger District

December 2019

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Chapter 1: Purpose of and Need for Action

Project Area Description and Location

Bar X

The combined Bar X, Colcord Canyon, Haigler Creek, and Young grazing allotments, henceforth referred to as **Bar X**, are located on the Pleasant Valley Ranger District, approximately eight miles north of Young, Arizona in Gila County (Figure 1). It encompasses a total area of 27,423 acres spread out over 23 pastures and holding areas. Pastures range in size from 675 acres to 10,900 acres. The Red Lake, Gentry Mountain, and Pleasant Valley allotments form Bar X's eastern boundary, Marsh Creek allotment is to the west, and 13 Ranch and Ellinwood allotments are the northern boundaries. The Heber-Reno Sheep Driveway bisects the allotments diagonally from northeast to southwest.

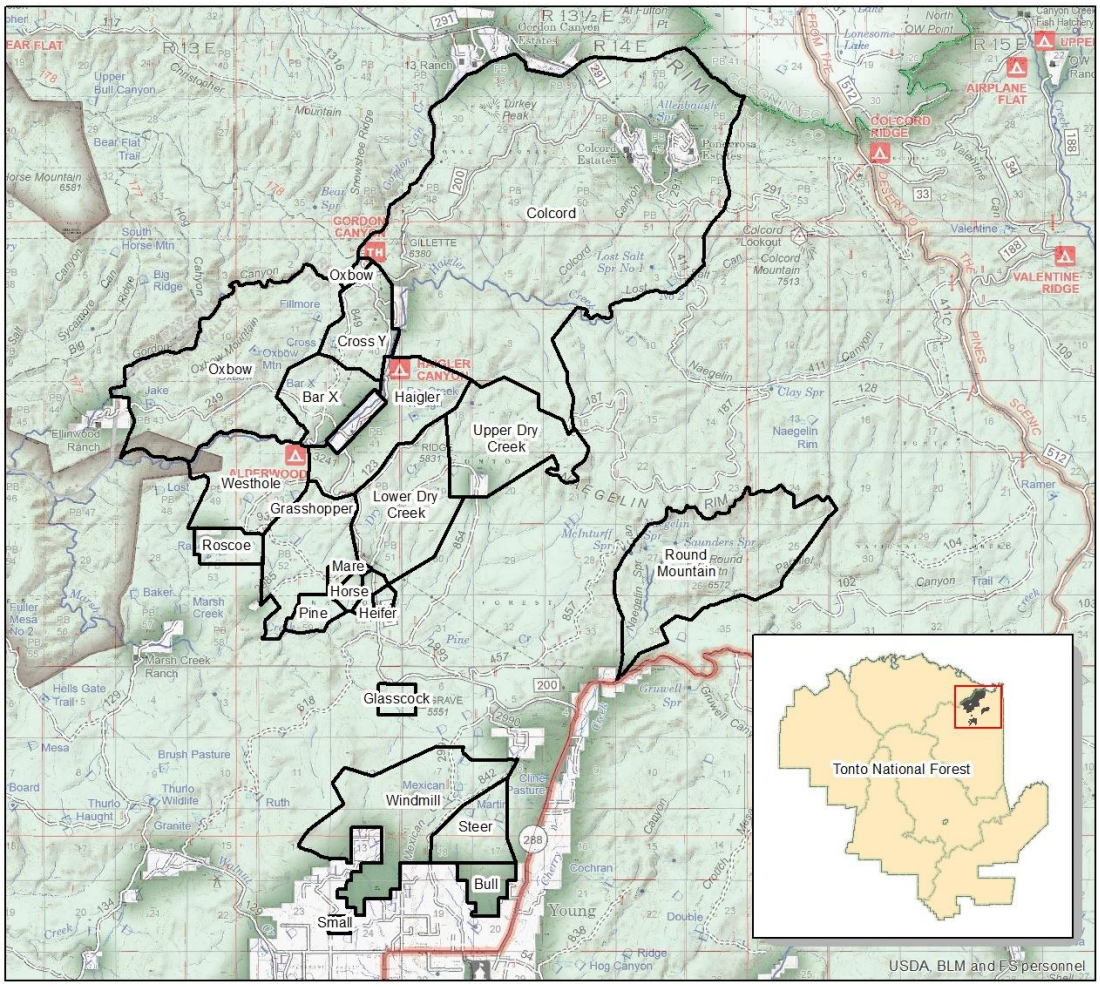

Figure 1: Map of Bar X with Pastures

Heber-Reno Sheep Driveway

The Heber-Reno Sheep Driveway bisects the Pleasant Valley Ranger District diagonally from northeast to southwest, running just north of Young before ending on the Apache Sitgreaves National Forest (Figure 2). The **Driveway** is located over approximately 26 linear miles and on 33,780 acres of the District, and it borders eleven different active cattle grazing allotments, on the Tonto National Forest. It is divided into eight pastures, ranging in size from 630 acres to 6,990 acres.

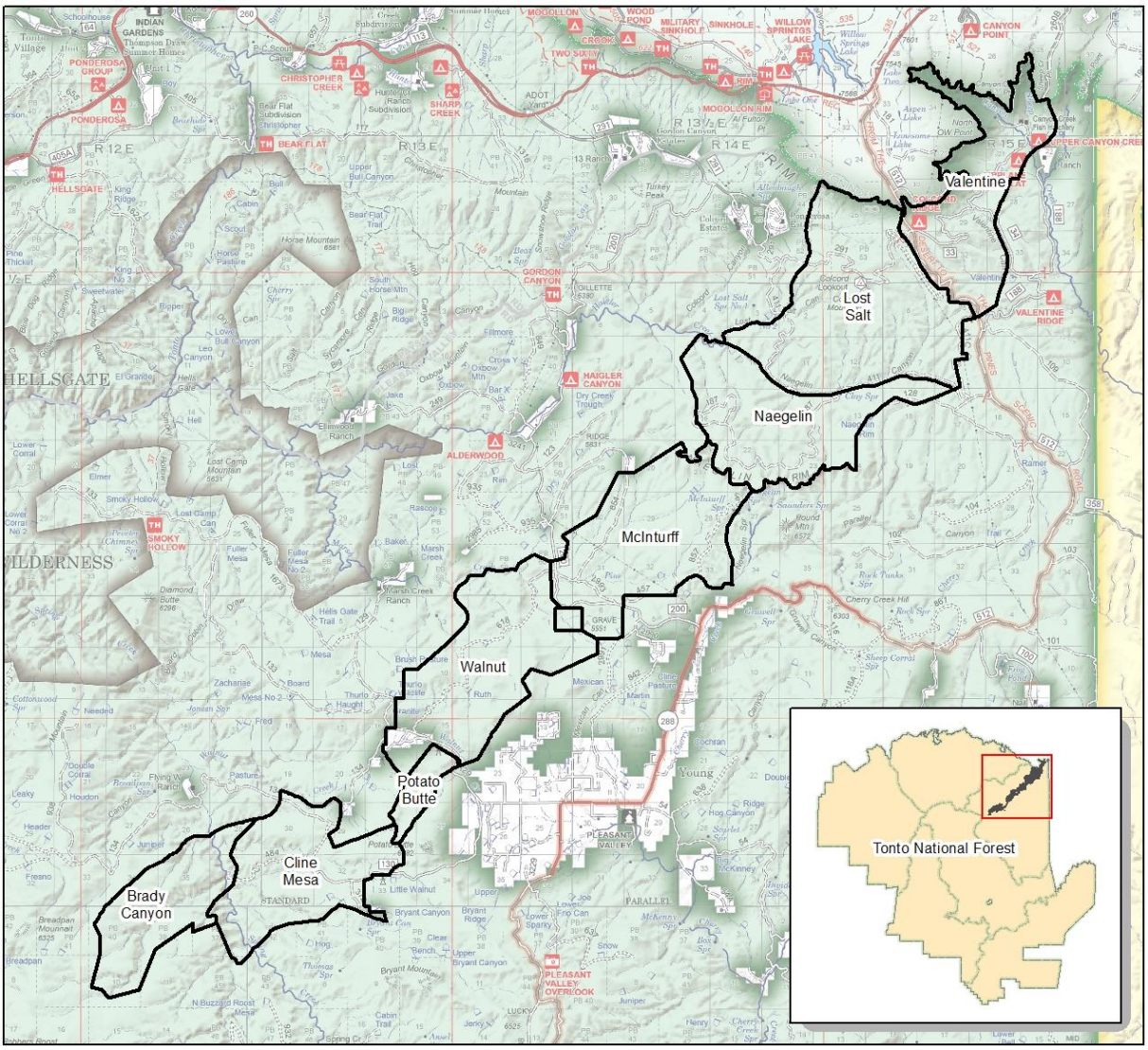

Figure 2: Map of the Driveway with Pastures

Both Bar X and the Driveway have similar topography composed mostly of gently rolling slopes intersected by several minor drainages and canyons, while the remainder is steep and rocky. Canyons along Haigler Creek, Spring Creek, the Naegelin Rim, and beneath the Mogollon Rim are very steep slopes with rocky bluffs and outcroppings with little vegetation. Elevations range from around 4,000 feet in the canyon of Spring Creek to 7,600 feet at the lip of the Mogollon Rim. The mean annual precipitation for the area is 22 inches.

Management History

Bar X

Bar X, Colcord Canyon, Haigler Creek, and Young grazing allotments have been run as a single operation under one term grazing permit since 1973. NEPA was last completed for these allotments in 1979. During that time, it was determined resource conditions on allotment were in need of improvement based on of years of mismanagement and overstocking. To address this, stocking rates were reduced from 468 adult animals to 59 adult cattle year long and the Colcord Canyon allotment and Turkey Peak pasture (the area labeled Colcord Pasture in Fig. 1) were removed from grazing. The intent was to improve long term productivity and economic viability by improving the range forage base. This management plan has been in place for the last 40 years and during this time conditions have improved. The results of past management are further evaluated in the existing condition portion of the document.

While studies from the Bar X's past were reviewed and considered by the ID team, analysis was focused on the most current data and best available science for this Environmental Analysis. The intent was to provide the deciding official with the most accurate, reliable, and relevant data for use in this Decision. Current management history is evaluated by looking at the last 12 years of data, when the current permitee was first issued a permit for Bar X.

Since then livestock numbers have slowly increased but averaged 3,707[1] animal unit months (AUMs) per year. This range falls within carrying capacity estimates based on acreage and estimated forage production (Holecheck, 2012).

The most recent allotment management plan (AMP) is from 1981 and excludes grazing in Colcord Canyon allotment and Turkey Peak pasture due to potential effects from grazing on resources. Although the intention was to continue monitoring the grazing viability of these areas at that time, this did not occur, and no administrative decision was ever made to reassess these areas for livestock use. During the 2015 and 2018 grazing season, cattle were authorized to use these areas on a trial basis so data could be gathered for this *National Environmental Policy Act* (NEPA) analysis of the proposed grazing authorization to determine if there were negative effects to the other resources (FSH 2209.13).

Heber-Reno Sheep Driveway

The Heber-Reno Sheep Driveway has been used to move sheep to and from winter grazing grounds to summer pastures on the Apache-Sitgreaves National Forest above the Mogollon Rim since the late 1890s. This use began before the establishment of National Forests.

The Driveway spans across the Mesa, Tonto Basin, and Pleasant Valley Ranger Districts of the Tonto National Forest. In the Mesa and Tonto Basin Districts, the Driveway is a permitted area for sheep which overlays cattle grazing allotments, allowing use from both types of livestock. In the Pleasant Valley District, the Driveway once overlaid cattle grazing allotments as well; however, it is currently a distinct fenced in area, apart from the adjacent allotments.

In 1963, a district-scale vegetation rehabilitation project began on the Driveway that involved reseeding, terracing, and juniper control work. At that time, the Forest Service fenced large portions of the

[1] Equivalent to 234 cow/calf pairs.

Driveway to be segregated from the adjoining allotments. A letter from the Forest Supervisor from 1964[2] reinforces the intention of the Forest Service not to permanently close the Driveway. The intent was to provide temporary cattle control during the rehab work. However, administrative action of authorizing permittees back onto the driveway did not occur and the fencing still remains.

Based on monitoring[3], the Driveway has been determined to have excess forage that could be used by cattle. In 2010, the permittee for the Bar X was given permission to return to grazing portions of the Driveway historically granted to that allotment. In addition, the permittee was allowed to increase their authorized numbers above permitted numbers because of the additional acreage. This carrying capacity was evaluated using a "stock and monitor" approach rotations. This involved measuring the effects of stocking levels over time to see if changes in stocking and/or management were needed (Forest Service Handbook 2209.13 Chapter 90). In 2011, the neighboring Soldier Camp allotment followed suit and was given permission to graze portions of the Driveway they had once used, along with an increase in their authorized numbers. From 2011-2018, the Driveway was authorized for a yearly average of 1,720 AUMs.

The Decision Notice and Finding of No Significant Impact (DN/FONSI) for the Heber-Reno Sheep Driveway, signed in February 2011, continued to authorize the use of the Driveway for sheep. Additionally, it authorized one pasture on the Driveway that is part of the Potato Butte allotment for both sheep and cattle use.

In 2018, the permittees for both the Soldier Camp and the Bar X allotments were informed they would no longer be authorized to use the Driveway areas and future use would be determined when a NEPA analysis is completed.

This document does not affect the 2011 Heber-Reno Sheep Driveway Decision which authorizes the Driveway's use by domestic sheep. This analysis is limited strictly to consideration of alternatives contained within the document and does not in any way change any other existing authorizations for use of the Driveway. This means that the Driveway will continue to be authorized for domestic sheep, regardless of any decisions resulting from this document.

Table 1 lists the eight pastures on the Driveway and the cattle grazing allotment which they were historically used by.

Table 1: Historic Use of Driveway Pastures

Driveway Pasture	Historic Allotment Use
Valentine	OW
Lost Salt Naegelin McInturff Walnut	Bar X
Potato Butte	Potato Butte
Cline Mesa Brady Canyon	Soldier Camp

[2] This letter can be found in the project record

[3] See the Vegetation section of the Existing Conditions part of this document for additional information.

Current Grazing Management

Bar X

The Bar X permittee incorporates a rotational grazing strategy to allow rest on grazed plants. Grazed pastures are rested the following year allowing for up to 24 months of non-use before being grazed again. Typically cattle graze the north end of Bar X in the summer time, and the south end in the winter. Pastures within the Bar X allotments typically do not have specific dates that they must be used. However, there are some resource-specific mitigations that limit their use. In 2008, the Tonto National Forest received a letter of concurrence from U.S. Fish & Wildlife Service after completing a Biological Assessment (BA) titled *Informal Ongoing Grazing Consultation for 33 Allotments*. According to the proposed action listed in the BA, livestock were excluded from grazing the Turkey peak, Colcord Canyon, or Lost Salt pastures due to the presence of Mexican Spotted Owl protected activity centers (PACs). Cattle were permitted to graze the Round Mountain pasture, which contains a portion of a PAC, during non-breeding season (September through February).

Monitoring during the grazing year focuses on grazing intensity and utilization, which is estimated by evaluating the amount of a grazed plant remaining while considering plant vigor, current annual precipitation, and the growth stage of key species. Utilization is limited to 30 to 40 percent for upland grasses, 50 percent for desirable browse species, 50 percent for woody riparian species, and 40 percent for herbaceous riparian species. Every year annual operating instructions (AOI) are developed in coordination with the permittee, which determine the time of year and duration of use that pastures will be grazed and ungrazed throughout the upcoming year.

Heber-Reno Sheep Driveway

Based on the 2011 decision, up to 8,000 sheep are permitted to graze the Driveway as they trail through on their way to the Apache-Sitgreaves National Forest. Use may occur two times per year, in spring and late summer. In the past decade, the permittee for the Driveway has sought authorization to use the Driveway four times and at significantly lower number of sheep than permitted. More commonly, the permittee has opted to truck sheep to summer grazing allotments, rather than herd them across the Driveway.

From 2010 to 2018 cattle were authorized to use portions of the Driveway again. During this time cattle permittees were responsible for coordinating with sheep permittees to determine if they would be using the Driveway during a grazing season. Sheep were given first priority for forage utilization on the Driveway, with excess forage available to cattle until utilization limits are reached. Competition between the two animals using the driveway was not observed as sheep tend to utilize more browse and cattle graze on grass.

Existing Range Improvements

Range improvements on the Bar X have been added over time as permitted by regulations. As improvements were constructed, maintenance responsibility was added to the term grazing permit.

Improvements have been added to areas of the Driveway as well, with maintenance responsibility being assigned to the corresponding allotment permittee responsible for their initial construction.

The current status of improvements vary and are evaluated depending on various factors: accessibility, water production, and changed management strategies. The Forest Service requires all improvements listed in the Term Grazing Permit to be maintained to standards agreed upon by the permittee and the Forest Service through a permit modification or Annual Operating Instructions. Improvements on Forest Service lands are property of United States Government.

Existing and Desired Conditions

This EA is based upon background information about the allotment and Driveway including current and past inventory and monitoring data and desired conditions of resources on the project area. This information is derived from direction and guidelines in the Forest Plan and from resource specialists' knowledge of the project area.

Existing conditions describe the current management situation and environmental conditions within the project area. Desired conditions describe how the resource should function after the project is implemented and are defined by 1985 Tonto National Forest Land Management and Resource Plan (Forest Plan) Standards and guidelines and the best available scientific information.

The Forest Plan identifies management prescriptions and management emphasis for particular management areas across the Tonto National Forest. Bar X is within Management Areas 5G, 5D, and 5B and the Driveway is within Management Areas 5G and 5D (U. S. Forest Service 1985). The Forest Plan provides guidance for management of multiple-use activities that occur within the Tonto National Forest. The Forest Plan provides objectives, standards, guidelines and management area direction relevant to the project and desired conditions for resources. Grazing is one of the many uses allowed on the Forest and the project area is determined suitable for grazing.

The Tonto National Forest allows the provision of forage for grazing, in support of domestic livestock production, as a viable and sustainable activity. Rangeland ecosystems are diverse, resilient and functioning within a healthy, sustainable landscape in the face of a changing climate. Areas that are grazed have stable soils, functional hydrology and biotic integrity while supporting healthy and diverse populations of native wildlife.

Management Area 5G is the General Management Area for the Pleasant Valley Ranger District. This area emphasizes "managing for a variety of renewable natural resources with primary emphasis on wildlife habitat improvement, livestock forage production, and dispersed recreation. Watersheds will be managed so as to improve them to a satisfactory or better condition. Improve and manage the included riparian areas (as defined by Forest Service Manual (FSM) 2526) to benefit riparian dependent resources." (Forest Plan, page 164)

Management emphasis for area 5D, the Mogollon Rim-Sierra Ancha area, is to "manage for a variety of renewable resource outputs with primary emphasis on intensive, sustained yield timber management, timber resource protection, creation of wildlife habitat diversity, increased populations of emphasis harvest species, and recreation opportunity. Timber harvesting methods and timing will include improvement of wildlife habitat quality and watershed condition and will consider impacts on intensive range and recreation management. Mining activities are authorized in conformance with existing laws and regulations. Visual quality protection will be emphasized in the area (analysis area 5542) of the

Highline Trail, a National Recreation Trail" (U. S. Forest Service 1985, page 151). *Areas accessible to livestock or wildlife will be grazed on a sustained yield basis without damage to other resources. Grazing management shall improve rangelands in less than satisfactory condition.*

Management Area 5B encompasses the Hellsgate Wilderness. The primary emphasis for this area is to "manage for wilderness values, wildlife habitats and natural ecological processes while allowing livestock grazing and recreation opportunities that are compatible with maintaining these values and processes." (U. S. Forest Service 1985, page 147)

Resources chosen to illustrate the existing and desired condition for this project are indicators of range management: vegetation, soils, riparian, water quality, and watershed conditions. For resource managers to determine if a project is maintaining or moving toward its desired condition, the resource's condition must be measurable over time.

Vegetation

Existing Conditions

Both the Bar X and the Driveway share similar vegetative conditions. The higher elevations in the northern portion of the project area is ponderosa pine (*Pinus ponderosa)* vegetative community which includes an understory of alligator juniper (*Juniperus deppeana*), scrub oaks (*Quercus* spp.), manzanita (*Arctostaphylos* spp.), and perennial grasses. Moving south, the landscape changes to be primarily pinyon-juniper woodland and juniper grassland. Understories are composed of species such as shrubby buckwheat (*Eriogonum wrightii*), grama (*Bouteloua* spp.) and threeawn (*Aristida* spp.) grasses, and some encroachment by prickly pear.

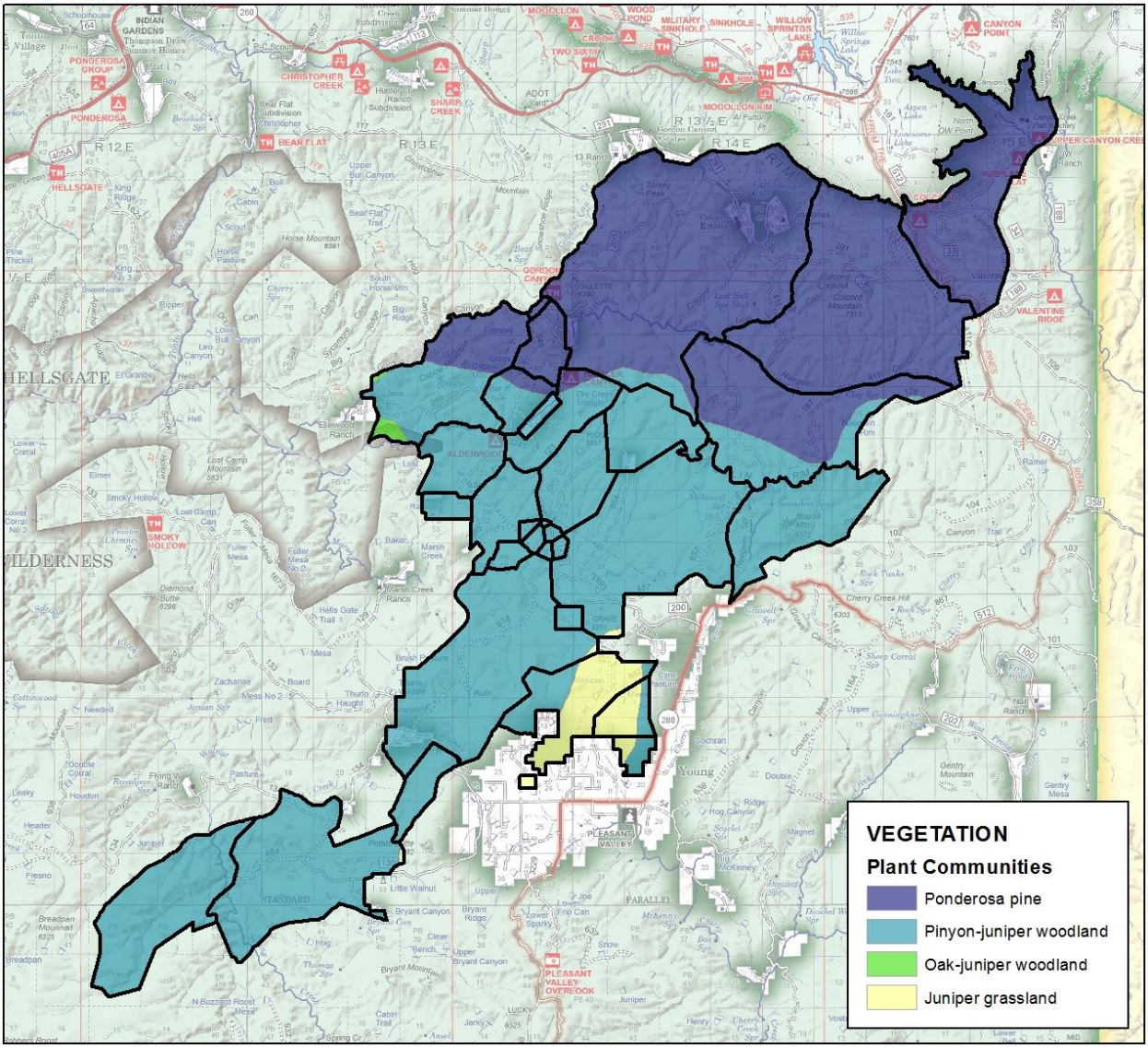

Figure 3: Vegetation Communities on Bar X & the Driveway

Figure 3 shows a map of broad vegetation groups for Bar X and the Driveway. These are groupings of climax plant communities designated by characteristic and diagnostic plants that distinguish one plant community from another (Brown 1995). There may be a large degree of variability within these vegetation groups. The vegetative types were developed from aerial photo interpretation, satellite imagery, and on-the-ground observations. Not all types and delineations were field validated.

Monitoring

The Tonto National Forest utilized "Reading the Range" monitoring protocol, implemented by the University of Arizona Cooperative Extension, which involved gathering data on herbaceous and half shrub vegetative cover, utilization monitoring, forage production, frequency, browse monitoring, onsite precipitation data, and characterization of soils. The intent of this data is to assist rangeland managers in making timely decisions relative to livestock management. Long term vegetative trend can be extrapolated from these data into the future. Protocols for Reading the Range were established

collaboratively between the United States Department of Agriculture's Forest Service and Natural Resource Conservation Service, University of Arizona, University of Arizona's Gila County Cooperative Extension, and local livestock ranchers.

In 2007, eight key areas were established across Bar X as Reading the Range monitoring sites. By 2014, 12 sites had been established. In addition, four sites are located on the Driveway established between 2007 and 2014. 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 (Holecheck, J.L., et al. 2012). 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 (ITR 1996).

Table 2: Current Conditions by Key Area on Bar X

Key Area	Pasture	Dominant Vegetation Type	Ground Cover Trends	Average Forage Production (lbs. per acre)
KA01	Lower Dry Creek	Juniper grassland and oak	Stable, with a slight increase in live vegetation and decrease in rock	310
KA02	Upper Dry Creek	Juniper grassland and oak (vegetation treatment in spring 2008)	Stable, with a slight decrease in live vegetation and bare ground and increase in litter	485
KA03	Grasshopper (northern)	Juniper grassland	Significant increase in live vegetation	653
KA04	Grasshopper (southern)	Juniper grassland	Stable throughout	660
KA05	Westhole	Juniper grassland	Significant increase in live vegetation and decrease in litter	606
KA06	Bar X	Juniper grassland	Significant decrease in live vegetation and increase in bare ground	684
KA07	Oxbow (southern)	Pinyon-juniper	Stable throughout	691
KA08	Windmill	Juniper grassland and oak	Slight increase in bare ground and slight decrease in litter and live vegetation.	854
KA09	Oxbow (northwestern)	Pinyon-juniper	Stable throughout	492
KA10	Pine Creek Exclosure	Pinyon-juniper	Moderate increase in live vegetation with a significant decrease in bare ground.	502
KA13	Colcord (southern)	Ponderosa pine mix	Stable throughout	258
KA14	Colcord (northern)	Ponderosa pine mix	Stable throughout	455

Table 3: Current Conditions by Key Area on the Driveway

Key Area	Pasture	Dominant Vegetation Type	Ground Cover Trends	Average Forage Production (lbs. per acre)
KA12	Walnut	Juniper grassland and oak	Moderate increase in live vegetation and litter with a significant decrease in bare ground.	344
KA02	Potato Butte	Juniper grassland	No change in live vegetation with a decrease in bare ground.	444
KA08	Cline Mesa	Juniper grassland	Stable throughout	945
KA11	McInturff	Juniper grassland (vegetation treatment in 2008-2009)	Moderate increase in live vegetation and a slight decrease in litter and bare ground.	519

Monitoring of these 16 sites show that ground cover types have remained stable throughout[4]. Distance between perennial plants is also measured as a reflection of ground cover and plant distribution. This measurement is called "fetch" and is a value used when discussing soil erosion potential. Trends show only minor fluctuations in fetch, most likely due to climate variability and potential for perennial regrowth. Data is available from the District office.

Production Utilization

Production utilization studies are conducted as a snapshot in time of an area's carrying capacity. They measure how much herbaceous forage is available in a given key area compared to how much is being consumed by cattle.

Production and utilization data has been gathered at key area monitoring sites at the same time Reading the Range was taking place. Generally, utilization has only been slight (one to 20 percent) to light (21 to 40 percent) with infrequent instances of moderate (41 to 60 percent) use. As a result, it was the assessment of the University of Arizona's Gila County Cooperative Extension that "conservative grazing management is being applied, as outlined in the multi-agency document "*Principals of Obtaining and Interpreting Utilization Data on Southwest Rangelands"* (Smith et al. 2005, Revised 2016).

Average herbaceous forage production was between 258 and 945 lbs. per acre across the sixteen key areas. This data, along with distance to water, slope, and percent of allowable forage use were used to help evaluate carrying capacity.

[4] Fluctuations in ground cover may be due to small variations in the transect lines from year to year.

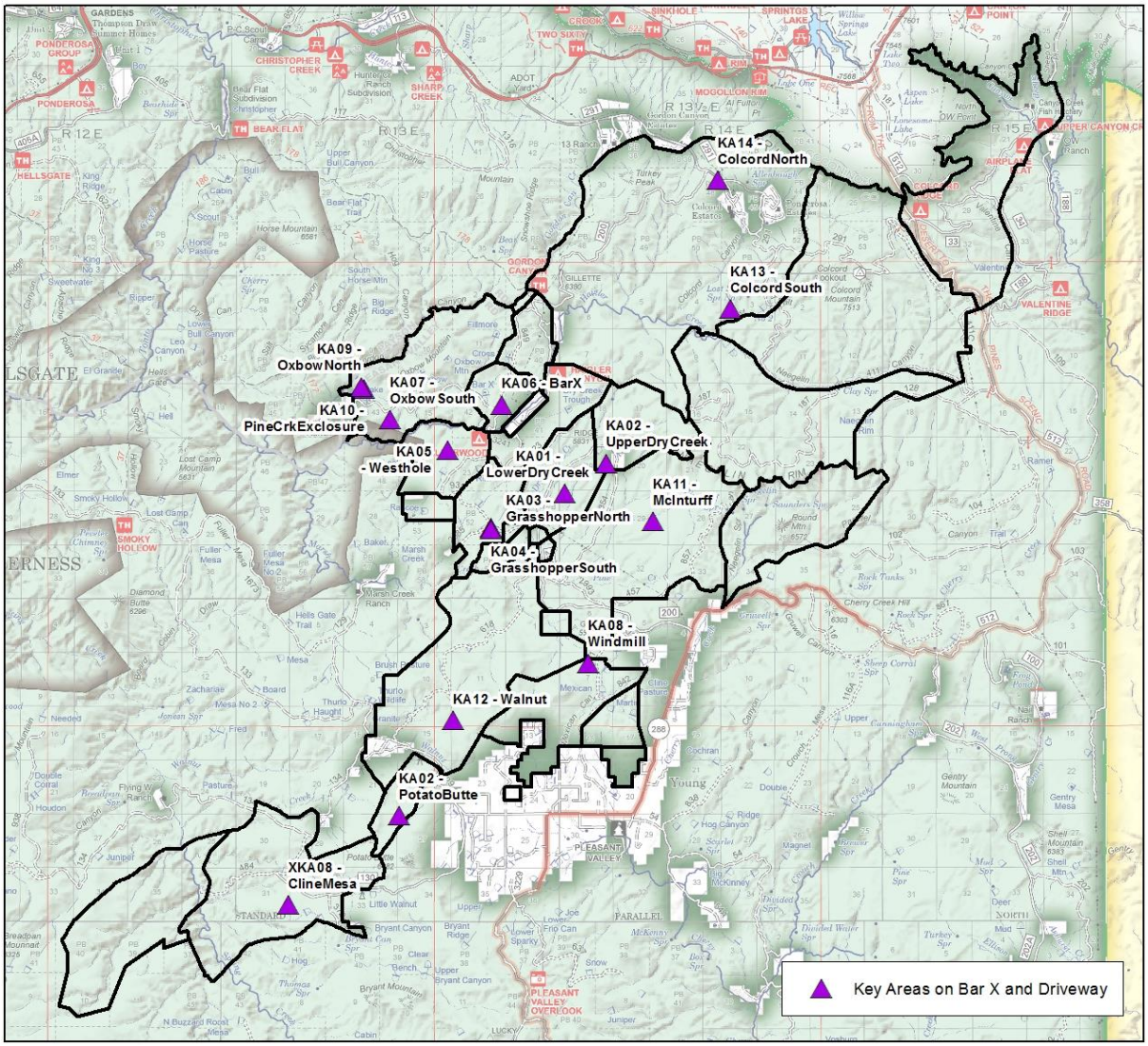

Figure 4: Key Monitoring Areas on Bar X and the Driveway

Desired Conditions

Desired conditions for the analysis area are based on Forest Plan guidance, site-specific knowledge of the allotments, and current scientific information related to the project area. In general, desired condition for the allotments based on the actions associated with grazing management are to maintain or improve soil and water quality, when possible, augment water supplies when compatible with other resources, and enhance riparian ecosystems, when possible, by improved management.

Table 4: Specific Desired Conditions for Bar X and the Driveway

Forest Direction for Domestic Livestock Grazing	Specific Desired Condition	How to Measure Desired Condition
Maintain a minimum of 30% effective ground cover for watershed protection and forage production, especially in primary wildlife forage producing areas. Where less than 30% exists, it will be the management goal to obtain a minimum of 30% effective ground cover.	Maintain or improve litter and vigor through both short term and long-term monitoring in key areas. Grazing would be managed so Allowable Use thresholds are not exceeded, at minimum, during a pasture's grazing period.	Utilize short- and long-term monitoring protocol to capture native plant ground cover, vigor, litter, and herbaceous perennial grass utilization. Monitoring should yield a stable to upward trend.
Maintain and restore riparian ecosystems. Management strategies should move degraded riparian vegetation toward good condition as soon as possible. Damage to riparian vegetation, streambanks, and channels should be prevented.	Limit browse to 50% of leaders on upper 1/3 of plants up to 6 feet tall, 40% utilization of plant species biomass for Deergrass (*Muhlenbergia rigens*), maintain 6-8 inches of stubble height for emergent species such as rushes, sedges, cattails, and horsetails.	Riparian utilization would be measured, at minimum, while livestock are in pasture. Excess utilization would result in management changes.
Implement forest plan forage utilization standards and guidelines to maintain owl prey availability. Promote development of owl habitat.	Utilization in Mexican Spotted Owl PACs and Northern Goshawk habitats would optimally be at 20% (with a maximum of 40%)	Upland utilization would be measured in PACs. Excess utilization would result in management changes.
Maintain potential for beneficial fire while inhibiting potential destructive fire.	Utilization on woody species would not exceed 50% on current year's growth.	Upland utilization would be measured. Excess utilization would result in management changes.
Strive to attain good to excellent range conditions.	Maintain a conservative grazing intensity which results in 30-40% utilization on herbaceous plants at the end of the growing season.	Utilize short- and long-term monitoring protocol to capture native plant ground cover, vigor, litter, and herbaceous perennial grass utilization. Monitoring should yield a stable to upward trend.

Overall desired condition for the analysis area is maintenance and/or restoration of sustainable ecosystems with effective grazing management. Effective grazing management involves implementing prescribed grazing strategies that achieve multiple management goals and outcomes.

Soils

Soil quality assessment and monitoring (soil condition) is necessary to determine watershed condition and long-term soil productivity (FSM 2550.2, 2009). Soil condition monitoring was completed during the Terrestrial Ecosystem Unit Inventory (TEUI) mapping process. Although conceptual in nature, TEUI data sets have been field verified in development and represent the best available science to evaluate soils within the project area. It is an evaluation of soil quality based on an interpretation of factors which determine 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). Another indicator of soil health is ground cover which is described and evaluated in the vegetation sections in Chapter 1 and 3 of the document.

Soils are evaluated and assigned a soil condition category, (satisfactory, impaired, or unsatisfactory), which reflects 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 functions is high.

Generally these soils have not been heavily impacted. These areas are either on slopes that have not been as heavily used or they have heavy shrub cover that has prevented heavy use.

Impaired – The soil indicators (hydrologic function, soil stability, and nutrient cycling) signify a reduction of soil function. The ability of soil to sustain 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.

Generally, these soils have slight to moderate soil compaction and have lost part of the original "A" horizon through moderate sheet and rill erosion. These soils have not been compacted as much as the heavily used soils in unsatisfactory condition. Nutrient cycling is limited as well with a poor distribution of litter in the interspaces. This is percieved from a qualitative perspective from the best available data.

Unsatisfactory – The soil indicators signify that a significant 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.

These soils typically occur in flat, open areas. These soils have a high degree of surface compaction and poor surface soil porosity, resulting in reduced infiltration capacity and potential for moderate to high amounts of sheet, rill or gully erosion. Nutrient cycling is limited as well with a poor distribution of litter in the interspaces. Vegetation diversity and species composition is, typically, low on these soils.

Existing Conditions

The soil condition classes described above are used to determine soil productivity and erosion under the U.S. Forest Service's watershed condition classification for the Tonto NF. Under this classification system, the sum of the acres of unsatisfactory and impaired soils is calculated and then percent of unsatisfactory and impaired soils within the watershed is determined. Designation of good, fair, or poor is based on 0-5% of watershed with unsatisfactory or impaired soils = Good, 5-25% of watershed with unsatisfactory or impaired soils = Fair, and >25% of watershed with unsatisfactory or impaired soils = Poor. Soil Contamination ratings are based on Nutrient N rating. Data displayed in Tables 5 and 6 and Figures 5 and 6 are based on soil conditions assessed at the watershed level. Table 5 summarizes this watershed data at a pasture scale.

Table 5: Soil Conditions for Bar X & Driveway Pastures Based on Watershed-Based Analysis

Pasture	Soil Productivity & Erosion	Soil Contamination	Overall Soil Condition
Brady Canyon	Poor	Good	Fair
Cline Mesa	Poor	Good	Fair
Lost Salt	Fair	Good	Fair

McInturff	Poor	Good	Fair
Naegelin	Fair	Good	Fair
Valentine	Fair	Good	Poor
Walnut	Poor	Good	Fair
Bar X	Poor	Good	Fair
Colcord Canyon	Fair	Good	Fair
Haigler Creek	Fair	Good	Fair
Young	Fair	Good	Fair

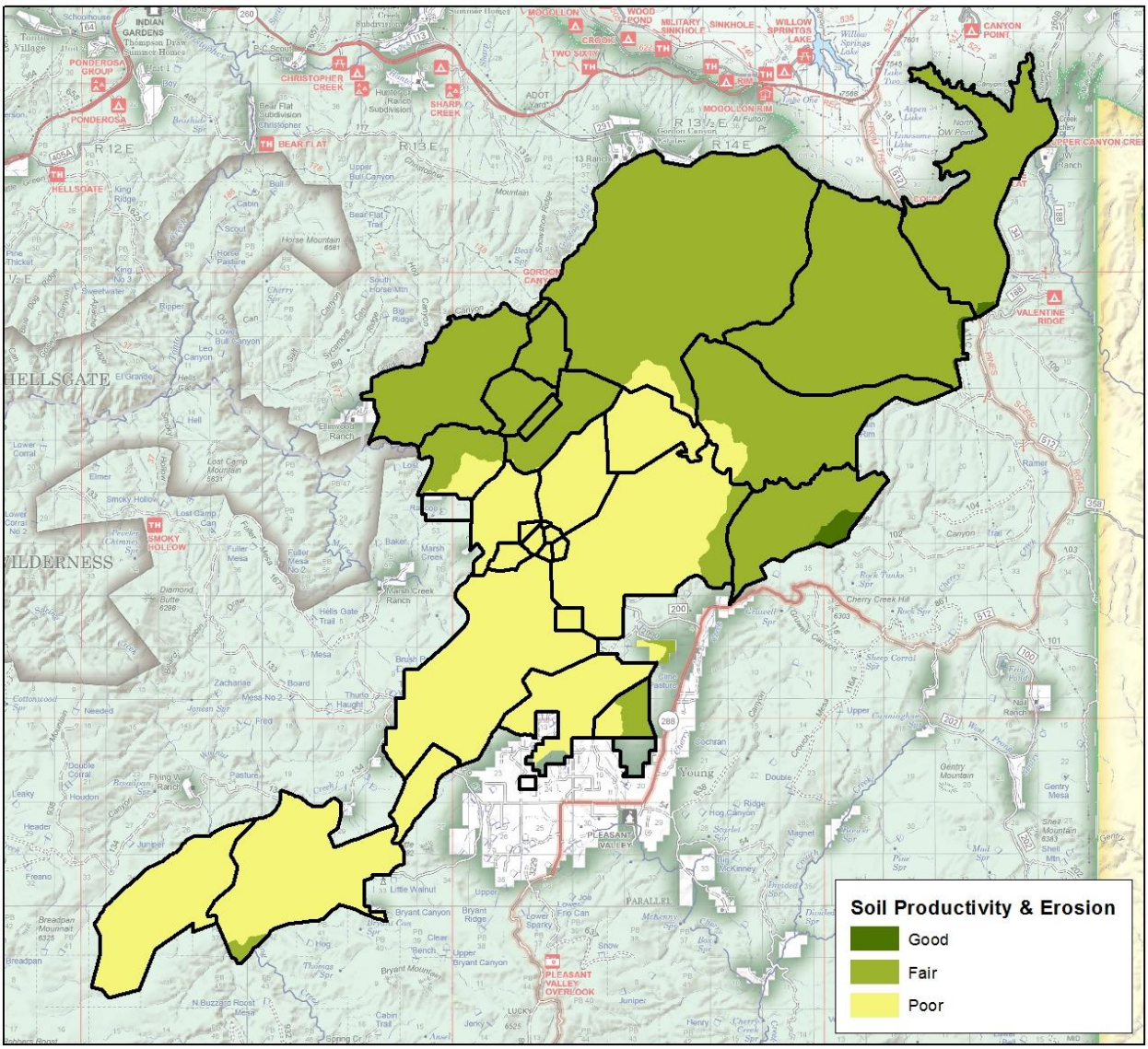

Figure 5: Soil Productivity and Erosion on Bar X and the Driveway

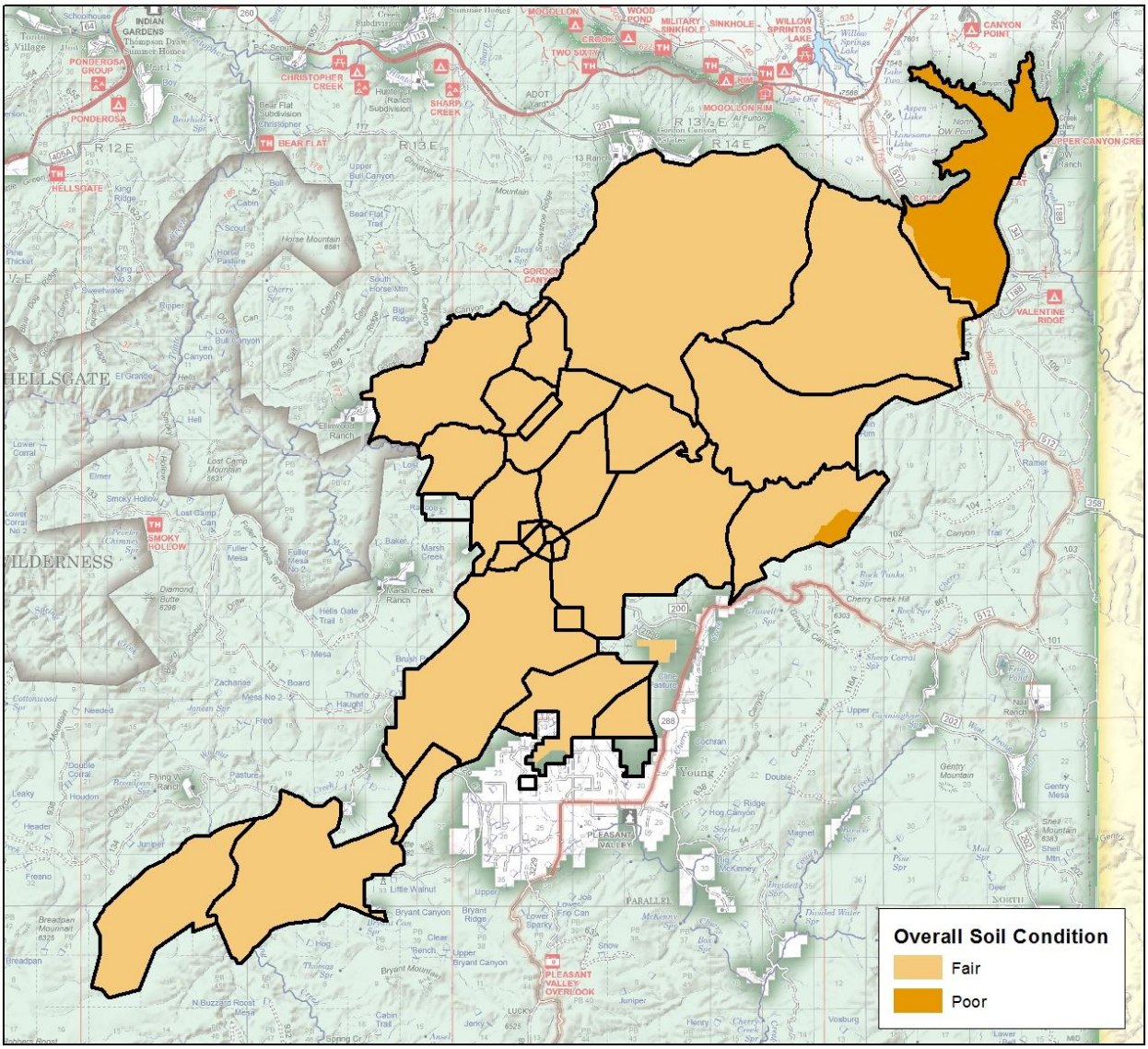

Figure 6: Soil Condition on Bar X and the Driveway

Table 6: Watershed Conditions for the Project Area

Watershed Name	Satisfactory (acres)	Impaired (acres)	Unsat. (acres)	Gross Acres	Net Acres	Impaired and Unsat.	Rating	Watershed Acres in Project Area	Total Project Area
Haigler Creek	28,979	2,498	755	32,231	32,231	10.09%	Fair	22,989	37%
Marsh Creek	11,119	5,859	3,955	20,932	20,932	46.88%	Poor	13,930	23%
Middle Spring Creek	11,241	3,655	1,535	16,430	16,430	31.58%	Poor	6,480	10%
Gruwell Canyon-Cherry Creek	16,403	3,101	2,356	21,896	21,861	24.96%	Fair	4,713	8%
Canyon Creek Headwaters	8,906	412	-	9,318	9,318	4.43%	Good	4,005	6%
Gordon Canyon	14,406	988	247	15,641	15,641	7.89%	Fair	3,894	6%
Walnut Creek	4,346	2,806	1,716	8,879	8,868	51.00%	Poor	3,293	5%
Pleasant Valley	2,542	1,264	648	4,518	4,455	42.93%	Poor	2,075	3%
Parallel Canyon-Cherry Creek	13,457	368	0	13,825	13,825	2.67%	Good	338	1%
Rock Creek	14,472	928	720	16,121	16,121	10.23%	Fair	70	0%
Upper Spring Creek	17,192	2,735	1,172	21,099	21,099	18.52%	Fair	59	0%

This analysis of Bar X and Driveway soil conditions, and their associated delineations were validated through the Forest Service The South Western Regions Soil Condition Class Rating guide (USDA Forest Service 1999))extracted from TEUI DATA or site inspections, however limited on-site data is available. Some of the soil condition classes are projected from similar sites across the landscape and based on theoretical approaches and methods generally accepted in the scientific community. Consequently, the soil condition classes assigned should be interpreted from a qualitative perspective and used as a coarse-filter to assign gross range soil condition classes per pasture as best possible.

Desired Condition

The Tonto National Forest Plan articulated the following desired conditions:

- Manage vegetation to achieve satisfactory or better watershed conditions
- Minimize impacts on soil and water resources from all ground disturbing activities
- Mitigate adverse effects of planned activities on soil and water resources through the use of Best Management Practices
- Emphasize improvement of soil productivity, air, and water quality
- Management activities within the desert zone must fully recognize the limitations this unique ecosystem has to the impacts of man's uses and activities

- Achieve a management situation that can respond to local or national demands for wood products, livestock production, water yield, and a wide mix of recreation opportunities, including wildlife related uses, which range from the primitive to the urban end of the spectrum. The goal is to produce these outputs and opportunities on a sustained basis while maintaining air, soil, and water resources at or above minimum local, State, or Federal standards. Emphasize improvement of soil productivity, air and water quality.

Forest Service Manual Direction

- 2550.1 – Authority 1, *The Multiple Use-Sustained Yield Act* states that management of the National Forests must provide "sustained yields in perpetuity without impairment of the productivity of the land."
- 2550.2- Objective "Maintain or restore soil quality on National Forest 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."
- 2550.3 – Policy "Manage forest and rangelands in a manner that will improve soil productivity."
- 2521.03 - Objective "Manage terrestrial ecosystems and NFS watersheds to protect soil productivity and hydrologic function. Implement soil and water conservation measures with management activities to maintain satisfactory or optimum watershed conditions."
- 2551.1- Soil assessments are conducted when knowledge of current soil quality conditions is required to advise decision makers whether adjustments in land management practices are needed.

Additional Forest Service Directives

Although the desired condition is to have all soils in satisfactory soil condition as described in FSH 2509.18-99-1, this is a long-term goal. Complete recovery of all soils is unlikely to occur within ten years. Characteristics of specific soil types often drive resiliency, productivity and resistance to erosion. Soils in arid and semi-arid environments recover slowly from disturbance. Rates of recovery will differ depending on factors such as magnitude of past soil loss, inherent soil properties, current vegetative ground cover, and type of ecosystem. However, all soils should be moving towards satisfactory conditions. The desired conditions for soils are to:

- Maintain or improve soils currently in satisfactory condition.
- Improve soils in impaired condition so they are reaching or moving towards satisfactory condition.
- Improve soils in unsatisfactory soil condition so they are reaching or moving towards at least impaired condition.

Soil productivity and function, including ability of soil to resist erosion, infiltrate water and recycle nutrients, should be sustained and functioning properly so terrestrial and riparian ecosystems are more resilient and better adapted to climate change. Herbaceous vegetation cover should be maintained at levels that contribute to suitable hydrologic function, soil stability, and nutrient cycling. Diversity of grass and forb species and presence of plant litter and grass, forb, shrub, and tree basal area surface cover should help reduce occurrences of compaction and erosion.

Slope

Slopes up to 60 percent are considered suitable for livestock grazing. Division of slope classification for livestock utilization analysis is a way of ensuring adequate forage production is available and within

reach of livestock. Livestock tend to utilize vegetation closer to water sources and on flatter ground first before moving further away from water and up steeper slopes. Forest Service monitors utilization and production on less steep slopes because slopes greater than 60 percent experience lighter grazing and are not an accurate representation of the pasture (Holechek, 1992 & 2012).

Table 7. Bar X and Driveway Slopes by Pasture

Pasture	Acres Per Slope Type				Total
	0-20%	21-40%	41-60%	>60%	
Bar X	486	179	20	1.9	686
Brady Canyon	1112	695	650	477.0	2934
Bull	201	68	2	0.1	271
Cline Mesa	1815	1184	695	379.2	4073
Colcord	3859	4870	1644	523.9	10897
Cross Y	301	310	76	8.1	695
Glasscock	122	23	0.03		145
Grasshopper	695	348	61	2.5	1107
Haigler	394	544	213	26.3	1178
Heifer	66	2.28	0	0	68
Horse	97	0.07	0	0	97
Hospital	48	0.05	0	0	48
House	45	13	1	0	59
Lost Salt	2118	3463	1228	179.7	6988
Lower Dry Creek	827	499	72	3.5	1401
Mare	54	9	0	0	63
McInturff	3625	1264	273	71.7	5233
Naegelin	1772	2125	483	92.4	4473
Oxbow	744	1020	710	622.3	3096
Pine	149	36	11	0.0	196
Potato Butte	486	117	28	6.1	637
Roscoe	276	11	1	0.1	288
Round Mountain	548	1046	611	259.5	2464
Small	49	0.2	0	0	49
Steer	377	190	16	0.3	582
Upper Dry Creek	597	490	252	74.2	1412
Valentine	1246	1667	846	467.2	4226
Walnut	2980	1754	390	70.3	5195
Westhole	615	358	107	102.3	1182
Windmill	1372	462	41	3.7	1879
Total	**27074**	**22747**	**8429**	**3372.1**	**61623**

Watersheds and Riparian Areas

Watersheds

Existing Conditions

In 2011, a national effort was completed by the Forest Service to assess the condition of all 6th code[5] watersheds on National Forest System land (Potyondy and Geier, 2011). Figure 7 shows a map of all 6th code watersheds within the project area.

Twelve overarching indicators were assessed including: water quality, water quantity, aquatic habitat, aquatic biota, riparian vegetation, road and trail network, soil, fire regime or wildfire effects, rangeland vegetation, terrestrial invasive species, forest cover, and forest health. From one to four attributes are assessed under each indicator and there are a total of 22 attributes assessed in this project area. Each indicator is identified as either Functioning, Functioning at risk, or Impaired based on the ranking of the attributes as good (1), fair (2), or poor (3) for each attribute. Eleven 6th code watersheds lie at least partially within Bar X allotment and the Driveway and results of the assessment for these 6th code watersheds are listed in Table 8. No one watershed covers more than 50% of the project area, however, Haigler Creek, Marsh Creek, Middle Spring Creek and Gruwell Canyon – Cherry Creek together make up 78% of the project area. Weighted averages of the 22 attributes for these four watersheds are shown in Table 9.

Watersheds rated as functioning exhibit high geomorphic, hydrologic and biotic integrity relative to their natural potential condition or would be considered to be in good condition. Watersheds rated as functioning at risk exhibit moderate geomorphic, hydrologic and biotic integrity relative to their natural potential condition and are considered to be in fair or satisfactory condition. Those watersheds that are impaired exhibit a low geomorphic, hydrologic and biotic integrity relative to their natural potential condition considered to be in poor condition. (Potyondy and Geier, 2011)

[5] Sixth code are the smallest in the hierarchy of watershed classifications. These sub-watersheds and are typically 10,000-40,000 acres in size.

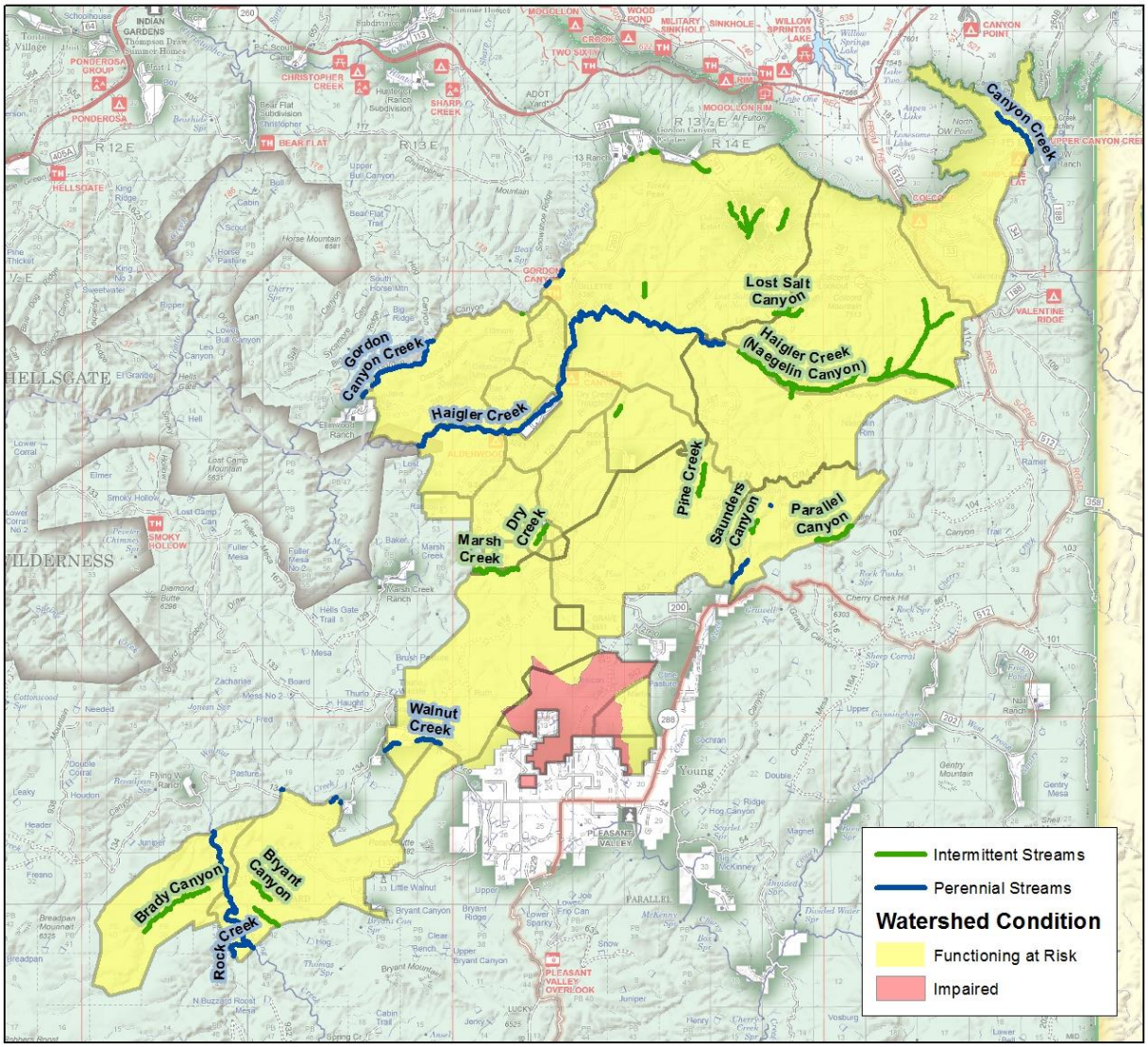

Figure 7: Bar X and Driveway Watershed Condition Class with Perennial and Intermittent Streams

Table 8: Watersheds Condition and Percent of Watershed within the Project Area

Name	Acres in Project Area	% of Total Project Area	Overall Watershed Condition
Haigler Creek	22,989	37	Functioning at Risk
Marsh Creek	13,930	23	Functioning at Risk
Middle Spring Creek	6,480	10	Functioning at Risk
Gruwell Canyon – Cherry Creek	4,713	8	Functioning at Risk
Canyon Creek Headwaters	4,005	6	Functioning at Risk
Gordon Canyon	3,894	6	Functioning at Risk
Walnut Creek	3,293	5	Functioning at Risk
Pleasant Valley	2,075	3	Impaired Function
Parallel Canyon – Cherry Creek	338	1	Functioning at Risk
Rock Creek	70	0	Functioning at Risk
Upper Spring Creek	59	0	Functioning at Risk

Of the four primary watersheds riparian vegetation is rated as poor in Gruwell Canyon – Cherry Creek, however the overall rating for riparian vegetation within the project area is fair. Soil productivity and erosion are rated as poor in Marsh Creek and Middle Spring Creek. See Table 9 for summary of indicators, weighted by the percent of the watershed within the project area, for these four watersheds.

Table 9: Indicators of Watershed Health for the Four Primary Watersheds in the Project Area Weighted by Percent Coverage (1 – 1.6 = Good; 1.7 – 2.2 = Fair; >2.3 = Poor)

Indicator	Attribute	Weighted Average of 4 Primary Watersheds	Condition
Water Quality	Impaired waters (303d Listed)	1.29	Good
	Water Quality Problems (not Listed)	1	Good
Water Quantity	Flow Characteristics	1.45	Good
Aquatic Habitat	Habitat Fragmentation	1.53	Good
	Large Woody Debris	2	Fair
	Channel Shape and Function	2	Fair
Aquatic Biota	Life Form Presence	1.37	Good
	Native Species	1.88	Fair
	Exotic and/or Invasive Species	2.16	Fair
Riparian Vegetation	Riparian Vegetation Condition	2	Fair
Roads and Trails	Open Road Density	1.88	Fair
	Road Maintenance	3	Poor
	Proximity to Water	2	Fair
Soils	Soil Productivity	2.3	Poor
	Soil Erosion	2.3	Poor
	Soil Contamination	1	Good
Fire Regime	Fire Condition Class	1.88	Fair
Forest Cover	Loss of Forest Cover	2	Fair
Rangeland Vegetation	Vegetation Condition	1	Good
Terrestrial Invasive Species	Extent and Rate of Spread	1	Good
Forest Health	Insects and Disease	1	Good
	Ozone	1	Good

Desired Conditions

In accordance with the Forest Plan, the Tonto National Forest should manage watersheds in a manner aimed at improving them to or maintaining them at a satisfactory or better condition. As the Watershed Condition Framework is currently the Forest Service's accepted measure of watershed condition, satisfactory equates to a rating of "functioning properly." Watersheds should also support multiple uses (e.g., grazing, recreation) with no long-term decline in ecological conditions and provide high-quality water for downstream communities dependent on them.

A properly functioning watershed: 1) exhibits high geomorphic, hydrologic, and biotic integrity relative to their potential condition.; 2) supports the magnitude, frequency, timing and duration of runoff within a natural range of variability; 3) maintains the movement of water and sediment from the surrounding uplands through the channel system in a manner that sustains the health and function of the channel

and riparian corridors; 4) exhibits resiliency to human activities and natural disturbances; and 5) maintains or improves water quality and riparian and aquatic species habitat.

Water Quality

Existing Conditions

The Arizona Department of Environmental Quality (ADEQ) assesses the quality of waters within the state in an integrated assessment report (305(b) report) that describes the status of surface water in the state in relation to state water quality standards and designated uses. The most recent report is the 2016 assessment report (ADEQ, 2018). Four streams within or shortly downstream of the analysis area are assessed in this report. They include Canyon Creek from its headwaters to the White Mountain Apache Reservation, Cherry Creek beginning just below Young, Gordon Canyon Creek which forms much of the western boundary of the analysis area, and Haigler Creek, from the headwaters to Tonto Creek. Water quality status of these streams is displayed in the table below.

Table 10: Water Quality Status of Streams within or Just Below Analysis Area

Stream Name	Designated Uses[1]	Water Quality Status	Uses attained	Uses inconclusive	Notes
Canyon Creek	DWS FC FBC AGI AGL AWC	Category 2 Attaining some uses	DWS FC FBC AGI AGL	AWC	AWC attainment could not be determined due to reporting limits of dissolved cadmium being too high.
Cherry Creek	FC FBC AGI AGL AWW	Category 2 Attaining some uses	FC AGI AGL	FBC AWW	FBC is inconclusive due to 1 exceedance each of *E. coli* and lead. AWW and FBC are inconclusive due to 1 phosphorous exceedance. Need more phosphorous, lead, and *E. coli* samples
Gordon Canyon Creek	FC FBC AGL AWC	Category 3 Inconclusive		All uses	No exceedances but needs collection of core parameters during three seasons.
Haigler Creek	FC FBC AGI AGL AWC (upper) AWW (lower)	Category 2 Attaining some uses	FC AGI AGL AWC AWW	FBC	FBC is inconclusive due to 1 *E. coli* exceedance. More samples needed

Designated use descriptions:

FC – Fish Consumption	AWC – Aquatic & Wildlife Coldwater	AGI – Agricultural Irrigation
PBC – Partial Body Contact	AWE – Aquatic & Wildlife Ephemeral	AGL – Agricultural Livestock Watering
FBC – Full Body Contact	AWW – Aquatic & Wildlife Warm water	DWS – Domestic Water Source

Designated uses for non-ephemeral, unlisted tributaries above 5000 feet are AWC, FBC and FC.
Designated uses for non-ephemeral, unlisted tributaries below 5000 feet are AWW, FBC and FC.
Designated uses for ephemeral, unlisted tributaries are AWE and PBC (A.A.C. R18-11-105).

Water Quantity

Existing Conditions

Climate

Climate within the project area is characterized by a bimodal precipitation pattern with about 60 percent occurring as frontal systems in the winter from December to March and about 40 percent occurring as monsoons in the summer from July to September. Summer storms can be more intense than winter storms but are generally of shorter duration and smaller aerial extent.

The nearest climate station to the allotments is Pleasant Valley Ranger Station. The period of record is 1964-2012 and the average annual precipitation is 22.1 inches (NOAA 2018). The data indicates seven of the ten years from 2003-2012 had below average precipitation (NOAA 2018). Data from the Western Regional Climate Center suggests that three of the five years since data collection ended at the Pleasant Valley RS have also been below normal (based on data collected for Climate Division 4 in Arizona which is primarily Gila County) (WRCC, 2018). Standardized Precipitation Index estimates for Pleasant Valley, Arizona indicate the community has been experiencing drought conditions (based on 12-month SPI data) twelve of the eighteen years since 2000. (https://uaclimateextension.shinyapps.io/SPItool/ accessed 12/2/2018).

Streams, Springs, and Stock Tanks

There are approximately 36 miles of perennial and intermittent streams in the analysis area. Intermittent streams flow part of the year but have shallow water tables year-round that support riparian vegetation. Perennial and intermittent streams in the analysis area are listed in the table below.

Table 11: Perennial and Intermittent Stream Length

Stream Name	Perennial Length (miles)	Intermittent Length (miles)
Canyon Creek	1.1	
Cherry Creek	0.6	
Gordon Canyon Creek	1.9	0.2
Haigler Creek	9.3	1.1
Spring Creek	3.1	
Walnut Creek	1.1	
Rock Creek	0.6	
Pine Creek		0.7
Naegelin Canyon		4.9
Saunders Canyon		0.3
Naegelin Spring Canyon		0.2
Marsh Creek		1.0
Bryant Canyon		0.6
Brady Canyon		1.8
Lost Salt Canyon		0.6
Parallel Canyon		0.8
Dry Creek		0.7
Unnamed Creeks		5.0

Based on ADWR water right claims there are approximately 30 springs and 32 stock tanks within the analysis area boundary on National Forest System (NFS) lands.

Desired Conditions

Water quality, including groundwater, meets or exceeds applicable state water quality standards, fully supports designated beneficial uses, meets the ecological needs of native aquatic and riparian associated plant and animal species, and meets the needs of downstream water users.

Streambeds contain less than 30 percent fines (e.g., sand, silt, clay) in riffle habitat (a rocky or shallow part of a stream or river with rough water) in cold water streams and less than 50 percent fines reach wide (generally a ¼ mile) in warm water streams for aquatic species.

Surface waters provide habitat for aquatic species and riparian species, contribute to connectivity for wildlife across the landscape, provide for local and urban potable water supplies, agricultural uses (e.g., livestock watering and irrigation), and recreation.

Riparian Areas

Existing Conditions

There are approximately 36 miles of perennial and intermittent stream channels within the Bar X and Driveway allotments that support obligate riparian vegetation. Of this total, 5 miles of perennial and 3.5 miles of intermittent are found on the Bar X and the remaining 12 miles of perennial and 15.5 miles of intermittent are on the Driveway. Obligate riparian vegetation requires reliable access to shallow groundwater supplied either by surface flow or groundwater for its survival. Based on Forest Service reports and associated changes in both upland and riparian vegetation, the extent of riparian vegetation has been reduced from historic conditions (Croxen 1926, Haskett 1935, Heffernan 2008).

Key Reaches

A stream reach is defined as any length of stream between two specified points. The key stream reaches listed below are stream channels/springs/riparian areas that were selected to survey because they are representative, responsive to changes in management, accessible to livestock, and contain key species. Key reaches are synonymous with designated monitoring areas (DMA's) defined by Burton et al. (2011) as the location where monitoring occurs. Monitoring within these areas, guides management of all riparian areas within the allotment. The table below displays key reaches by pasture.[6]

Table 12: List of key reaches within each allotment and pasture

Allotment	Pasture	Key Reaches
Bar X	Grasshopper	Marsh Creek
	Colcord Canyon	Colcord Canyon
	Colcord Canyon	Allenbaugh Spring
	Haigler	Haigler Creek
Young	Round Mountain	Cherry Creek
		Saunders Canyon
Driveway	Walnut	Walnut Creek
	McInturff	Pine Creek

[6] Pasture data taken from corporate database (S_R03_TON.rmu_subunit)

Existing and desired conditions of these key reaches are discussed below. Existing conditions assessments vary by reach but may include proper functioning condition assessment or a similar approach as outlined in Mason and Johnson 1999[7], stream type (Rosgen 1996), and/or monitoring data from riparian photo points.

Allenbaugh Spring. The actual spring source is in a very narrow valley (20 feet wide) upstream from the Colcord Road (FR 291). The spring creates a small channel that runs out of the valley into a wide-open area to the road for about 100 feet. It is a Rosgen "E" type channel and supports a wetland of thick sedges and rushes. Assessment of the channel and spring found all aspects (deposition pattern, vegetation rating, and width/depth ratio condition) to be in stable condition.

Cherry Creek. Cherry Creek originates below the Mogollon Rim and flows approximately 51.7 miles south to its confluence with the Salt River. It flows approximately two miles across this pasture 0.5 miles of which are perennial. The channel is wide with mainly cobble and boulder sediments. Riparian vegetation is thick and diverse and includes: sycamore, ash, alder, red willow, Gooding's willow, grape, deergrass, and shrubs and forbs. Old channels and the terrace support large sycamores and pine trees. Assessment of the creek determined that the channel stability was impaired, depositional pattern was unstable, vegetation was stable, and width/depth ratio condition was unstable making the overall condition of the stream impaired.

Colcord Canyon. The spring that supplies this reach of Colcord Canyon originates above FR291 on private land. The reach that begins below the road is a Rosgen "E" type stream that supports a wet meadow. The channel is narrow and sediment consists of sand with some cobble. The floodplain is covered with sedges, rushes, and horsetail, with an occasional false indigo and pine. Minor impacts were observed from recreation, camping on terrace, and trail into creek. Assessment of the channel and spring found that all aspects (deposition pattern, vegetation rating, and width/depth ratio condition) to be in stable condition.

Haigler Creek. Community type of the surrounding area is coniferous forest, Great Basin Woodland, and grassland. Dominant obligate trees include Arizona Alder along the creek and Arizona Sycamore in the abandoned floodplains. Multiple age classes of trees were observed. Some reaches of Haigler Creek throughout the project area, being in narrow canyons, are inaccessible to cattle. Some reaches receive high recreation use, which was observed in 2018 field assessment near Haigler Canyon campground. In many places' banks are dominated by boulder/bedrock/cobble with only small areas of finer sediment. Photo point monitoring of Haigler Creek at multiple locations shows an increase in bank stabilizing vegetation and recruitment of additional woody species from 1993-2018.

Marsh Creek. Marsh Creek flows approximately 0.2 miles across the south portion of the Grasshopper Pasture. This reach of the creek is very productive, supporting alder, willow, sycamore, and abundant deergrass that is facilitating bank formation. At the west end of the reach, overflow channels create a swampy area that supports sedges and rushes. There is only one other water source in this pasture

[7] Condition ranking within the Mason and Johnson 1999 approach are: Stable, Unstable, Impaired and Severely Impaired. Primary aspects measured with this method are depositional pattern, vegetation, and width/depth ratio condition.

(Grasshopper Tank). Assessment of the creek found that it was overall a stable system with a stable depositional pattern, stable vegetation, and impaired width/depth ratio condition.

Pine Creek. Pine Creek flows 0.7 miles near the top of the McInturff Pasture. While stream is indicated as intermittent in the National Hydrography Dataset, the permitee indicated that he has observed it flowing year-round. Stream was determined to be in proper functioning condition and there are obvious signs of upward trend based on increasing riparian obligates alongside established upland species and recovering soils.

Saunders Canyon. Saunders Canyon is a small tributary to Cherry Creek that originates on the Naegelin Rim. It is ephemeral, except for a 0.25 reach fed by Saunders Spring that provides a more sustained flow and contains willow/ponderosa pine vegetation type. There is ¼ mile of willow riparian vegetation by the spring.

Walnut Creek. Walnut Creek originates east of Potato Butte and flows generally west to its confluence with Spring Creek. About one half mile of the creek is contained within this pasture. Photo point monitoring between 1997 and 2017 in this reach show an increase in the density of herbaceous riparian vegetation. Assessment of the creek determined that it is a stable system for all elements surveyed.

Desired Conditions

Riparian areas (including streams, seeps, springs, and wetlands) are intact, properly functioning, and resilient to disturbances.

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

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

Long-term desired conditions are to:

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

Recreation, Wilderness, Visual Quality

Existing Condition

Developed Recreation

There are five semi developed campgrounds within the analysis area. These campgrounds are very popular April-November and often receive large group use.

Colcord Ridge Campground is located 36 miles east of Payson on Forest Road 33 off of Forest Road 512. The campground is comprised of a family campground with approximately 20 sites. Currently the district is working on upgrading the campground in order to go through the formal process to start charging fees.

Airplane Flat Campground is located 40 miles east of Payson on Forest Road 33 off of Forest Road 512. The campground is comprised of a family campground with approximately 13 sites. Currently the district is working on upgrading the campground in order to go through the formal process to start charging fees.

Upper Canyon Creek Campground is located 40 miles east of Payson on Forest Road 33 off of Forest Road 512. The campground is comprised of a family campground with approximately 12 sites. Currently the district is working on upgrading the campground in order to go through the formal process to start charging fees.

Haigler Canyon Campground and Day Use site is located 34 miles east of Payson on Forest Road 200. The campground is comprised of a family campground that accommodates both RV and tent camping.

Alderwood Campground is located35 east of Payson on Forest Road 202A. This is a small primitive campground with only 4 sites but is popular with hunters and fishermen.

Dispersed Recreation

The following recreational activities are common in dispersed areas across the Payson and Pleasant Valley Ranger Districts.

Dispersed Camping: group and family camping in undeveloped areas along roads and creeks, within forested portions of the project area, is very popular. Dispersed camping takes place across the entire project area especially in areas along waterways and roadways.

Off Highway Vehicle Riding: Besides camping, OHV riding is very likely the most frequent recreational activity on the Payson and Pleasant Valley RD. Currently, OHV use is allowed across the ranger district unless posted closed. Use of dirt bikes, jeeps, and other four-wheel drive vehicles is also common across the project area.

Hunting: The project area is located within the Arizona Game and Fish Management Unit 23. This game unit provides small and big game hunting opportunities such as elk, deer, bear, mountain lion, and javelina that is popular with in and out of state hunters as well as permitted outfitting and guiding companies. A year around activity across the district, hunting is heaviest during the fall.

Hiking, Mountain Biking, and Horse Back Riding: All three activities are very popular across the district and primarily take place in the forested upper elevations areas.

Fishing: Portions of the Haigler Creek and Canyon Creek are found within the project area. Both rivers are popular fishing destinations and are stocked regularly by Arizona Game and Fish.

Wilderness and other Special Areas

There is one designated wilderness area, one Inventoried Roadless Area, and one administrative site within the project area.

Wilderness: The Hellsgate Wilderness was established by Congress with passage of the *Arizona Wilderness Act* on August 28, 1984. There are approximately 222 acres of wilderness within the project area.

Inventoried Roadless Area: 222 acres of the Hellsgate Wilderness Contiguous Inventoried Roadless Area is located within the project area. The 2001 Roadless Rule established prohibitions on road construction, road reconstruction, and timber harvesting within the boundaries of inventoried roadless areas on National Forest System lands. The intent of the 2001 Roadless Rule was to provide lasting protection for inventoried roadless areas within the National Forest System in the context of multiple-use management.

Administrative Site: One administrative site is located within the project area-the Colcord Lookout. This site has been dedicated for National Forest administrative use from the original reserved public domain.

Trails

There are no designated trails within the project.

Lands and Special Uses

The project area contains approximately 28 tracts of private lands otherwise known as inholdings. Several of these inholdings have right-of-way access across National Forest land and/or special use permits for pipelines or water containment. There are multiple mining claims located within the project area, but no active mines.

Special uses within the project area include multiple utility corridors under permit to Arizona Public Service (APS) and Salt River Project (SRP). Multiple special use permits for hunting outfitting and guiding and one permit for horse rides.

Desired Condition

Recreation Opportunity Spectrum

The Forest Plan identifies and describes a recreation opportunity spectrum (ROS) class system to be used on forest lands, including the analysis area, to help guide development and management in order to provide a variety of recreation experiences desired by the public and range from essentially natural, low use areas to highly developed intensive use areas. The table below shows the number and percentage of acres of each classification in the project area.

Table 13: ROS Classification Acres in Project Area

Classification	Acres	Percentage
Rural	525	1
Roaded Natural	20,115	33

Classification	Acres	Percentage
Semi Primitive Motorized	28,333	45
Semi Primitive Nonmotorized	12,690	21
Urban	0	0
ROS Total	**61,663**	

Heritage

Heritage Resources are a combination of archaeological, historic, and traditional cultural resources, including contemporary Tribal uses of natural, archaeological, and historic resources. The spatial boundary used to evaluate direct and indirect consequences of the project was the allotment boundary and the pastures for sheep driveway that are contiguous, since no cultural resources outside of this area will be affected by proposed project activities. The analysis area covers approximately 61,200 acres.

Cultural resource inventory surveys in the project area have previously focused on a) those areas in which standard range activities are most likely to have the potential to affect archaeological sites, and b) those areas where new range improvements are planned and expected to be implemented within the next two years. Approximately sixteen percent (16%) of the project area have been completely surveyed to date for ground-disturbing activities. Previously conducted archaeological surveys have been undertaken both for compliance purposes (e.g. electrical transmission lines, grazing improvements, timber sales, fuels reduction and wildfire) and for research by various academic institutions (Prescott College, Southern Illinois University, Museum of Northern Arizona, Arizona State University).

Existing Condition

The Bar X Allotment and the Heber-Reno Sheep Driveway, and the federal lands adjacent to it, are known to contain hundreds of prehistoric archaeological sites representing the occupation and agricultural modification and use of this area by people related to the Hohokam and Mogollon archaeological traditions over a period of 8,000 to 10,000 years. Additionally, both areas contain many historic sites reflecting the use and occupation by Apache and Yavapai hunters, gatherers, and farmers, Anglo ranchers, stockmen, miners and prospectors, Basque and other Iberian and Latin American sheepherders, and the current land managing agency, USDA Forest Service.

Thousands of years ago, nomadic hunters and gatherers during what is called the Archaic Period first ventured up into the sub-Mogollon Rim country. There were not many of them and they stayed near the natural water sources in the canyons. The most substantial evidence of their passing is a distinctive style of rock art seen in a few places and occasional surface artifacts such as projectile points. The first permanent settlers were Hohokam colonists related to the prehistoric inhabitants of the Salt River Valley. Others began using the area after about 1000 AD, exploiting the abundance of agave. These early sites are characterized by pithouse architecture, which generally leaves nothing visible on the surface but concentrations of artifacts (Wood 1989).

After about 1150 AD, some of these settlements were abandoned while others continued to be occupied. It was probably about this time that these people began building above-ground masonry structures and transforming the area for agriculture. Drastic changes began about 1280 AD with the

influx of refugees from other parts of central Arizona who had been displaced by the Great Drought of 1275-1300 AD. After 1280 AD and continuing to the middle of the 14th century, the population grew very rapidly and many new settlements were built and existing ones greatly expanded. Scattered among these fields are hundreds of roasting pits and detached single room structures usually called "fieldhouses." Rock art, mostly in the form of petroglyphs pecked into cliff and boulder faces, is also abundant throughout the area.

Some archaeological evidence also suggests affiliation with Hohokam and Salado traditions, and possibly the Verde Valley cultures as well. It has not been established whether the Anchan Tradition represents a distinct group of Hohokam people who moved into the area, an indigenous people absorbing influence from their surroundings, or a combination of the two. The Central Arizona Tradition (CAT) is a recognized ceramic classification extending into the Pleasant Valley area, and Anchan ceramics are sometimes grouped with this for ease of description.

After the prehistoric inhabitants left, the area lay empty until the late 17th, 18th, or early 19th century, when it was temporarily re-occupied by the Apache and Yavapai. Their archaeological remains are extremely ephemeral compared to the previous periods. Very early on in the history of the Tonto area it was recognized that its primary commodity was not lumber, copper, or forage, but water. The Tonto National Forest was created in 1905 to protect the Salt River Watershed (Effland Jr. and Macnider 1991). It was at this time that ranching, running sheep, and mining for copper were the predominant uses of the Bar X allotment, and each of those activities has left an archaeological record of its own.

These activities resulted in the first great push for infrastructure development in Forest Service history. Ironically, it took a massive economic depression in the country to provide the forest with the labor, equipment, and money to install the roads and recreation facilities. The Works Progress Administration (WPA) and the Civilian Conservation Corps (CCC) were the largest of the public works programs created by the Federal Government to provide jobs during the Great Depression of the 1930s (Collins 1999). These two programs were responsible for the construction of modern recreation and Forest Service administrative facilities, and hundreds of miles of roads and trails connecting them (Otis et. al 1986; Merrill 1981). These programs also attempted to protect the watershed of the reservoirs by slowing erosion. Thousands of check dams and other erosion control features were built to slow the widespread erosion on the Tonto caused by overgrazing.

The beginning of World War II brought an end to the public works programs and the surge in facility construction (Otis et. al 1986). Forest development came to a near standstill during the war. Post-war prosperity created another wave of population growth in Arizona and the Phoenix area in particular. As Phoenix and its surrounding communities grew, the pressures on the recreational facilities on the Tonto National Forest began to reach a critical point. New highways throughout the state made it easy for people to enjoy the forests in numbers never before seen. As a result, the Depression-era facilities were being overwhelmed. The early 1960s saw a new boom of recreation and administrative site development. Throughout the Tonto, new camping and picnicking sites were built. Improved forest roads gave visitors access to parts of the national forest that had been difficult to reach.

Purpose Of and Need for Action

Bar X and the Driveway are a priority for completing grazing allotment planning in conformance with the requirements of the *National Environmental Policy Act* and the *Endangered Species Act* on the Pleasant

Valley Ranger District. Completing this effort on time and to standard is essential not only for the Forest Service's regulatory compliance, but for the current allotment permittee's success and productivity. The Forest Plan identifies both Bar X and Driveway as suitable for domestic livestock. Current management does not meet these Forest Plan objectives as some portions within the project area are not authorized for grazing despite being evaluated as suitable for grazing.

The purpose of this action is to consider livestock grazing opportunities on public lands where consistent with management objectives. In addition, per FSH 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.

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 Forest Plan and continued domestic livestock grazing is consistent with its goals, objectives, standards, and guidelines (U.S. Forest Service, 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).

Chapter 2: Alternatives

Future Review of the Decision

In accordance with Forest Service Handbook direction, an interdisciplinary review of the decision would occur within 10 years, or sooner if conditions warrant. If this review indicates that management is meeting standards and achieving desired conditions, the existing management activities would be allowed to continue. If monitoring demonstrates that objectives are not being met or new information indicates effects not previously considered, a new proposed action would be developed and appropriate NEPA analysis and disclosure would occur.

Public Involvement

Prior to the final development of the Proposed Action analyzed in this EA, the Forest met with permittees and other local parties to identify and evaluate management objectives and strategies. The Purpose and Need and Proposed Action was listed in the Schedule of Proposed Actions on February 27, 2019 and was provided to the public and other agencies for comments during a 30-day scoping period initiated on March 5, 2019. Over 170 comments were received in response to individual contacts through posted letters and emails and the public notice in the Payson Roundup newspaper. At the same time, the Forest consulted with ten tribes with ancestral ties to lands now managed by Tonto National Forest.

On June 5th, the Environmental Assessment for Bar X Allotment & Heber-Reno Sheep Driveway Grazing Authorization was completed and distributed for comment to State, Federal, Tribal Government agencies, professional organizations, multiple-use organizations, environmental organizations, non-government organizations, and individuals who responded to the Scoping and Preliminary Environmental Assessment. The public was also notified of the opportunity to comment through a legal notices published in the Payson Roundup (*Project Record*). Participants were provided 30 days to review and comment. Twenty-two responses were received during the comment period. All responses were reviewed and considered for the Bar X Allotment & Heber-Reno Sheep Driveway Grazing Authorization Final Environmental Assessment.

The US Forest Service response to comments received during the 30 day notice and comment period are located in the Project Record.

There were multiple form letter campaigns sent by the residents of Colcord and Ponderosa Estates (located within the project area) which took place both before and during the scoping phases for the Environmental Assessment. Those campaigns resulted in approximately 250 letters which voiced opposition to cattle grazing on National Forest Lands adjacent to their communities. The Forest Service does not regard form letters as “votes” as to whether the proposed action should go forward. Form letters are not addressed by volume, but rather considered based on content.

Issues

The Forest organized comments into categories that reflected similar concerns about the proposed action. The gathering of comments from the public for scoping purposes was intended to bring out issues that could be addressed (mitigations, project design) by the final proposed action, or by the development of alternatives.

Unfenced private property exists within the allotment boundaries, causing contention with some homeowners. A number of residents in these neighborhoods have voiced concerns and disapproval over the Proposed Action and the possibility that cattle may enter onto their private property, damage their septic systems, or be present on roadways.

There are approximately 350 inholdings across the Tonto National Forest, with an overwhelmingly majority within active grazing allotments. These inholdings may be further divided into separate properties. Through the development of the EA, the Forest Service determined that the action will not be significant as these subdivisions have always been within an active grazing allotment. Arizona is an open range state which has enacted laws making it the responsibility of private landowners and private communities to construct a lawful fence to keep out cattle (*(ARS) Title 3, Chapter 11, Article 8*). This means that, according to state law, it is not the responsibility of the grazing permittee nor federal agency to keep cattle off private lands.

In turn, National Forests are "working" forests managed for multiple uses like wildlife, timber, livestock grazing, mining, water quality, and recreation. When the Forest proposed changes to management, such as this Environmental Assessment, property owners are interested parties are offered opportunities to get involved and participate in project planning and have input in these decisions. National Forest lands cannot be "grandfathered in" or exempt from multiple uses by virtue of proximity to private property. The scoping process allows ideas, comments, and concerns to be heard and incorporated into the most appropriate management decision.

While some comments reflected concerns about safety and conflicts between the multiple uses allowed in the project area, the multiple uses have been practiced in the project area and the overall forest for many years. Although "same place-same time" encounters between uses are understood, they are not considered conflicts or safety issues that require consideration in grazing authorization planning analyses. Through development of this document, this issue has been determined to be not significant in the context where substantial scientific dispute exists, rather than to public opposition of a proposed action.

No issues were identified that were within the scope of the comment solicitation and required other than mitigations or minor alterations in project design.

No Grazing – Alternative A

Under this alternative term grazing permits on all Bar X Grazing allotments within the project area would be cancelled, reducing permitted AUM's to zero in the allotments for a period no less than 10 years, following guidance in *36 CFR 222.4* and Forest Service Manual (FSM) 2231.62. Existing improvements no longer functional or needed for other purposes, including interior fences, cattle guards, and water developments would be evaluated for continued usefulness and removed as necessary. Exterior allotment boundary fences would be assigned to neighboring permittees for maintenance. Continued maintenance of existing water developments may be adversely affected.

The Driveway would not be authorized for use by cattle. It would still be used as a sheep driveway, allowing up to 8,000 sheep to graze the Driveway bi-annually as they trail through on their way to the Apache-Sitgreaves National Forest. Existing improvements may still be maintained as needed, however

as trucking has been used in lieu of the Driveway in recent years past, it is likely improvements will not be maintained. Continued maintenance of existing water developments may be adversely affected.

Under Chapter 90 regulations, a "No Grazing" alternative must be considered in any Range NEPA analysis.

Proposed Action – Alternative B

The proposed action consists of four components: authorization, improvements, conservation measures, and monitoring. The proposed action follows current guidance from Forest Service Handbook 2209.13, Chapter 90 (Grazing Permit Administration; Rangeland Management Decision making).

Authorization

The Pleasant Valley Ranger District of the Tonto National Forest proposes to continue to authorize livestock grazing on Bar X under updated terms and conditions. This includes the use of Colcord allotment and Turkey Peak pastures. In addition, cattle would be authorized to graze in the Heber-Reno Sheep Driveway.

Historically, the Driveway was also grazed by cattle and was a part of adjacent allotments (including Bar X). Allotments neighboring the driveway, (who historically used portions of the driveway), would be authorized to incorporate them into their grazing operation. Sheep would continue to have priority use and additional capacity in the driveway would be granted to adjacent allotments. The Driveway would be subdivided into eight pastures that will be available for use by adjacent allotments that historically grazed cattle on it. The adjacent allotments include Bar X, Soldier Camp, Potato Butte, and OW allotments.

Bar X

Proposed yearly maximum authorized use would vary between 4,002- 9,250 Animal Unit months (AUMS[8]) adult cattle year-long. This includes the use of the Driveway. Actual authorized numbers would vary annually based on current resource conditions. Adult cattle may include cows with calves, non-lactating cows, or bulls. Additionally, up to 160 weaned calves (498 AUMS) up to 18 months of age (yearlings) would be authorized from January 1st through May 15th annually. Yearlings are the progeny of existing cattle on the allotment.

[8] 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 .7 was used to calculate AU's for yearlings

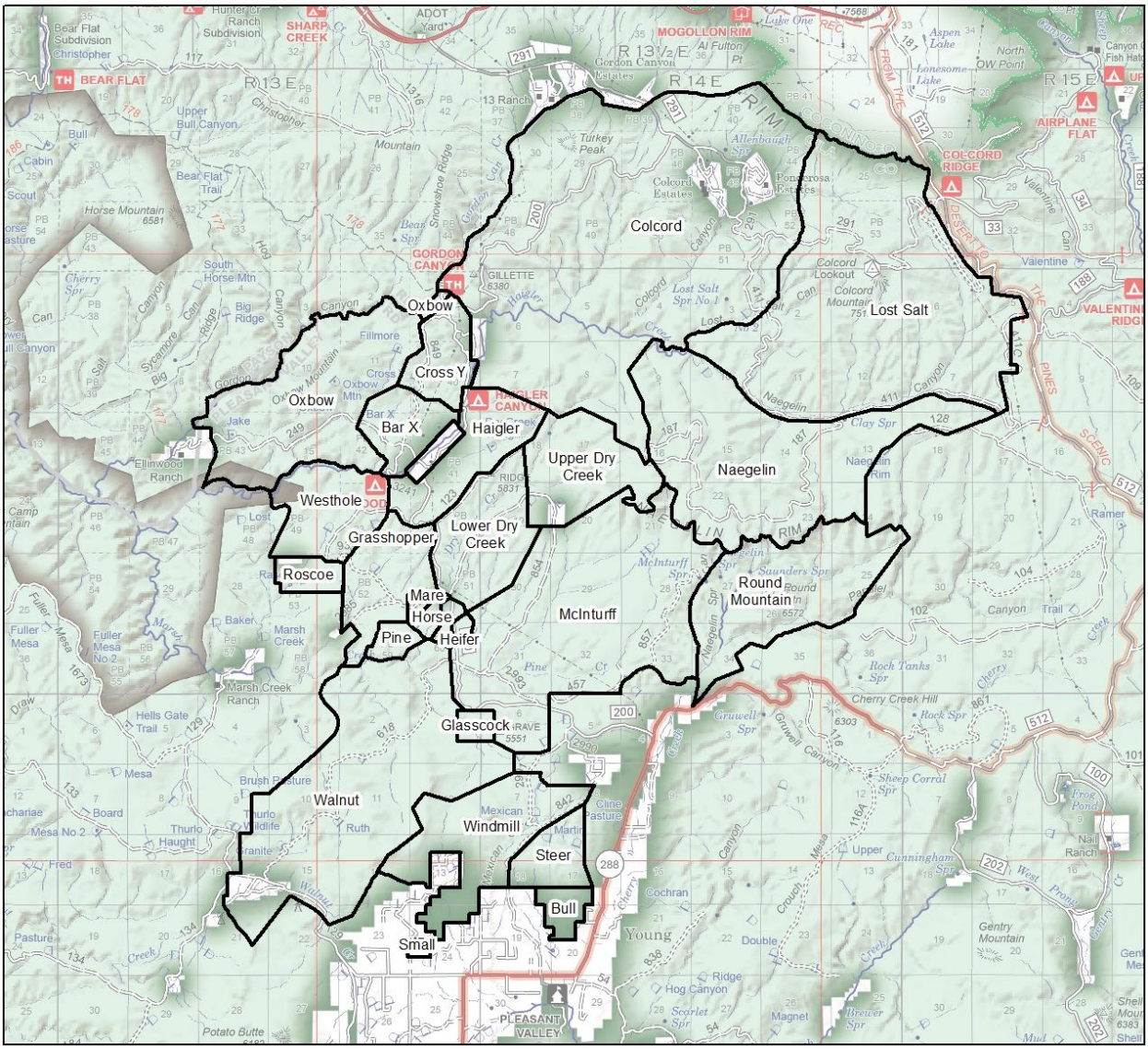

Figure 8: Bar X with its Driveway Pastures

Table 14: Proposed Permitted Numbers and Season of Use by Allotment

Allotment	Class	Number	AUMs	Season of Use
Bar X	Adult Cattle	239	3,794	3/1-2/28
	Yearlings	67	208	1/1-5/15
Sheep Driveway – Lost Salt, Naegelin, McInturff, and Walnut Pastures	Adult Cattle	313	4,960	3/1-2/28
	Yearlings	93	290	1/1-5/15
		TOTAL	**9,250**	

Heber-Reno Sheep Driveway

A grazing capacity analysis was completed for the Driveway and the Bar X to help develop the proposed action (Bedson and Sturla, 2018). This in combination with utilization, condition and trend data were used to develop the proposed action. Additional capacity would be granted to the adjacent allotments as shown below. Time of use and duration in pastures will be determined annually when the Forest Service and permittees meet to develop the annual operating instructions for each allotment.

The Valentine Pasture would be granted to the current OW permittee. Although there are several allotments that border this pasture, the OW allotment has the greatest need for additional pastures. The OW permittee is currently operating with a seasonal permit. The additional pasture would be available for use yearlong if resource conditions allowed, bringing balance to the operation. The other pastures in the OW allotment would remain seasonal but the permittee could potentially run year-long, should conditions allow. Proposed yearly maximum authorized use for Valentine Pasture would be up to 840 AUMS adult cattle year-long.

Table 15: Proposed Permitted Numbers and Season of Use for the OW Allotment

Allotment	Class	Number	AUMs	Season of Use
OW: Sheep Driveway - Valentine Pasture	Adult Cattle	50	840	3/1-2/28

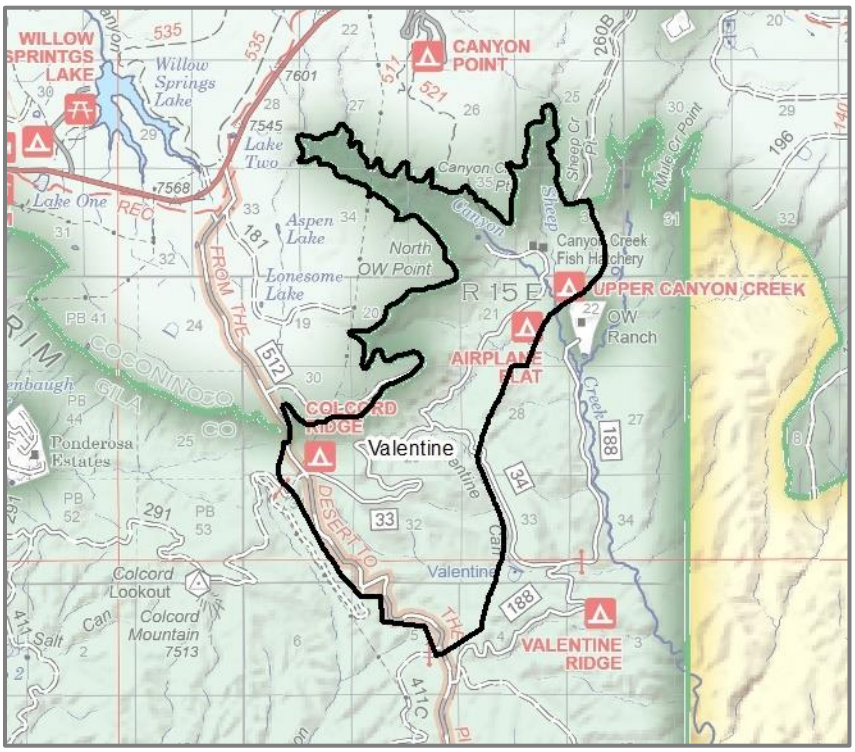

Figure 9: OW's Driveway Pasture

The Potato Butte pasture of the Sheep Driveway is currently already authorized for use by cattle (Heber-Reno/ Morgan Mountain Sheep Driveways DN and FONSI, 2011). When this area was last authorized, capacity was not evaluated so this portion was included in the analysis to determine the number of permitted cattle to graze the area. Proposed yearly maximum authorized use would be up to 145 AUM's year-long.

Table 16: Proposed Permitted Numbers and Season of Use for the Potato Butte Allotment

Allotment	Class	Number	AUMs	Season of Use
Potato Butte: Sheep Driveway	Adult Cattle	9	145	3/1-2/28

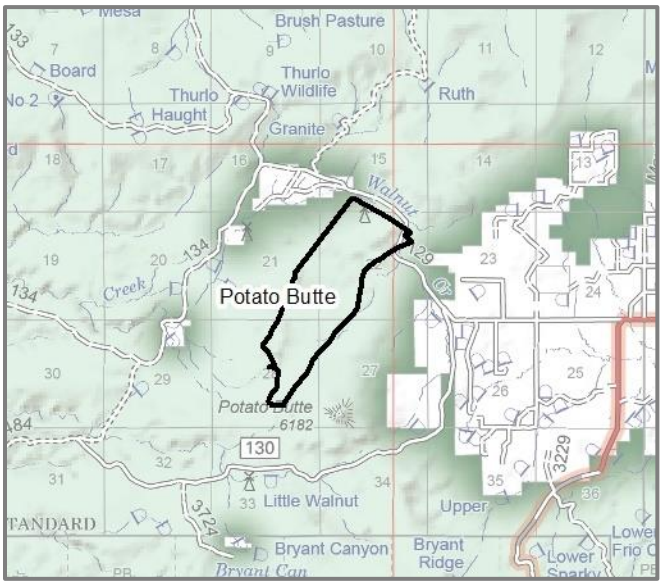

Figure 10: Potato Butte's Driveway Pasture

Cline Mesa and Brady Canyon pastures have historically been a part of the Solider Camp allotment and bisect it. These pastures would be made available to the Solider Camp permittee who has been using and maintaining these pastures in recent years on a trial basis. Proposed yearly maximum authorized use would be up to 1345 (Cline Mesa) and 665 (Brady Canyon) AUM's year-long.

Table 17: Proposed Permitted Numbers and Season of Use for the Soldier Camp Allotment

Allotment	Class	Number	AUMs	Season of Use
Solider Camp: Sheep Driveway Cline Mesa Pasture	Adult Cattle	85	1345	3/1-2/28
Solider Camp: Sheep Driveway Brady Canyon Pasture	Adult Cattle	42	665	3/1-2/28

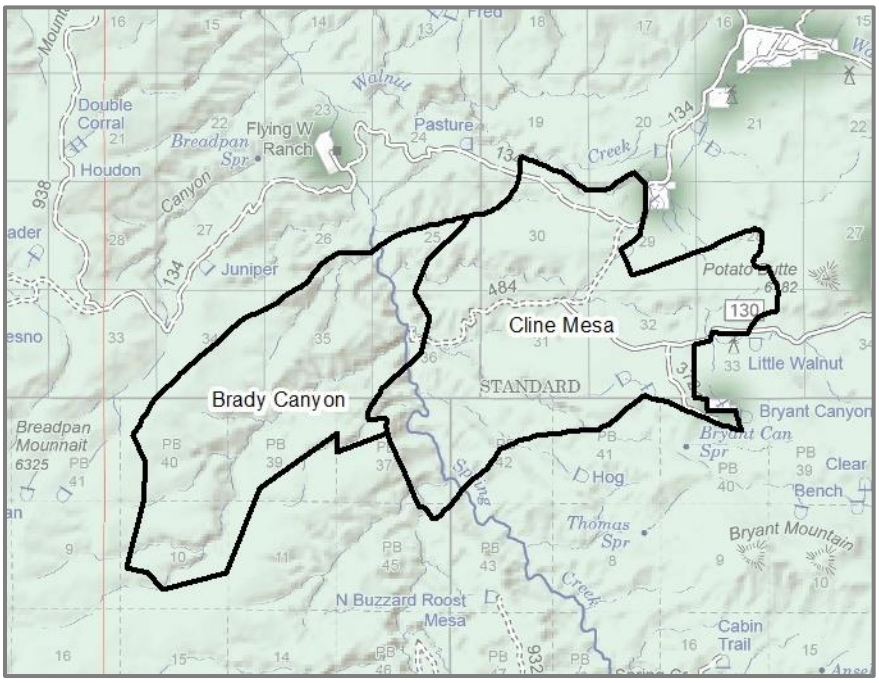

Figure 11: Soldier Camp's Driveway Pastures

Permitted Livestock Numbers: As range improvements are installed, or as conditions on the Driveway allow, authorized numbers may be increased up to the proposed maximum AUM's numbers as listed in Tables 14-17. Annual adjustments would be planned and authorized by the Pleasant Valley District Ranger. Factors affecting annual authorized livestock numbers may include precipitation, pasture rotation, forage production, current range conditions (i.e. forage and growing conditions), water availability, resource monitoring (see monitoring section below) and permittee needs. Further details for annual adjustments are in Administrative Actions below.

Grazing System

Bar X

One adult cattle herd with up to 160 weaned calves would graze all pastures within the allotment. The Forest Service may authorize the splitting of the herd in response to current resource conditions upon

permitee request, to reduce impacts on resources. Additionally a ranch horse/mule herd (up to 20 riding/packing stock used for working the allotment) may be grazed throughout the year in traps and holding pastures. These animals would be counted towards total permitted AUMs.

Heber-Reno Sheep Driveway

Priority use of the Driveway would be given to sheep that are currently permitted to use it. Cattle use on the driveway would not impact the sheep permitee's ability to graze sheep on the Driveway. Forage excess of what is used by the sheep would be considered available for grazing by cattle. The Tonto National Forest and cattle grazing permitees would coordinate with the sheep permitee annually to determine planned use for the season. Adaptive management would be used to determine the length of time and the time of year cattle would graze within the driveway.

Common to Bar X and the Driveway

Grazing would occur through a rotational system, either deferred or rest-rotation grazing, which would allow plants the opportunity for growth or regrowth. Pasture use may be deferred in order to accomplish other resource goals related to fire, fuels and habitat in addition to recovery for grazing schedules. While some portions of the allotments are more suitable for winter use and others more for summer, the use of each pasture would vary within the appropriate season over time, in order to prevent the establishment of patterns of repeated use. Animals would be moved to the corresponding allotment once the pasture was grazed. The goal would be to allow for complete deferment of individual pastures, for up to a year, periodically, based on site specific utilization and recovery. All pastures would be available for grazing within the limits of forage availability and appropriate season of use based on current resource conditions.

Annual operating instructions would specify pasture rotation schedules each year and include timing, livestock numbers, and duration. A rotation schedule would be developed with the permittee and incorporated into the allotment management plan to provide an estimate of grazing schedules. This schedule can be altered annually and authorized in the Annual Operating Instructions by the District Ranger.

Using Adaptive Management, actual numbers of livestock may vary based on the class of livestock, duration of use and climatic conditions. Grazing systems may also be modified as needed to meet stated management objectives. Adaptive Management provides the flexibility to continually modify management, based on monitoring, in order to achieve specific objectives. The monitoring and analysis included in Adaptive Management help identify if structural improvements or management actions are needed that have not been disclosed or analyzed in a previous environmental effect's analysis. An interdisciplinary review would result in providing the Deciding Official the information necessary to determine whether correction, supplementation or revision of the previous EA, if any, is required. (FSH 1909.15(18) and FSH 2209.13(96.1)

Vegetation Utilization

Grazing would be managed to achieve long-term goals in pasture key areas and ensure allowable vegetation use thresholds are not exceeded.

Table 18: Allowable Vegetation Use Thresholds

Vegetation	Use Threshold
Upland herbaceous	30-40 percent of current year's growth
Upland browse	50 percent of current year's growth
Riparian herbaceous	Limited to 40 percent of plant species biomass and maintain 6 to 8 inches of stubble height of species on emergent such as sedges.
Riparian woody	Limited to 50 percent of leaders browsed on upper one third of plants up to 6 feet tall

Range Improvements

Existing Structural Improvements

Maintenance of existing range improvements on the Bar X and Sheep Driveway would be assigned to the grazing permit holder. Not all current improvements are constructed or maintained to standards. As improvements are reconstructed, they would be rebuilt to new standards (i.e. wire spacing). Existing improvements would not need to be modified until reconstruction is needed.

Proposed Structural Improvements

Structural range improvements 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 range improvements to be completed in a specific order or timeframe. The following improvements are identified to be installed within the first two years following a decision on this project. These improvements would have heritage resource surveys completed before a decision is signed.

Table 19: Proposed Structural Range Improvements to be implemented within the First Two Years

Description	Allotment	Pasture
Development of roadside or winged stock tanks	Bar X	Colcord, Lost Salt
Installation of a cattle guard	Bar X	Colcord
Corral	Bar X	Colcord
Development of roadside or winged stock tanks	Driveway	Valentine

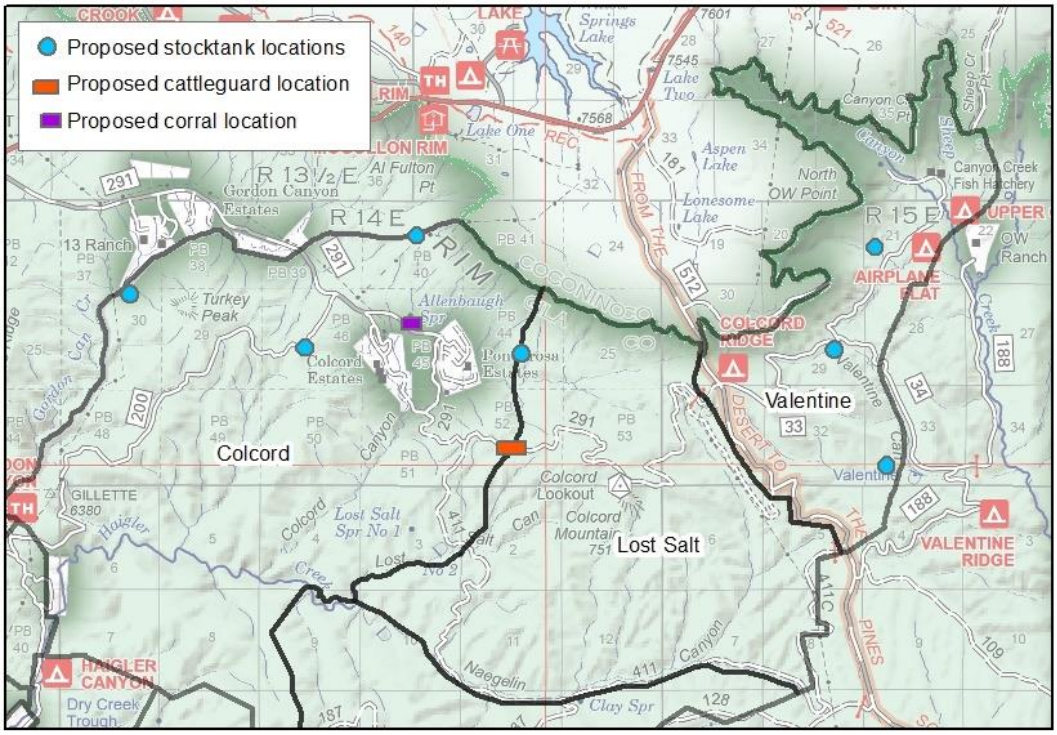

Figure 12: Proposed Improvement Locations

Additional Infrastructure

In addition to the structural range improvements listed above, additional infrastructure may be constructed if needed in the future.

The effects of adding any additional infrastructure such as fencing or waters to achieve resource objectives in the future are disclosed in and tiered to this environmental analysis. Heritage clearances for both the improvement and the access to the improvement would be obtained before implementation of any future improvements. Improvements may be authorized as necessary to achieve desired conditions without additional environmental analysis.

Improvements may be constructed in the future in order to facilitate livestock distribution throughout the allotment and assist in achieving the desired conditions and management objectives set forth in this analysis. Examples of future improvements may include, but are not limited to:

- Additional pasture division fencing
- Holding trap development
- Stock drive development
- Livestock handling facilities development
- Spring development
- Exclosures
- Development of dirt tanks
- Development of additional pipelines and troughs
- Development of additional trick tanks and catchments
- Cattle guard
- Wildlife water development

Improvement Design Features and Specifications

All existing and new improvements would follow Forest Service direction. Much of the design features are taken from the Forest Service Structural Range Improvement Handbook or other Forest Service policy and Best Management Practices. Additionally, all improvement components (e.g., rusted out troughs, broken sections of pipe, wire etc.) replaced during maintenance or reconstruction would be removed from Forest and properly disposed of.

The effects of adding any additional infrastructure such as fencing or waters to achieve resource objectives in the future are disclosed in and tiered to this environmental analysis. Heritage clearances for both the improvement and the access to the improvement would be obtained before implementation of any future improvements. Improvements may be authorized as necessary to achieve desired conditions without additional environmental analysis within the following specifications

Access

- Motor vehicle and or ATV/UTV access to range improvement sites would be on existing roads where practicable. Off-road vehicle use by pickup, trailer, ATV, UTV, or motorcycle needed to transport materials or machinery to maintain or inspect structural range improvements (fences, corrals, pipelines, wells, windmills, storage tanks, water delivery systems, troughs, earthen tanks) assigned in Part 3 of the term grazing permit as the permit holder's responsibility for maintenance is authorized. Existing routes or the shortest, most direct route to the improvement must be used and new route construction (i.e. blading a path) is not allowed without additional authorization. Cross-country motorized travel is not allowed when conditions are such that cross-country travel would cause unacceptable natural and/or heritage resource damage.

Springs

- All spring source facilities and headboxes should be adequately protected (i.e. buried or encased) or fenced. Headboxes would be constructed of concrete, metal, treated wood or other durable material.
- Horizontal wells must contain a shut off valve and reducer.
- Spring developments would not dewater the spring and must maintain a residual flow for riparian obligate vegetation and wildlife species.

Pipelines

- Diameter of pipe should be large enough to carry the flow of the water development but not less than 1 inch.
- Inlet and outlet pipe are protected by anchoring to 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 above ground pipeline supported structures would be maintained to keep pipe at gradient and prevent sagging.
- Pipelines with air and drain valves would be covered with fine screen to prevent rodents and dirt from entering pipeline. Screens must be replaced as needed.
- Pipeline leaks would be repaired or damaged section would be replaced with materials similar to materials from original construction.

- Pipelines with valve cover boxes would be kept covered and repaired when needed.
- Sufficient water should remain at the spring source to provide for riparian and aquatic resources supported by the spring.
- Riparian and aquatic resources supported by springs may be protected from grazing by fencing.

Troughs and Storage Tanks

- Troughs would be kept at heights that make them useable to livestock. Steel troughs should be kept off of the ground. Troughs which become elevated or uneven from trampling or erosion are periodically backfilled to maintain a useable height, authorization may be needed.
- Troughs and storage tanks should have float valves to maximize the volume of water remaining at the spring source to support aquatic and riparian habitat.
- Excess water in trough would be contained in an overflow pipe at least 50 feet away or nearest drainage. End of overflow pipe must be protected from trampling by livestock.
- New water developments would be constructed in uplands, at least 400 feet away from riparian areas, to encourage livestock use out of the bottoms and improve distribution across the uplands.
- All existing or future water developments that have open tops (i.e. troughs, open top storage tanks) must have escape and access ramps. All escape ramps would be built of expanded metal or similar materials and extend to bottom of trough and sides. Ramp would be firmly secured to trough rim so it would not be knocked loose by animals. Access ramps would be constructed of durable material such as concrete or metal. Slope would not exceed 45 degrees.

Fences

- All broken wire would be spliced and repaired and re-stretched to keep tension. Wire splices would be made with 12-gauge size tie wire or type of wire used in initial construction.
- Broken or rotted posts, braces or stays would be replaced where needed to maintain wire tension.
- Top wire on all range fences should be kept at 42 inches in height, and bottom wire should be smooth and 16-18 inches above ground. General maintenance would adhere to original construction, unless required by Forest Official. Reconstruction would be to these outlined standards.
- Brush will be maintained clear of fence lines 6’ on either side
- Fences crossing system trials will have gates installed.

Gates

- Wire gate tension should be sufficient to prevent gate from sagging and still be easily opened and closed. Gate loops are made of smooth wire, not barbed wire.

Conservation Measures under the Proposed Action

The following conservation measures will be followed when implementing the proposed action. The goal of these measures is to reduce impacts and disturbance to special status species and their habitats.

Riparian

- Equipment or staging areas needed to conduct range management activities (heavy equipment, vehicles, temporary holding pens, etc.) would be outside riparian areas or river/stream corridors and when appropriate, will utilize spill containment systems to minimize impacts.
- Motorized vehicles or heavy equipment used to complete range management activities will not be permitted to cross a perennial stream unless an established road already exists.

General / Improvement Construction and Maintenance

- It will be the permittee's priority to ensure that any livestock observed in unscheduled areas are removed from those areas. If fence repairs are needed, the permittee will complete repairs immediately.
- New watering developments (earthen stock tanks, above ground drinkers, troughs, etc.) would not be developed within 400 ft. of riparian areas.
- To prevent or reduce impacts to special status species and critical habitat, new water developments would not be constructed in areas occupied by special status species or in areas that would remove Primary Constituent Elements of any species proposed or designated critical habitat. This also includes selecting areas that require the least amount of vegetation removal, felling or trees or removing downed logs.
- New water developments within one quarter mile of a protected habitat or occupied breeding area for Mexican spotted owl, northern goshawk or peregrine falcon would not be constructed during sensitive breeding seasons where the action may disrupt breeding behavior or recruitment. This also applies to maintenance of existing waters inside PACs or PFAs. If non-nesting is confirmed by the District Wildlife Biologist, restrictions to avoid breeding season may be waived on a case by case basis.
- All new or existing above ground water developments will have wildlife ramps to allow for ingress and egress.
- New spring developments would be constructed with the spring box designed so that residual flow is left at spring head to prevent dewatering.
- 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 16-18 inches to allow wildlife to safely pass under.
- New water developments across the project area will be monitored twice per year to ensure that bullfrogs do not colonize new areas.

Chiricahua Leopard Frogs

- Permittee will notify USFS Range and Wildlife staff 60 days prior to the maintenance cleaning of any stock tank or drinker occupied by or within dispersal distance of a CLF occupied site.
- Tonto National Forest will continue to collaborate with the Bar X permittee to eliminate nonnative predators at or near Chiricahua leopard frog populations or suitable habitat that pose a threat to those populations, and/or prevent existing sites with suitable Chiricahua leopard frog habitat from becoming occupied by nonnative species.

- Immediately prior to pasture use, the permittee will inspect pasture boundary and livestock exclosure fence lines that are adjacent to areas known to be occupied by Chiricahua leopard frogs. Permittee will ensure that any fence repairs are completed prior to pasture use.
- Permittee will ensure that any livestock that are observed in unscheduled areas associated with Chiricahua leopard frog habitat are removed from those areas within 48 hours of their discovery. If fence repairs are needed, complete repairs immediately.
- Permittee will implement measures to reduce the likelihood and extent of transferring chytrid fungus throughout the Bar X Grazing Allotments. This specifically includes taking steps to disinfect or dry equipment and footwear used to clean tanks.
- To minimize livestock trampling and loss of bankline cover, the Tonto National Forest and permittee will consider methods to protect suitable or occupied frog habitat through the construction of partial fencing (barbed or pipe rail) and/or construction of trick tanks or double tanks when one tank is fenced and the other remains open.

Gila Trout

- Permittee will ensure that any livestock that are observed in unscheduled areas associated with Gila trout recovery or recreational streams are removed from those areas within 48 hours of their discovery. If fence repairs are needed, complete repairs immediately.
- During Gila trout spawning season (March through May), occupied streams and associated riparian areas will not be used as a driveway when moving cattle from one pasture to another.

Narrow-headed Gartersnakes

- Permittees will ensure that any livestock that are observed in unscheduled areas associated with narrow-headed gartersnake occupied sites or critical habitat are removed from those areas within 48 hours of their discovery. If fence repairs are needed, complete repairs immediately.

Mexican Spotted Owl

- Creation of new earthen tanks located within Mexican spotted owl critical habitat will be placed in areas where there will be no negative impacts to Primary Constituent Elements (PCEs). For example, trees or snags greater than 18 inches diameter breast height would not be felled.
- Livestock grazing or livestock management activities will occur within PACs in the project area but the following actions will not be permitted inside of MSO PACs during the breeding season (March 1 – August 31):

    1. the use of mechanized equipment such as chainsaws or electric/gas powered post pounders
    2. operating ATV/UTVs other than on existing roads
    3. use of corrals
    4. maintenance of corrals, buildings, or earthen stock tanks

  On a case by case basis, exceptions may occur where above actions 2, 3, and 4 may take place during the breeding season when nesting is confirmed and a nest site is located; this case by case exception does not apply to action 1. Actions 2, 3, and 4 could occur inside a PAC if the action takes place at least one quarter mile away from the known nest site and the District Wildlife

Biologist and U.S. Fish and Wildlife Service confirm that nesting birds will not be disturbed from noise or human activity.

Bald and Golden Eagles

- The Forest Service will coordinate with U.S. Fish and Wildlife Service and the Arizona Game and Fish Department to ensure that golden eagle nest location data are updated annually or as new data are collected.
- Range management actions near golden eagle nest trees and/or cliff platforms would be designed to protect eagles from disturbance. Spatial and temporal buffers for the breeding season (January 1st to July 31th) will be determined on a site-specific and annual basis in coordination with U.S. Fish and Wildlife Service and the Arizona Game and Fish Department.
- New construction or maintenance of fence or water developments will not occur within one mile of an occupied golden eagle nest during the breeding season (January 1st to July 31th) unless the District Wildlife Biologist, Arizona Game and Fish Department and U.S. Fish and Wildlife Service determine that disturbance from the action will not cause injury, loss in productivity or cause nest abandonment. These buffers and timing restrictions may be lessened or increased after consulting with Arizona Game and Fish Department and U.S. Fish and Wildlife Service on a case by case basis.

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 would occur yearly and would include such things as inspection reports, forage utilization measurements in key areas, livestock counts, and facilities inspections. Utilization measurements are made following procedures found in the Interagency Technical Reference (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 Payson 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) 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), would 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 would 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

Noxious Weed Monitoring

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

Water Quality Monitoring

All waterways monitored by ADEQ within the project area are currently attaining or inconclusive for all uses. E. *coli* contamination from livestock is of particular concern, however, because the area has multiple potential sources for E. *coli*, such as recreation or wildlife it would be necessary to determine the source of the contamination in order to address it. To the extent practicable, the Tonto NF will work with ADEQ to determine the source of the contamination if E *coli* or other impairments occurs on these or other waterways within the project area. There are many different potential sources of *E. coli* in this area including humans (via recreation and septic tanks), wildlife and cattle. If the source of contamination is determined to be due to grazing activities, the Tonto NF will adjust management within those areas accordingly.

Response to Monitoring

Within the scope of the grazing authorization decision, the Forest may adjust management in response to monitoring data, in combination with other factors such as weather patterns, likelihood of plant

regrowth, and previous years' utilization levels. Authorized number of livestock may be adjusted but would not exceed the number authorized in the grazing decision. The grazing decision and associated allotment management plan is implemented through the term grazing permit and annual operating instructions (AOI). Necessary annual adjustments to grazing management on the allotment would be implemented through the AOI, which would adjust use to be consistent with current vegetation productivity and resource conditions. The AOI may change season of use and pasture rest periods and may also include mitigation measures 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 current resources conditions or unforeseen environmental concerns such as drought, fire, flood, etc.

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. Salting locations would be coordinated with the wildlife biologist, range staff and permittee.
- 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 necessary infrastructure for managing livestock are in functioning condition prior to entering the next scheduled pasture.

Administrative Actions to Adjust Grazing Management

There are several types of administrative actions that could be used to modify grazing management within the allotment. If monitoring indicates that desired resource conditions are not being achieved in the desired time frame or in areas of this allotment, there are tools, or administrative actions that would be used to modify livestock management. Although there are many factors which may cause a desired condition to not be met, the following show how livestock management may be modified if livestock grazing is determined to be the probable cause why these desired conditions are not being met. The list below gives examples of administrative actions included in this proposed action that may be taken to respond to certain resource conditions.

- 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 salting and mineral blocks to aid in distribution, especially away from critical areas such as riparian areas. (This does not include supplemental hay feeding)
- Herding livestock
- 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

Drought Preparation

Drought is inevitable in the southwest. The Standardized Precipitation Index (SPI) is a widely used index to characterize meteorological drought on a range of timescales (https://www.ncdc.noaa.gov/oa/climate/research/prelim/drought/spi.html) . On short timescales, the SPI is closely related to soil moisture, while at longer timescales, the SPI can be related to groundwater and reservoir storage. It quantifies observed precipitation as a standardized departure from a selected probability distribution function that models the raw precipitation data (Keyantash and Dracup 2004). Regional Forest Service policy (USDA Forest Service, 2007) sets a threshold of - 1.00 SPI for a 12-month period, which triggers an evaluation of drought conditions. Once this is triggered, an interdisciplinary allotment evaluation is conducted to identify drought effects on an individual plant and landscape basis. Factors to consider in the evaluation include:

- Local precipitation data: rain gauge data, departures from normal;
- Current range management status: monitoring for desired conditions;
- Stocking levels: current authorized livestock numbers, grazing strategy;
- Available water sources: status of hauling water, stock tank levels, condition of improvements, well or spring production, presence of valuable riparian vegetation at the water source.

When an allotment's 12-month SPI becomes positive, vegetation resources would be evaluated for indicators of drought recovery. The following are evaluated:

- Recovery of vegetation: improved plant vigor, restoring litter production, restoring forage production;
- Implementation of grazing: focus on recovery through incremental restocking and pasture rest.

Early communication is important. The Tonto National Forest will work with the permittee to develop a drought preparedness guidelines to be included in the Allotment Management Plan. These guidelines would help frame initial communications related to the first signs of management impacts due to

drought. Guidelines should address potential drought impacts to livestock and vegetation, identify known issues, and strategically plan for different scenarios while actively monitoring.

Off-Road Travel

The following on-going activities requiring motor vehicle use off designated routes would be authorized to conduct livestock grazing activities on National Forest System lands within the Tonto National Forest:

- Off-road vehicle use by pickup, trailer, ATV, UTV, or motorcycle needed to transport materials or machinery to maintain or inspect structural range improvements (fences, corrals, pipelines, wells, windmills, and storage tanks, water delivery systems, troughs, earthen tanks) assigned in Part 3 of the grazing permit as the permit holder's responsibility for maintenance. Existing routes or the shortest, most direct route to the improvement must be used and route construction (i.e. blading a path) would not be allowed without additional authorization.
- Using an off-road vehicle to place supplements in strategic locations for livestock management purposes may be authorized by the District Ranger in the Annual Operating Instructions when requested.

Vehicle use to gather or move livestock off-road would not be authorized. Cross-country motorized travel would not be allowed when conditions are such that cross-country travel would cause unacceptable natural and/or heritage resource damage. Off-road use of heavy equipment (i.e. backhoe, dozer, loader, etc.) may be authorized for range improvement development as needed. Cross-country travel to construct new range improvements and other off-road travel by the permit holder would be analyzed in the environmental analysis for this project. Before new improvements are approved, Heritage clearance would be obtained, including the route to access the development.

No additional Section 106 cultural compliance is required for specific limited-use authorizations already covered by separate decisions under the *National Environmental Policy Act* per The Region 3 Region-wide Travel Management protocol with the Arizona State Historic Preservation Officer. Motor vehicle use in designated wilderness areas would continue to be managed consistent with the provisions of the Wilderness Act [Section 4(d)(4)(2)] that provides for limited exceptions for grazing livestock as further defined in the Congressional Guidelines (FSM 2323.22)

Alternatives Eliminated from Detailed Analysis

Continue Current Management

Under this alternative there would be no change in allotment management. As permits expire, new permits would be issued for the classes and numbers of livestock currently permitted. Annual authorized use would continue to be controlled through annual operating instructions. None of the proposed improvements (Alternative B) would be implemented, but existing improvements would be maintained. For comparison, this alternative assumes management intensity, utilization and distribution patterns similar to the past five years. This alternative was not analyzed in detail as it does not meet the purpose and need to manage resources in a manner that achieves Forest Plan objectives and desired conditions, or formally incorporate adaptive management that allows for sufficient management flexibility.

As indicated in *Current Grazing Management*, current (AUM's) are less than the Proposed Action. Additionally, within in the existing current allotment management, there is no opportunity for adaptive management, making it difficult to change yearly authorized AUM's as necessary based on current

resource conditions. The scope of current management places it within the range of alternatives between the No Grazing and the Proposed action. As such, the Proposed Action was developed with the strategy to minimize or eliminate the need for additional alternatives to be developed FSH 2209.13 (92.32).

Comparison of Alternatives

This section provides a summary of the effects of implementing the alternatives. The indicators in the first column of the following table were generated by tracking issues identified by scoping and compare how those would be affected by each alternative.

Table 20: Comparison of Alternative by Issue

Selected Issues	**Alternative A – No Livestock Grazing/ No Improvement Projects**	**Alternative B – Proposed Action - Continue to authorize livestock grazing on Bar X under updated terms and conditions. In addition, cattle would be authorized to graze in the Heber-Reno Sheep Driveway.**
Livestock Capacity	None, closed to grazing.	• Bar X and Driveway Pastures: Up to 552 cow/calf pairs plus 160 yearlings depending on current resource conditions • Ow Driveway pastures: up to 50 adult cattle depending on current resource conditions • Potato Butte Driveway pastures: up to 9 adult cattle depending on current resource conditions • Solider Camp Driveway pastures: up to 122 adult cattle depending on current resource conditions
Soils and Vegetation Conditions	Likely improved condition and upward trend in native grass communities. Continued decline of native grass communities in areas with Yellow Blue Stem grass.	Conditions same as Alt. A, but slower trend in native grass communities. Yellow Blue Stem grass may be grazed by domestic livestock at different times of the year and expansion may potentially be reduced.
	No monitoring.	Both effectiveness and implementation monitoring would continue on an annual basis.
	No management implemented to change conditions.	Adaptive Management options are implemented to resolve problems.
Wildlife	Recovery efforts related to special status species continue with no grazing impacts. A vegetation response is expected, with more forage available for wildlife. This alternative would eliminate noise and human disturbance caused by routine range operations; wildlife avoidance of livestock congregation areas would also be eliminated. Decreases in	Recovery efforts related to various species continue with protections in place to address grazing impacts wherever practical. Direct impacts may adversely affect Chiricahua leopard frog and Gila trout if present in the project area. Implementation of conservation measures and riparian utilization guidelines are intended to reduce effects and maintain or

	availability of water at stock tanks would occur over time as no maintenance of these water sources would occur under this alternative.	increase existing riparian and upland vegetation. Aquatic species, especially Chiricahua leopard frog will benefit from increased water permanency in the project area.
Wilderness	No maintenance of infrastructure within the Hellsgate wilderness area.	Maintenance of infrastructure within the Hellsgate wilderness area is the responsibility of the permittee within the MRDG guidelines. Existing infrastructure is limited to some pasture and boundary fences.

Chapter 3: Affected Environment and Effects Analysis

This chapter summarizes the condition of the various resource environments in the project area and the potential effects to those environments due to the implementation of the alternatives analyzed. The chapter is organized into sections by resource, with each section presenting the resource condition (affected environment) followed by the effects analysis (effects) of implementing each alternative analyzed. For all effects analysis, the best available data was evaluated in consideration of the alternatives.

Past, Present & Reasonably Foreseeable Actions

Cumulative effects are the past, present and reasonably foreseeable future actions that potentially add to the direct and indirect effects considered in this EA. These effects are considered in each resource section and if no direct or indirect effects are analyzed, no cumulative effects are analyzed in detail. In general, actions that may be considered in a cumulative effect's analysis include fire, wild and prescribed projects, maintenance of roads and recreation sites, off-road vehicle use, human recreation activities and future projects that have been planned and NEPA analysis scheduled for the future. Future actions not having a proposed action and analysis scheduled are considered too speculative to include in this analysis. While planning under the Four Forest Restoration Initiative is ongoing and the treatments proposed are reasonably foreseeable, there are no specific plans, at this time, that can be evaluated. The spatial bounds for cumulative effects on wildlife and soils are the watersheds in which the project area is located. For vegetation, the bounds are the project area. The temporal bound for cumulative effects on all resources is ten years which is the term of the proposed grazing permit.

Range

Affected Environment

Within Bar X, current management has improved allotment vegetative conditions compared to conditions in recent decades. Trial grazing periods within the Turkey peak, Colcord Canyon, and Lost Salt pastures (currently closed to grazing) along with the Driveway have demonstrated that available forage may be utilized in these areas in a way to maintain or achieve desired conditions (FSH 2209.13). Trial use of the Driveway also demonstrated that this area may be utilized in partnership when with domestic

sheep as it historically was used. During these periods of trial use, ground cover remained stable and conservative utilization was achieved. The Proposed Action has been designed to improve unsatisfactory areas as well as maintain or improve conditions for the Bar X and Driveway that are in satisfactory vegetative condition.

Effects Analysis

General Effects of grazing

Ecosystem processes (energy, nutrients, and water) in arid and semiarid plant communities are affected by grazing herbivores. Removal of herbaceous vegetation, trampling and hoof action, and fecal and urine deposits by domestic and wild ungulates can positively or negatively impact plant communities depending on the number of animals and length of time they are present on a site. Domestic livestock, mainly cattle and sheep, were introduced on western rangelands in the late 1800s and early 1900s (Manier and Hobbs 2007). Grazing effects of wild and domestic ungulates differ primarily due to the fact that managers have very little control over the timing, intensity and duration of use by wildlife.

Shifts in plant community composition are caused by a range of natural disturbances. While grazing can cause shifts in vegetation state, it is not always the leading cause. Often, grazing pressures are removed with the idea that its absence would allow the vegetative community of a specific site to return to historical conditions (Ruyle and Dyess 2010). Historical conditions of the site may not be reached even with the removal of grazing. Altered soil characteristics such as water infiltration rates (Castellano and Valone 2007), seed source deficiencies, and presence of exotic or invasive plant species are additional limitations (Ruyle and Dyess 2010). In addition, lack of frequent fire, a historical natural disturbance of Southwestern rangelands, has changed over story structure, which in turn has changed composition and abundance of herbaceous species (Reynolds et al. 2012). Global climate change also poses important implications on state changes in vegetation caused by climate or other disturbances, further decreasing the chances that disturbed sites would return to historical conditions without intensive human management (Ruyle and Dyess 2010). Yellow Blue stem (*Bothriochloa ischaemum*), which is a non-native invasive species, has recently been documented in the area, and may change the potential of range sites.

Alternative A (No Grazing) – Direct and Indirect Effects

Vegetative composition

Vegetation Type: Juniper grassland and PJ oak woodland:

Removal of grazing from juniper grasslands and PJ oak woodlands that have been grazed intermittently for more than 50 years may directly and indirectly affect the current state of ecosystem processes. Shrub cover may increase in the absence of grazing by domestic livestock. Grazing use levels on the forage species would be light to moderate grazing intensities by wildlife, particularly elk and deer. It is predicted that the physiological growth requirements of the forage plants would be favored with the absence of livestock grazing. Therefore areas on the allotments would increase in forage plant densities and plant residues. Additionally, there could be an increase in plant species composition and improved vigor of forage plants within the allotments. The overall forage production (biomass) could also increase with no domestic livestock grazing. Some species of plants over time may become decadent without ruminant livestock grazing, becoming unpalatable to wildlife species that favor young grass plants.

Juniper encroachment is expected to continue and this could alter the natural fire regimes of the project area. These factors would influence the short- and long-term range condition and trend.

Areas outside of normal livestock use (slopes greater than 60%) and areas with stable soils would remain stable or fluctuate slightly up or down based on growing season precipitation patterns. Areas that receive normal livestock use may or may not change to a higher condition class in the next 10 years as it will depend on growing season precipitation patterns. Key areas already with stable trends are likely to remain stable or improve, depending on site potential.

Vegetation Type: Ponderosa pine:

Grazing levels would be light, although wild ungulates such as mule deer, Coues white-tailed deer, and elk would still impact herbaceous and browse plant species. These impacts are expected to be minimal. It is predicted that the physiological growth requirements of the forage plants would be favored in all key areas under this Alternative. Therefore, all areas on the allotment would likely increase in desirable forage plant densities such as perennial bunch grasses and forbs. Additionally, there would be an increase in plant species composition and improved vigor of forage plants within the allotment. Overall forage production (biomass) would also increase with no livestock grazing by cattle. The overall effect would allow for the quickest recovery in unsatisfactory areas and improve vegetative conditions overall across the allotment (Arnold, 1950).

Restoration

Vegetation Type: Juniper grassland and PJ oak woodland:

Soil erosion can hinder improvements in vegetative composition by as many as 20 years in desert systems (Holechek et al. 2004). Vegetative sites that have crossed an ecological threshold to a state where a return to a perennial grass dominated site is unlikely, removal of grazing may not achieve desired resource conditions without additional restorative efforts (West et al. 1984). The same prediction holds for the project area; the action of grazing removal from a site may not achieve desired conditions by itself.

Removal of livestock would decrease bare ground with the accumulation of litter while reducing compaction from livestock trampling and grazing. Recovery of vegetation and soils across the allotments would be slow and depend upon the level utilization the areas received in the past. A response from no grazing may be greater in these vegetation types on the allotments since they contain more grasses and forbs than in the Ponderosa pine vegetation type. It is expected that with the accumulation of litter and reduction of bare ground, there would be less run off from precipitation and more water available to vegetation. Annual recruitment may increase which would benefit native wildlife such as rabbits, deer and elk. An increase in annuals and other grasses would increase soil percolation and increase subsurface organic material.

Although currently there are no plans for restoration projects such a juniper thinning or mastication, these projects would not be pursued or planned for by Forest Service range staff or permitees. These projects may be considered in the future by District Fire, Fuels, and Wildlife staff.

Vegetation Type: Ponderosa pine:

Implementation of Alternative A would not necessarily restore the reference or historical structural and species composition characteristics in ponderosa pine forests alone. Only re-introduction of fire and

application of informed, mechanical, grazing, or other biological treatments would move current forest conditions toward desired conditions.

Absence of grazing from specific areas within ponderosa pine forests in the project area could produce a range of adverse effects. Approximately 9,700 acres of high intensity wild fires have burned within the Bar X and Driveway. These fires were the Rodeo Chedeski (4,000 acres; 2002), Haigler (700 acres; 2007), and Poco (5,000 acres; 2012). These fires burned in primarily in ponderosa and juniper grassland vegetation types. High intensity, severe and uncharacteristic nature of these fires shifted historic species composition of the understory and over story components to a shrub-dominated state with sparse groups of ponderosa pine, juniper, and some oak trees.

Uncharacteristic stand-replacing fire would drive change in ponderosa pine forests with the absence of grazing unless other management practices such as thinning, mechanical or biological treatments are applied to these systems (Reynolds et al. 2012).

Range Improvements

Under the No Action alternative, range improvements would no longer be maintained by the permittee. Existing boundary fences would be assigned to adjacent permittees (where applicable). Interior fences and other infrastructure may be removed, as funding or workforce allows. Water developments, important for wildlife may be maintained where feasible using other program funds or volunteers. Often, recreational users take advantage of existing corrals and water developments to care for their horses or mules while using National Forest System trails. Additionally, some wildlife species may have grown accustomed to reliable water at water developments, so there may be short-term negative impacts to their populations without those water sources.

Noxious Weeds

Absence of grazing in these vegetation types would remove one vector of spread in the project area, but the spread of weed seeds would continue naturally on upland vegetative sites. In the absence of grazing, seeds could still be dispersed by humans via domestic animals, contaminated hay, uncertified seed, off-highway vehicles, and heavy road maintenance equipment. Existing infestations would still receive treatment in the absence of grazing. Absence of grazing would also decrease observations of any new noxious weed establishments and would limit the control to chemical or manual removal only.

Drought and Climate

The No Action alternative does not impact the occurrence of drought.

Climatic carbon dioxide levels (CO2), temperature, and precipitation would play a role in vegetation structure. Higher temperatures would create hotter conditions and change soil moisture regimes (Izaurralde et al. 2011). High altitude plants may not be readily adaptable to higher temperatures and may be negatively affected as a result. This is undesirable because higher altitude herbaceous plants are generally more nutritious than lower altitude plants (Bertrand et al. 2008), so their deterioration would negatively impact wildlife and other herbivores. Some studies have reported that increased CO2 would significantly increase Carbon 3 pathway plant production, indicating that shrubs and woody species would become more prevalent. (Hatfield, et al., 2011) As a result, increased levels of shrub and woody species may contribute to a vegetative structure that leads to stand-replacing or uncharacteristic wildfire (Reynolds et al. 2012). The absence of livestock would decrease CO2 emissions within the project area but would not affect climatic conditions

Fire

A natural disturbance on Southwestern forests and rangelands, fire behavior may be affected by the removal of livestock due to a possible increase in shrub cover (Manier and Hobbs 2007). Removal of grazing would allow herbaceous components to build up to a level where more frequent fires could re-enter the disturbance regime (Laughlin et al. 2006).

Frequent, low intensity fire has played an important role in how ponderosa pine/mixed conifer forest structure and species composition has been shaped. The grass-forb-shrub community is the basis on which tree groups and individuals have been arranged. This herbaceous and shrub component are important for maintaining frequent surface fires (Reynolds et al. 2012). Absence of grazing the herbaceous (grass-forb) component could allow necessary fine fuels to carry low intensity, frequent fire through these forests.

Alternative B (Proposed Action) – Direct and Indirect Effects

Vegetative composition:

Vegetation Type: Juniper grassland and PJ oak woodland:

The predicted effects of the Proposed Action on juniper grassland and PJ oak woodland vegetation types may vary depending on the trends in climate and precipitation over time. Monitoring in the portions of these allotments that have been grazed regularly over the last ten years has shown a range of responses to grazing pressure, rest and precipitation, which is well within the range of natural variability associated with these vegetation types in the southwest. During dry periods some components of the plant community would decrease and during wet periods, under appropriate management, these same components would recover. Flexibility in the stocking rate up to the proposed permitted numbers would allow managers to respond to short term changes in precipitation by either increasing or decreasing the annual authorization accordingly to achieve outcomes desired on a pasture by pasture basis. No adverse direct or indirect effects are anticipated.

Vegetation Type: Ponderosa pine forest:

Where present in these vegetation types, grasses, forbs, and shrubs are selected for grazing by livestock. Excessive grazing of these components may reduce plant diversity and decrease soil stability. These also play roles in maintaining natural fire regimes and help limit pine seedling establishment. Grazing impacts on vegetation may be mitigated by timing of use, head management (yearlings), adjustment of stocking rates, addition of range improvements, limiting utilization rates, and conformance with the Tonto Forest Plan (Allen, et al, 2002).

This alternative would limit forage utilization to conservative levels (up to 40 percent for grasses, forbs, and shrubs). This is within the range recommended for grazing in the southwestern United States. Most rangeland grasses and forbs can have 35 percent to 45 percent of their leaves and stems removed every year and still remain healthy and productive so that plants can photosynthesize and manufacture energy to produce more leaves, stems, and seeds (Holechek 2012). With the grazing utilization stipulations, the Proposed Action would maintain or improve upland vegetation productivity and condition by maintaining utilization levels that have been authorized leading up to this document.

Restoration

Livestock impact soils by compacting and loosening soil from trampling and trailing in addition to selecting for forage species. Direct impacts depend on the duration, timing, class or kind of livestock, and intensity of grazing. Grazing management can moderate the effects of livestock grazing. The proposed grazing strategy outlines in the proposed action was designed to maintain or improve conditions across the Bar x and Driveway.

There are no specific restoration projects in the proposed action.

Range Improvements

Addition of range improvements may play a key role in helping move current conditions towards desired conditions and helping to achieve management objectives set forth in this analysis.

Table 21: Proposed Structural Range Improvements to be implemented within the First Two Years

Description	Allotment	Pasture
Development of roadside or winged stock tanks	Bar X	Colcord, Lost Salt
Installation of a cattle guard	Bar X	Colcord
Corral	Bar X	Colcord
Development of roadside or winged stock tanks	Driveway	Valentine

Roadside or Winged Stock Tanks

The installation of a tank includes using a bulldozer to dig the tanks, build berm around the tank, and construct bar ditches to collect water. Cross country travel may be utilized to access the site. Incidental tree and shrub removal may take place in the footprint of the tanks. Tanks are typically 100’ x 100’ feet in diameter and 8-10 feet deep.

Areas near future improvements may experience high levels of use, but distribution opportunities for livestock, would likely be improved. Utilization around current improvements such tanks or troughs may also decrease because of the additional water troughs elsewhere in pastures. Any future range improvement tiered to this EA would be required to complete additional heritage and biological clearances.

Corrals and Fences

The construction of the additional fence for grazing exclosures/corrals/traps and study areas may have impacts to vegetation resources through the partial clearing of woody vegetation for fence line construction and maintenance, typically 6’ on either side of the fence. A rebuilt corral is included as part of the proposed action is located at an original corral location which is already disturbed. This location was selected because it is logistically ideal, but also to minimize any future disturbances.

Additional impacts may occur from livestock and wildlife that may use the fence line as a travel corridor. Corrals may be made of a variety of materials including pipe rail, buck and rail, or rail road ties. They are generally no larger than 200’ x 200’ concentrate animals when being used, usually no more than bi-annually. Animals are typically held in corrals for short period of times, generally over night or while pastures are being gathered or animals being worked. Indirect impacts from the concentration of

animals include in trampling or defoliation of established vegetation, considerable ground compaction, reduced infiltration and potential expansion of invasive species into the newly created disturbed areas.

Cattle Guards

Construction of a cattle guard involves the excavation of the road bed to install the premade metal cattle guard. The guard is approximately 12’ long by 6’ wide with concrete pads on the sides for support. The guard would be installed with a backhoe and dug down approximately 4’ deep. Once lowered into the dugout roadbed, the guard will be installed. Existing range fence will tie into the sides of the cattle guard, and the existing gate is removed, no longer needed.

Future Range Improvements

Standard structural range improvement projects would be completed across allotments as specific needs are identified and funding is available. The types of improvements could include:

- Additional pasture division fencing
- Cattle guards
- Holding traps and traps around dirt tanks
- Livestock handling facilities
- Spring development and exclosures
- Construction of dirt tanks
- Placement of additional pipelines and troughs
- Development of additional trick tanks and catchments

Wells & Storage Tanks

Direct impacts would include disturbance to vegetation around the well site from the well drilling equipment. This would be localized to an area approximately 10’ x 15’ around the well. Sediment from the drilling would be spread out around the well site. Approximately 100 square feet of vegetation resources would be impacted by storage tank placement. Storage tanks may be placed adjacent to or away from the well to depending on water line pressure. Storage tanks are generally 4’ in diameter and 6-7’ tall. They are placed behind brush to minimize visual obstruction and deter vandalism. Tanks are connected to the well via 1.25” polyethylene pipe.

Pipelines & Troughs

Any future proposed improvement locations would be designed to following existing roads and areas that have been previously disturbed, minimizing impacts to existing vegetation where possible. Vegetation would be directly impacted in the short-term by the installation of pipelines and troughs. Direct impacts would include full removal of some vegetation species within the footprint of the project (up to 60” across) before or during installation using hand or power tools. Indirect impacts would include trampling or defoliation of established vegetation during installation, and expansion of invasive species into disturbed areas. Pipe would be weaved through and around existing vegetation causing minimal impacts. The surface disturbance from pipeline is expected to be minimal. Levels of moderately higher use would be expected to occur in areas within ¼ mile from trough locations.

Noxious Weeds

Yellow Blue Stem is an introduced bunchgrass that is becoming invasive within the Bar X and Driveway. Historically is was commonly used as cattle forage in other areas of the country, however in the southwest, cattle and wildlife generally find it less palatable than warm-season native grasses. As a result, livestock may avoid grazing this grass, giving them a competitive advantage to persist over native plants.

By itself, grazing is inadequate to eradicate or control yellow blue stem as this species is highly tolerant of close grazing. Yellow blue stem is palatable when young and may have equal or greater forage quality in the early growing season as compared to some native species. However, yellow blue stem plants generally mature more quickly than most native warm-season grasses and correspondingly become less palatable. Despite yellow blue stem usually avoided by grazing animals in favor of native warm season grasses during periods of adequate moisture, they can be highly selected by grazers during drought periods. Yellow blue stem retain green leaf material longer than some native species at the onset of drought, which allows them to recuperate more rapidly when precipitation eventually returns to normal levels.

Drought and Climate

The proposed action would not affect drought. Drought conditions would be monitored with the Standardized Precipitation Index (SPI). Rain gauges may also be used to monitor precipitation within various areas of the allotments. Utilization strategies during drought would be adjusted to compensate for decreased plant growth and would allow for residual forage for wildlife food and thermal cover.

Fire

The proposed action would directly affect wildland fire within the project area through the reduction of fuels such as grasses, forbs, and brush. The removal of fuels would reduce fire's ability to spread through dry fuel loads. Livestock may trample fine fuels which creates a more compact fuel bed reducing its flammability and ability to spread. Range staff would work with fire and fuels to schedule pasture use so proper levels of fine fuels (grasses) are present to achieve desired prescribed fire outcomes.

Alternative A (No Grazing) - Cumulative Effects:

Implications of historic unregulated livestock grazing, fire suppression and logging on North American Southwestern rangelands in the late 1800s and early 1900s (Moore et al. 2006; Reynolds et al. 2012) must be considered as a lasting effect across the project area. Ecological processes may benefit from livestock removal on Juniper grassland types, if climatic variables remain more or less constant. If, however, more frequent and longer droughts persist as predicted (Izaurralde et al. 2011), then plant communities would not necessarily benefit from the absence of grazing.

Maintenance thinning of Juniper mosaics by the permittees within the project area would cease under alternative A. If these mosaics do not benefit from the continuation of thinning by the permittees, completed treatments are not likely to be maintained and this vegetation type could shift back to a less desirable canopy cover and vegetative state. Alternatively, absence of grazing could allow for more comprehensive prescribed fire treatments.

Ceased maintenance of water and fence improvements may have undesirable implications for wildlife. Wild ungulates such as mule deer, elk, white tailed deer, and Coues' white-tailed deer depend on many

livestock watering facilities. Absence of cattle would essentially cease all maintenance of such earthen stock tanks and developed springs, imposing potential water shortages for wildlife species.

Other activities taking place in the project area such as recreation, hunting, logging, thinning, and mining would continue to persist in the absence of grazing. OHV use would persist on and off authorized or unauthorized roads, waterways would still receive recreational impacts, and fire would still be suppressed in most cases.

Under the No Grazing scenario, improvements in resource conditions are expected to be mild to moderate over the long-term, vegetation (fuels) would likely continue to build up as no livestock would be removing above ground biomass. This may increase the probability of wildfire within the allotment which may have increased negative impacts to vegetation and soil resources. Uncharacteristic stand-replacing fire would drive ponderosa pine forests in the absence of grazing unless other management practices such as thinning, mechanical or biological treatments are applied to these systems (Reynolds et al. 2012).

The effects of climate change and drought may impact vegetation condition of the allotment, however, the continued absence of livestock grazing pressure may lessen plant stress, thereby reducing or slowing these effects.

Alternative B (Proposed Action) – Cumulative Effects

The Bar X allotments have been active livestock grazing allotments with livestock grazing occurring in some form in the project area for over a century. The Driveway has been actively grazed by sheep and cattle for over a century as well, although cattle have been excluded since the 1960's and only allowed to use recently under a trial basis for this NEPA document. Environmental effects of past grazing practices are reflected in the current description of the affected environment for the allotment.

The Proposed Action grazing practices are not expected to contribute toward any downward trends in resource conditions on the allotment. Continuing to authorize livestock grazing on Bar X under updated terms and conditions and authorizing cattle to graze in the Heber-Reno Sheep Driveway is not anticipated to contribute additional adverse impacts to allotment resource conditions as described in Chapter 3. Monitoring has demonstrated that current management has resulted in improvements to vegetative condition in the allotment. A flexible management livestock rotational system with a selective rest-rotation strategy, light to conservative grazing intensity, and the potential for additional range improvements are not expected to result in significant direct or indirect negative effects to vegetation and are likely to maintain or improve the overall vegetative condition of the allotment.

The proposed grazing management strategy has the potential to move Juniper grassland and PJ oak woodlands toward desired conditions and ecosystem function, if stocking levels are promptly adjusted to vegetation and ecosystem needs. The flexibility of maintaining herds of varying sizes allows appropriate stocking levels to be applied in proper vegetation units at optimum seasons of the year without compromising the overall level of AUMs.

In general, effects of a yearlong grazing system in this ecological region would be mostly beneficial as long as each vegetation unit receives the correct period of rest at the appropriate time of year. Grazing schedules would be determined by previous use, previous rest, season of use, precipitation, growing conditions and over all recovery, on a pasture by pasture basis for specific goals for various vegetation types. No adverse cumulative effects are anticipated.

Soils

Affected Environment

Details on affected environment for soils can be found in Chapter 1 – Existing Conditions – Soils.

Effects Analysis

Direct Effects

Livestock grazing can affect soil quality in several ways. Hoof action of cattle can directly impact soils by compacting soils. The risk for surface compaction is greatest when soils are wet (NRCS, 1996). Compaction decreases water infiltration and increases the hazard of water erosion (NRCS, 1996, 1998, 2001). Trailing by livestock on steeper slopes can physically displace soils, leading to erosion. Livestock tend to concentrate on flatter areas especially if they are fairly open. Livestock tend to use 10 to 30% slopes thirty percent less often than 0 to 10% slopes and 30 to 60% slopes sixty percent less often than 0 to 10% slopes. Slopes over 60% are seldom used (Holechek, 1992). Because of the tendency of Livestock to use flatter slopes, areas of impacted soils are more likely to be found on gentler slopes.

Range improvements (e.g. fencing, water developments, etc.) can have slight, localized, short-term impacts to soils during construction. Building new fences and developing waters, as mentioned in the proposed action, would have small, localized direct impacts to soils.

Indirect Effects

Livestock indirectly impact soil function through the utilization of vegetation resulting in a loss of protective cover including litter. The loss of vegetation and litter exposes the soils to raindrop impact and overland flow thus leading to increased erosion. Reduced cover can result in a loss of soil organic matter and a reduction in soil microbes which play a significant role in nutrient cycling. Soils that are lower in organic matter may have poorer structure which also affects infiltration and percolation. Building fences and developing waters will indirectly affect soils by improving distribution of cattle resulting in a net positive effect on soil function. Other management actions, such as salting and water development, that affect livestock use patterns, can improve distributions and lessen impacts to heavily used areas but could lead to increased use of other areas that had been previously unused or lightly used.

Cumulative Effects

Cumulative effects include the direct and indirect effects of the proposed action and alternatives when added to all past, present, and reasonably foreseeable future actions. Past use of the project area has contributed in the current soil conditions.

Other activities and management actions that have occurred in the past or are presently occurring in the analysis area are:

- Fire
- Roads
- Introduction of non-native invasive plants that lead to an increased risk of erosion and wildfire
- Historic grazing
- Recreation & land use

Recent and on-going drought and possible future climate change can also impact conditions. Higher temperatures and lower precipitation are predicted for the southwestern United States (Garfin et al. 2013)

The criteria used to evaluate alternatives will be based on the likelihood of moving toward or attaining desired conditions described in the affected environment and in the Tonto National Forest Plan.

Effects by Alternative

The criteria used to evaluate alternatives will be based on the likelihood of moving toward or attaining desired conditions described in the affected environment and in the Tonto National Forest Plan. The alternatives are contrasted based on the likelihood of upland vegetation and soils attaining the short and long-term desired conditions described in the Affected Environment. Soils in less than satisfactory condition are generally on gentler slopes. Even with good management, flatter areas will still tend to receive heavy use since these areas are favored by livestock. Areas established to monitor cattle utilization, are normally on flatter, more open areas (Holecheck, 2012). If monitoring of grazing intensity of these areas shows acceptable use, other parts of a pasture can be expected to have acceptable levels of impacts.

Alternative A: No Grazing

Direct and Indirect Effects

The direct and indirect effects of this alternative will, generally, be beneficial to soils and vegetation and provide the potential for attaining the desired conditions. The no grazing alternative would allow impaired and unsatisfactory soils, often affected by compaction, to recover. Soil conditions that are currently less than satisfactory are largely attributable to the cumulative effects of many factors. Areas impacted by fires are more likely to recover under this alternative. Naturally unstable areas are likely to have no improvement as expected. Grazing can also affect recovery of certain species within chaparral communities impacted by fire. No grazing would benefit these communities. Even with continuous rest, the rate of recovery is expected to be slow for most areas as the development and recovery of soil is a very slow process. Climate change presents additional considerations. Warming and drying of the climate could increase the risk of wildfire. The No Grazing Alternative will provide the fastest increase to vegetative cover, species diversity and improvement of soil condition.

The amount of time required for recovery of soil function can vary from several years to decades depending on the severity of the impacts and the nature of the ecosystem. This alternative is likely to lead to the fastest overall improvement in soil function but even with complete rest it may take more than ten years for some areas with impaired and unsatisfactory soil condition to improve to a better condition class.

Effects on Biological (Cryptogamic) Crusts: Biological crusts play an important role in some ecosystems especially the Sonoran Desert and, to a somewhat lesser extent, the other ecosystems in the analysis area. Biological crusts bind and protect soil from both water and wind erosion. Grazing can have detrimental effects on the amount of biological crusts (Beymer, 1992). This alternative is most likely to increase the cover of biological crusts and their ecological benefits.

Alternative B: Proposed Action *(see chapter 2 alternatives*)

Direct and Indirect Effects

Hoof action of cattle can cause direct impacts by compacting soils. Compaction decreases water infiltration and increases the hazard of water erosion (NRCS, 1996, 1998, 2001). Soils most likely to have impaired or unsatisfactory conditions occur on flatter areas which are more likely to be used by livestock. These areas are likely to continue to receive a substantial amount of use however, if allowable use guidelines are not exceeded (allowable use), these areas should begin to improve. Improvement is not likely to be as fast as would occur under the alternative A.

Effects on Biological (Cryptogamic) Crusts: Biological crusts play an important role in some ecosystems especially Sonoran Deserts and, to a somewhat lesser extent, other ecosystems in the analysis area. Crusts bind and protect soil from both water and wind erosion. Grazing can have detrimental effects on the amount of biological crusts (Beymer, 1992). Biological crusts on sandy soils are less susceptible to disturbance when moist or wet; on clay soils, when crusts are dry. In general, light to moderate stocking in early- to mid-wet season is recommended (USDI, 2001, p 67).

The effects of improvements (fence construction, tank construction or improvement, etc.) would be a minor, localized, short-term disturbance to soils.

Cumulative Effects

Direct and indirect effects of alternative B, when combined with other past, present or reasonably foreseeable actions (cumulative effects) as listed above, are likely to result in attainment of desired conditions for soils and vegetation but at a slower rate than for alternative A. Soil conditions that are currently less than satisfactory are largely attributable to the cumulative effects of the various factors mentioned above.

Rates of recovery will depend on soil factors (biotic and abiotic), and climatic factors. Areas of traditional livestock concentration, such as near water developments or salting and bedding grounds may recover fastest in the absence of livestock grazing, however with adequate management, such areas can also be maintained or improved under the proposed action.

Watersheds & Riparian Areas

Affected Environment

Details on affected environment for watersheds and riparian areas can be found in Chapter 1 – Existing Conditions – Watersheds and Riparian Areas.

Effects Analysis

Direct and Indirect Effects Common to Both Alternatives

Ten of the 11 watersheds that touch the project area are considered functioning at risk. No one watershed covers more than 50% of the project area, however, Haigler Creek, Marsh Creek, Middle Spring Creek and Gruwell Canyon – Cherry Creek together make up 78% of the project area. Weighted averages of the 22 indicators for these four watersheds are used here for analysis of direct effects. The upper quarter of the Gruwell Canyon-Cherry Creek watershed has not been grazed by cattle since 1979. Approximately half of Cherry Creek in this watershed flows through private property. With this

variability in uses and in stream and riparian area condition, the riparian vegetation condition and large woody debris ratings are unlikely to change under any alternative.

The upper half of the Haigler Creek watershed has not been grazed by cattle since 1979. Except for Naegelin Canyon, which is functioning at risk and trending upward based on 2018 field data, the creeks in that part of the watershed that have been assessed are stable. Some reaches of Haigler Creek throughout the project area, being in narrow canyons, are inaccessible to cattle. Some reaches receive high recreation use. With this variability in uses and in stream and riparian area condition, the riparian vegetation condition and large woody debris ratings are unlikely to change under any alternative.

Under alternative A, or with successful mitigation measures under alternative B, the riparian vegetation condition and large woody debris ratings could improve one condition class for Marsh Creek watershed, which would improve the overall rating from Functioning at risk to Functioning.

Alternative A – Direct and Indirect Effects

Under alternative A all grazing permits on Bar X within the project area would be cancelled and improvements not deemed functional or needed would be removed. Project area lands in the Sheep Driveway would continue to be authorized for sheep but not cattle and existing improvements may still be maintained. Alternative A eliminates the direct and indirect effects of cattle grazing to recovering stream channels, riparian areas, and watersheds within the allotments. This alternative meets the intent of Forest Plan direction to protect, manage, and restore riparian areas.

Direct Effects

Riparian areas with a natural flow regime, i.e., free from diversions, dams, and groundwater mining, generally have a high inherent potential for recovery from disturbance by ungulates (Floyd and others 2003; Allington and Valone 2010). In many cases, the most effective mechanism to restore riparian areas and aquatic systems in semi-arid system is to exclude livestock and wild ungulates temporarily or long-term (Dobkin and others 1998; Milchunas 2006; Fleischner 2010; Batchelor et al, 2015). Within the observed key reaches, riparian vegetation has made substantial recovery, though in some cases channels need more time to be fully functional or could degrade from fully functional with additional grazing pressure. Implementation of this alternative would allow recovery or maintain or improve the existing condition of the riparian areas and stream channels.

Indirect Effects

Alternative A usually provides the most rapid increase of upland vegetative cover, species diversity, and improvement of impaired and unsatisfactory condition soils. These changes reduce surface runoff, dampen peak flows, and decrease the probability of channel adjustments, impacts to riparian vegetation and loss of channel function. Implementation of this alternative should maintain or improve the existing condition of the upper watersheds.

Alternative B – Direct and Indirect Effects

Direct Effects

The existing condition of riparian areas, riparian vegetation utilization, residual vegetation heights and availability of off-channel water developments are the elements most likely to affect riparian area and stream channel condition and recovery. Two surveyed areas (Naegelin Canyon and Cherry Creek) are functioning at risk or impaired.

Riparian utilization guidelines are intended to maintain or increase existing riparian vegetation. The proposed action recommends mitigating direct effects of livestock grazing in key reaches by using riparian utilization measurements (implementation monitoring) (ITR 1999, Burton et al. 2011). 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 improve. Mitigation measure should be effective for all of the key reaches except Marsh Creek in Middle Pasture which does not have enough available, palatable riparian vegetation to provide for statistically valid annual use monitoring as a management tool. Utilization guidelines were not intended for riparian areas that have the potential to support riparian vegetation, but do not, or support very low cover or density of riparian vegetation. Clary and Webster (1989) recommend that grazing riparian areas in early seral condition be deferred until riparian vegetation re-establishes and ecological status improves. Because the riparian vegetation on Marsh Creek in Middle Pasture is low in cover and density, riparian utilization measurements may not effectively identify the threshold of unacceptable impact that would trigger moving cattle from the riparian area or pasture or use levels may be reached quickly. This channel does have the potential to support riparian tree seedlings and an herbaceous understory based on photo points and comparison areas and should be rested until riparian vegetation has become re-established. At that time it would then be managed using riparian utilization measurements (implementation monitoring).

The proposal to develop roadside or winged stock tanks on the Colcord, Lost Salt, and Valentine pastures will not adversely impact riparian areas or stream channels as they are located along roads and collect road runoff or runoff generally. Other water developments are not specified and cannot be specifically analyzed here, however, improvement design features and specifications can be generally examined for direct effects. Troughs and storage tanks will be located 400 ft. from riparian areas, which could have the positive effect of drawing cattle away from riparian vegetation and stream channels. Additional development of springs could impact spring resources because any change to the spring environment impacts spring resources, however, these impacts will be minimized if spring developments do not dewater the spring and maintain residual flow.

None of the four stream reaches within the project area that were assessed by ADEQ (2018) are impaired. Three of the four are listed as Category 2 – attaining some uses and the third, Gordon Canyon Creek is listed as inconclusive because it needs collection of core parameters during three seasons. On Canyon Creek the aquatic and wildlife coldwater could not be determined due to reporting limits determined due to reporting limits of dissolved cadmium being too high. Full-body contact on both Cherry Creek and Haigler Creek is inconclusive due to one exceedance on each stream for E. *coli*. Cherry Creek also had one exceedance of lead and phosphorous. Livestock tend to deposit a greater amount of waste close to water sources than they create in other areas of the range (Gary et al., 1983) and the probability of disease-causing organisms contaminating areas with full or partial body contact increases with the intensity of livestock use (Gary et al., 1983, Belsky et al 1999). Research on the impacts of livestock grazing on water quality on National Forest System lands is sparse and that which does exist is often conflicting (Roche et al 2013). While livestock grazing along Haigler Creek and Cherry Creek has the potential to contribute E. *coli* to the waterways, recreation in these areas would also likely contribute to water quality concerns. Other potential impacts to water quality would be mitigated through implementation of established Best Management Practices (BMPs). While there are concerns that microbial and nutrient pollution by livestock grazing on public lands degrades water quality (e.g.,

Brunson & Steel 1996 and Derlet and Carlson 2006), the literature is inconclusive as to the relative role that cattle play in this contamination, and a recent study specifically examining this issue concluded that recreation and grazing can be compatible uses (Roche et al 2013) Fecal indicator bacteria such as E. Coli are regulated to safeguard public health from waterborne pathogens such as Cryptosporidium parvum and E. coli O157:H7 and human enteroviruses including adenoviruses and coliphages.

Indirect Effects

Grazing of impaired and unsatisfactory condition uplands may slow the rates of upland recovery, indirectly slowing the rate of riparian area and stream channel recovery from the scouring effects of increased runoff and higher peak flows. If management prescriptions are followed and cattle are moved when use guidelines are met, the negative, indirect effects of grazing will be minimized.

Cumulative Effects Common to Both Alternatives

The existing condition of streams and riparian areas on these allotments is the result of the cumulative effects of historic and recent management, natural disturbances, and the interaction between these two agents of change. This discussion includes the 6th code watersheds listed in Table 8 (existing condition) and begins with the settlement of lands in the 1880s.

Historic grazing has had an extensive effect on watersheds, stream channels and riparian areas. The range was considered over stocked with cattle by 1891 (Allen 1989). There have been many accounts of the overstocking and subsequent drought and flood events that occurred throughout central and southeastern Arizona (Wagoner 1952). Tonto National Forest Range Management files (File Code 2210) document concentrated use at water sources including springs and riparian areas.

Existing patterns of elk use are currently slowing the recovery of riparian vegetation in some of the streams in this allotments. Levels of elk use will continue to impact stream channel and riparian area condition and trend.

There are several designated camping areas as well as dispersed camping within the project area. Recreation activities, such as camping, can impact stream terraces and riparian vegetation along Haigler Creek, Cherry Creek and other creeks in the project area.

Unauthorized motorized cross-country travel can impact streams and riparian areas through removal, destruction, or degradation of herbaceous and woody vegetation, aquatic emergent vegetation, and stream banks. The Tonto NF's Travel Management plan is intended to analyze alternate motorized routes for providing access and a recreation experience sufficient to discourage motorized vehicle operators from feeling compelled to travel off established roads or trails. Once routes are established, maps will be available to the public. Enforcement of the Travel Management decision is imperative to ensure compliance.

Several entities hold water right certificates or claims to divert water from springs and creeks within the project area for domestic or other uses. These diversions reduce the amount of water flowing in the creeks but may only be noticeable during low flows. The water rights in this area have not yet been adjudicated.

Other activities and management actions that have occurred within the watersheds include road development, lack of road maintenance, off-road vehicle use, mining, fire suppression, and prescribed fire. These activities can cause short and/or long-term sedimentation into stream channels.

Grazing can exacerbate the impact of climate change on a watershed (Bescheta et al 2013). The combined impact of increased drought frequency and duration alongside altered upland plant and animal communities from grazing has the effect of reducing habitat and a loss of mesic and hydric plants (Karl et al 2009). The anticipated increased variability in runoff from climate change together with reduced flows due to range water developments, decreased riparian vegetation, streambank erosion, and increased stream width from grazing will increase stream temperatures, further accelerate streambank erosion, and degrade water quality and aquatic habitats (Wilcove et al 1998; Jelks et al 2008, Serrat-Capdevila et al. 2007). With continued drought and higher temperatures, small water sources may dry up leaving less water for cattle and wildlife.

Summary of Alternatives

Alternative A

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

Alternative B

The direct and indirect effects of this alternative, when combined with other past, present or reasonably foreseeable actions (cumulative effects discussed above), are not likely to limit the attainment of desired conditions for riparian areas but at a slower rate than alternative A.

Wildlife

The Forest plan provides general wildlife resource goals, including 1) providing for species diversity in the ecosystem, 2) maintaining or improving wildlife and fish populations through improvement of habitat, 3) ensuring that fish and wildlife habitats are managed to maintain viable populations of existing species, 4) preventing adverse modification of critical habitat for threatened and endangered species, and 5) managing to improve threatened, endangered, and sensitive species with a goal of increasing population levels that would remove them from the lists.

This section discloses, in separate subsections, the existing condition, status in the project area, and potential effects of the Bar X and the Driveway grazing project on (1) species and their habitats listed as endangered, threatened, candidate, or proposed under the federal Endangered Species Act of 1973 as amended (ESA), and 2) species designated as sensitive by the Regional Forester in Region 3. Separate analysis reports have been completed to assess impacts of the proposed action to habitats designated for management indicator species (MIS) and migratory birds with provisions under the Migratory Bird Treaty Act (MBTA) for the Tonto National Forest.

Consultation with U.S. Fish and Wildlife Service is required where endangered, threatened, candidate species, or their critical habitat may be affected by a proposed Federal action. We have initiated consultation with the U.S. Fish and Wildlife Service on six federally listed species that occur or may have suitable, proposed or designated critical habitat in the project area. In addition to the 6 federally listed

species, 13 Forest Service sensitive species, 7 management indicator species and 25 migratory birds have been analyzed given they are present or are reasonably certain to occur in the project area. The project area also provides habitat for many game and nongame species. Although there is a lack of formal surveys for rare plants within the project area, rare local or regionally endemic plants may be present.

Threatened and Endangered Wildlife, Plants, and Fish

Section 2 of the Endangered Species Act of 1973, as amended 1978, 1979, 1982, and 1988 (16 U.S.C. 1531 et seq.) declares that "…all Federal departments and agencies shall seek to conserve endangered species and threatened species and shall utilize their authorities in furtherance of the purposes of this Act." Section 7 directs Federal agencies to ensure that actions authorized, funded, or carried out by them are not likely to jeopardize the continued existence of any threatened or endangered species or result in the destruction or adverse modification of their critical habitats (16 U.S.C. 1536 et sq.).

Species occurrence records from Tonto National Forest, Arizona Game and Fish Department databases and Environment Review Tool, and the U.S. Fish and Wildlife Service's Information, Planning, and Conservation (IPaC) decision support system were used to identify listed species which may occur or have suitable habitat within the project area. Table 22 includes federally listed species and/or critical habitat that are considered within the project area and analyzed in detail within this document. Species with federal listing status included on the U.S. Fish and Wildlife Service list but excluded from further evaluation are addressed in Table 23.

Table 22: Threatened or Endangered Species Evaluated in Detail within the Action Area

Common Name/ Habitat	Species	Status[9]	Determination
Chiricahua leopard frog	(*Lithobates [Rana] chiricahuensis*)	ESA LT	May Affect, Likely to Adversely Affect
Narrow-headed gartersnake and Proposed Critical Habitat	*Thamnophis rufipunctatus*	ESA LT, PCH	May Affect, Not Likely to Adversely Affect
Mexican spotted owl and Designated Critical Habitat	*Strix occidentalis lucida*	ESA LT, DCH	May Affect, Not Likely to Adversely Affect
Designated Critical Habitat for spikedace	*Meda fulgida*	DCH	May Affect, Not Likely to Adversely Affect
Gila Trout	*Oncorhynchus gilae g.*	ESA LT	May Affect, Likely to Adversely Affect
Mexican Wolf	*Canis lupus baileyi*	ESA XN	Not Likely to Jeopardize

[9] LT – Listed threatened; XN – Nonessential experimental population; DCH – designated critical habitat; PCH – proposed critical habitat.

Table 23: Species Excluded from Detailed Analysis

Species Name	Species	Status	Exclusion Justification
Northern Mexican gartersnake and proposed critical habitat	*Thamnophis eques*	ESA LT, PCH	There are no historic or current records of occupancy within the project area. Nearest proposed critical habitat stream from project area is over 5 downstream miles. No anticipated indirect effects.
Designated critical habitat for Chiricahua leopard frog	(*Lithobates [Rana] chiricahuensis*)	DCH	Nearest designated critical habitat is 1.7 miles outside the project area. No anticipated downstream impacts.

Affected Environment

Chiricahua leopard frog (Lithobates [Rana] chiricahuensis)[10]

ESA Status: Threatened, June 13, 2002
Recovery Plan: 2007
Critical Habitat: March 20, 2012
Effects Finding (species): May Affect, Likely to Adversely Affect
Effects Finding (critical habitat): No Effect

A small portion of the Bar X Allotment and Driveway overlap the north-central boundary of the Gentry Creek Management Area in Recovery Unit 5 outlined in the Chiricahua leopard frog (CLF) Recovery Plan. There are only two extant sites in the project area, both on the Young Allotment in the Bar X Allotment. Spatially there is a third extant population showing on Driveway, but this site is under Red Lake Allotment Management. In addition to the two extant sites inside the project area, suitable habitat exists in both the Bar X Allotment and Driveway. Suitable habitat includes all perennial waters 1) within elevational range of the frog (3,400 to 9,000 feet), 2) that contain a mixture of aquatic and perimeter vegetation to provide oviposition sites, thermoregulation, and refuge from predators, 3) are absent or have low densities of nonnative aquatic species and 4) have a variety in substrate and range of shallow to deeper water for potential hibernacula (USFWS 2007).

Suitable habitat types within the Bar X Allotment and Driveway include stock tanks, springs, and streams, however, little data exists describing how many stock tanks or springs within the project area are 1) no longer functional, 2) inhabited by nonnative aquatics like bullfrogs, crayfish or barred tiger salamanders, or 3) store amphibian diseases like chytrid fungus or ranavirus. Provided these sites do not have high densities of nonnative aquatic species, they could be considered suitable lentic sites for frogs. Perennial reaches in the project area include Haigler Creek, Spring Creek, Rock Creek, Canyon Creek, Cherry Creek, Gordon Canyon Creek, and Walnut Creek. The approximate 17 miles of perennial streams within the project area could also be considered suitable lotic sites provided they lack high densities of

[10] For life history information on the Chiricahua leopard frog visit https://www.azgfd.gov/w_c/edits/documents/Lithchir.fi_002.pdf

nonnative sport fish, crayfish, or bullfrogs. Unfortunately, all perennial stream miles within the project area contain some level of nonnative aquatics. In addition to the presence of nonnative species, the presence of chytrid fungus has been known to occur within the project area. Although no strategized sample efforts have taken place within the project area, incidental samples have been collected from several waterbodies and tested positive for chytrid.

The Naegelin Canyon – Cherry Creek metapopulation in the Gentry Creek Management Area of Recovery Unit 5 is located to the east and south of the project area. The metapopulation is actively managed by the Gentry Local Recovery Group (GLRG).

Detailed information presented below represents data from CLF protocol surveys up to July 30, 2018 by permitted biologists from Payson Ranger District, Arizona Game and Fish Department, and Phoenix Zoo; this data is housed in Arizona Game and Fish Department's Ranid Frog Projects *Riparian Herpetofauna Access Database*. Data beyond July 30, 2018 was used to report recently discovered occupied sites. Please see below for more detailed information of CLF populations specifically found in the project area.

Status within Bar X Allotment

Prior to May of 2018, CLFs were not known to occur on the Bar X Allotment. However, two recently discovered CLF sites were reported by Arizona Game and Fish Department and wildlife biologists contracted by the Tonto National Forest. In addition to these two new sites, the Arizona Game and Fish Department has proposed four future introduction sites on the Bar X Allotment.

- Unnamed Drainage to Cherry Creek - On May 14, 2018, Mexican spotted owl contracted surveyors from Transcon Environmental Incorporated reported a possible Chiricahua leopard frog detection near the Cherry Creek and Parallel Canyon confluence. The sighting was confirmed by Christina Akins, Zoned District Wildlife Biologist after viewing voucher photographs taken during the initial observation. Due to 2018 Stage III Area Closures on the Tonto National Forest, the site was not revisited in 2018. Within the Bar X Allotment, this site falls in the Young Allotment and is considered occupied.
- Naegelin Spring Canyon (TON-0267) – On May 15, 2018, Arizona Game and Fish Department Ranid Frogs Specialist reported a new Chiricahua leopard frog site in Naegelin Spring Canyon, a tributary to Cherry Creek. This site was previously visited one time in 1997 and no frogs were detected. Within the Bar X Allotment, this site falls in the Young Allotment and is considered occupied.
- Future Introductions Sites – In partnership with the range permittee, the CLF RU5 GLRG has surveyed earthen stock tanks across Bar X Allotment in preparation for future CLF introductions. After several years of surveys focusing on presence of nonnative species and water permanency, the GLRG has proposed four earthen stock tanks for CLF introduction; Grasshopper Tank, Rim Tank, Lost Tank, and Martin Tank. In addition to these four sites, all permanent waters across Bar X Allotment free of nonnatives will be considered for future introductions.

Status within the Driveway

Although Naegelin Rim Tank spatially falls within the Driveway boundary, there is a pasture fence that excludes this tank from the Driveway and incorporates it into Red Lake Allotment management. Therefore, the CLF population at Naegelin Rim Tank will be discussed in the Status Adjacent to the Project Area. Currently, there are no extant CLF populations in the Driveway.

Status Adjacent to the Project Area

The Naegelin Canyon – Cherry Creek metapopulation in the Gentry Creek Management Area of Recovery Unit 5 occurs just outside the project area to the east and south. Since 1979, CLFs have been reported at 26 sites at any given year. Populations include both lentic and lotic sites and range from streams, earthen livestock tanks and above ground wildlife catchments across National Forest and Arizona Game and Fish Department land (Figure 6). Of the 26 known CLF sites, 22 have been occupied by frogs at one time or another since 2012. Since 2014, in partnership with Arizona Game and Fish Department, U.S. Fish and Wildlife Service, and Phoenix Zoo, CLFs of various life stages have been released to several of these sites.

Narrow-headed Gartersnake (Thamnophis rufipunctatus)[11]

Endangered Species Act Status:	Threatened, July 08, 2014
Recovery Plan:	No
Critical Habitat:	Proposed, July 10, 2013
Effects Finding (species):	May Affect, not Likely to Adversely Affect
Effects Finding (critical habitat):	May Affect, not Likely to Adversely Affect

Status within Bar X Allotment (Haigler Creek)

Haigler Creek is the only known extant population of narrow-headed gartersnakes within the project area. The Final Rule for listing the narrow-headed gartersnake as threatened describes Haigler Creek as "likely not viable" with the presence of suitable physical habitat, native prey base presence, and nonnative species presence (USFWS 2014). During a visual encounter survey and trapping effort in 2008, a single adult male narrow-headed gartersnake was hand captured (Kern and Burger 2008, pp. 2, 5–6). Surveys continued in 2013 with no detections (Burger and Jeager 2013, p. 2) and again in 2014 where three juvenile narrow-headed gartersnakes were captured (Matt Goode, 2014, personal communication). The 2014 detections were just downstream of Alderwood Campground and that same year, a neonatal narrow-headed gartersnake from the same area was observed (T. Jones, personal communication, 2014). In 2018, the Tonto National Forest contracted the Arizona Game and Fish Department Contracts Branch to 1) prioritize streams for narrow-headed gartersnake surveys across the Payson and Pleasant Valley Ranger Districts and 2) evaluate habitat suitability and capture and/or detection rates by completing single or repeated multi-day presence/absence surveys involving extensive trapping and visual encounter surveys along designated one kilometer reaches. Two streams within the project area were selected for surveys, Haigler Creek and its tributary, Gordon Canyon. From late July to the end of August, three trapping efforts consisting of four consecutive trap days were completed in each drainage but narrow-headed gartersnakes were not captured.

Narrow-headed gartersnakes feed exclusively in fish. The fish community in Haigler Creek consists of both native fish (desert sucker, longfin dace, speckled dace, and chub) (USFWS 2011, p. 8-163 – 8-164) and nonnatives including rainbow trout, brown trout, and green sunfish (Goode 2016, p. 2). Crayfish are also present in significant numbers (Kern and Burger 2008, p. 2; Goode 2016, p. 2; Goode and Parker 2015, p. 5). Most recent survey results found that chub may be extirpated above a natural barrier site that occurs downstream of Alderwood Campground (Mosher et al. 2012, p. 3–4; Vasey et al. 2012, pp.

[11] For life history information on the narrow-headed gartersnake, please visit https://www.gpo.gov/fdsys/pkg/FR-2014-07-08/pdf/2014-14615.pdf

3–4). Mosher et al. (2012, p. 3–4) found the only native fish species that still occurs above the natural barrier are desert suckers and only below Alderwood Campground. During the 2018 gartersnake trapping efforts, Arizona Game and Fish Department incidentally captured longfin dace, desert sucker, brown trout, rainbow trout, and fathead minnow (R. O'Donnell, personal communication, 2018).

Status within the Driveway (Canyon Creek)

Canyon Creek is the only known extant narrow-headed gartersnake population within the Driveway, however, all records are downstream of the Driveway Boundary. See Status Adjacent to the Project Area below for more details on the Canyon Creek population.

Status Adjacent to the Project Area

All narrow-headed gartersnake observations reported in Canyon Creek have been located near Valentine Ridge Campground, downstream to the reservation boundary. In 2015, Arizona Game and Fish Department surveyed Canyon Creek and found eight individual snakes below Valentine Ridge with evidence of reproduction. A second survey that same year documented seven additional records. In 2016, Arizona Game and Fish Department's trap survey effort in Canyon Creek resulted in the capture of nine snakes with an additional observation made during a fish survey. Surveys continued in 2017 and 2018 with assistance from the Tonto National Forest and multiple detections including several neonates were reported.

Proposed Critical Habitat[12]

The U.S. Fish and Wildlife Service proposed critical habitat for the narrow-headed gartersnake on July 10, 2013 (78 FR41550). There are 6 units proposed as critical habitat. Critical habitat units occur in Greenlee, Graham, Apache, Yavapai, Navajo, Gila, and Coconino Counties in Arizona, as well as in Grant, Hidalgo, Sierra, and Catron Counties in New Mexico. Proposed critical habitat on the Forest occurs within the Verde River, Tonto Creek, and Upper Salt Sub basin Units and includes the portions of or full lengths of the East Verde River, Tonto Creek, Houston Creek, Canyon Creek, Verde River, Salt River, and Haigler Creek. The total amount of proposed critical habitat on the Tonto National Forest is approximately 46 square miles (29,440 acres). Critical habitat includes a 600ft lateral extent to either side of bankfull stage.

Status within the Bar X Allotment

Proposed critical habitat within the project area includes 2.48 square miles of Haigler Creek. Within the Bar X Allotment, the reach runs across the Bar X Allotment, Colcord Allotment, and Haigler Creek Allotment. Haigler Creek is within Tonto Creek Sub basin Unit. Critical habitat includes a 600ft lateral extent to either side of bankfull stage.

Status within the Driveway

Proposed critical habitat within the project area includes 1.95 square miles of Canyon Creek (Upper Salt Sub basin Unit) and 1.17 square miles of Haigler Creek (Tonto Creek Sub basin Unit).

[12] For a detailed description of primary constituent elements for Narrow-headed gartersnake critical habitat visit http://www.gpo.gov/fdsys/pkg/FR-2013-07-10/pdf/2013-16520.pdf

Status Adjacent to the Project Area

As described above, Canyon Creek and Haigler Creek extend beyond the project area to the north and west. A small reach of Tonto Creek also falls within the five-mile project area buffer.

Mexican Spotted Owl (Strix occidentalis lucida)[13]

ESA Status:	Threatened, March 16, 1993
Recovery Plan:	2012, First Revision
Critical Habitat:	August 31, 2004
Effects Finding (species):	May Affect, not Likely to Adversely Affect
Effects Finding (critical habitat):	May Affect, not Likely to Adversely Affect

The Tonto National Forest is currently working with U.S. Fish and Wildlife Service to revise existing Protected Activity Center (PAC) boundaries and establish new PACs across the Payson and Pleasant Valley Ranger Districts following guidance and criteria in the MSO Recovery Plan. Three PAC boundaries within the Bar X Allotment have recently been revised (Turkey Peak SW, NW, NE). Two new PACs (Haigler Creek and Lost Spring) have been drawn and intersect both Bar X Allotment and Driveway. Two PACs adjacent to the Project Area (Canyon Lower and Valentine Lower) have been removed because of lack of habitat and several others have undergone boundary revisions. These boundary revisions and new establishments have been reviewed by U.S. Fish and Wildlife Service Supervisory Biologist, Shaula Hedwall, during a meeting held August 21, 2018 in Flagstaff, Arizona, U.S. Fish and Wildlife Service Southwest Forest Science Complex Office.

Status within Bar X Allotment

The Bar X Allotment falls entirely within the Upper Gila Mountain Recovery Unit. Data presented below comes from surveying original PAC boundaries, however, 2018 revision boundaries will be used when evaluating effects of grazing to the species and its habitat.

Protected Activity Centers

A total of nine Mexican spotted owl Protected Activity Centers (PACs) occur on the Bar X Allotment; two of which were recently drawn and extend onto the Driveway. One of the nine PACs (Parallel PAC) barely intersects the southeastern boundary of the project area. Habitat identified as PACs within the Bar X Allotment makes up 17% or 4,718 acres of the total area and includes both forested and cliff-canyon habitats. See Appendix B for tables containing PAC names and survey history that has occurred after the PAC was established.

Recovery Habitat

Forested and Riparian Recovery Habitat occurs in forests and rocky canyons used by owls for roosting, foraging, dispersal, and other life history needs, but only includes those areas outside of PACs. Recovery Habitat is intended to: 1) provide protection for areas that may be used by owls; 2) foster creation of roost/nest habitat; 3) simultaneously provide managers with greater management flexibility than is allowed in PACs; and, 4) facilitate development and testing of management strategies that could be applied in PACs (USFWS 2012).

[13] For life history information on the Mexican spotted owl, please visit https://www.fws.gov/southwest/es/arizona/Documents/SpeciesDocs/MSO/2012MSO_Recovery_Plan_First_Revision_Final.pdf

Very little potential MSO recovery habitat exists outside of existing PACs and designated critical habitat boundaries given vegetative communities in these areas are mostly pinyon juniper woodland and juniper grassland. Recovery habitat important to MSOs for life history needs include ponderosa pine-Gambel oak, mixed conifer, and riparian forest communities (USFWS 2012). To estimate the amount of potential MSO recovery habitat within the project area, Mid-Scale Existing Vegetation Dominance Type Map Unit data created by USDA Southwest Region was used to identify areas that have potential for becoming foraging, nesting, roosting, or dispersal habitat. In total, only 192 acres meets the definition of Recovery Habitat and includes an unnamed tributary to Gordon Canyon and a small reach of Haigler Creek west of Alderwood Campground.

Status within Driveway

Protected Activity Centers

A total of six MSO PACs occur on the Driveway; two of which extend onto Bar X Allotment and were discussed above. Lower Valentine PAC overlaps with the Driveway but once PAC revisions are finalized, the PAC designation for Lower Valentine will be removed and no longer bisect the project area. Habitat identified as PACs within the Driveway makes up 9% or 2,577 acres of the total area and includes both forested and cliff-canyon habitats. See Appendix B for tables containing PAC names and survey history that has occurred after the PAC was established.

Recovery Habitat

Outside of PACs and designated critical habitat, there is no recovery habitat in the Driveway.

Status Adjacent to the Project Area

Protected Activity Centers

Three PACs are directly adjacent to or have shared boundaries with the project area, Bear Springs PAC, Rose PAC, and Lower Gordon PAC. See Appendix B for tables containing PAC names and survey history that has occurred after the PAC was established.

Designated Critical Habitat14

The U.S. Fish and Wildlife Service designated critical habitat for the spotted owl in 2004 on approximately 8.6 million acres of Federal lands in Arizona, Colorado, New Mexico, and Utah (USFWS 2004). Within the designated boundaries, critical habitat includes only those areas defined as protected habitats (defined as PACs and unoccupied slopes greater than 40 percent in the mixed conifer and pine-oak forest types that have not had timber harvest in the last 20 years) and restricted (now called "recovery") habitats (unoccupied owl foraging, dispersal, and future nest/roost habitat) as defined in the 1995 Recovery Plan (USFWS 1995). The 1995 Recovery Plan was used as the basis for the 2004 critical habitat rule. The PCEs for spotted owl critical habitat were determined from studies of their habitat requirements and information provided in the Recovery Plan (USFWS 1995). Since spotted owl habitat can include both canyon and forested areas, PCEs were identified in both areas.

Designated Critical Habitat in Bar X Allotment

The project area falls within critical habitat unit UGM-10. Approximately 15,884 acres or 57% of Mexican spotted owl critical habitat occur on the Bar X Allotment, specifically in Colcord, Young, and Haigler allotments. Note that not all developed land areas within the critical habitat boundary of the

[14] For a detailed description of primary constituent elements for Mexican spotted owl critical habitat visit https://www.govinfo.gov/content/pkg/FR-2004-08-31/pdf/04-19501.pdf#page=2

designation will contain the habitat components essential to the conservation of the species. Critical habitat falls within the central and northeastern half of the project area.

Designated Critical Habitat in Driveway

Like Bar X Allotment, the Driveway falls within a portion of critical habitat unit UGM-10. Approximately 16,426 acres or 48% of Mexican spotted owl critical habitat occur on the Driveway, specifically in Naegelin, Lost Salt and Valentine pastures. Critical habitat falls within the central and northeastern half of the project area.

Designated Critical Habitat for Spikedace (Meda fulgida)[15] [16]

ESA Status:	Uplisted Endangered, February 23, 2012
Recovery Plan:	September 1991
Critical Habitat:	Re-designated, February 23, 2012
Effects Finding (species):	May Affect, not Likely to Adversely Affect

Revised critical habitat for spikedace was finalized with the change in its status from threatened to endangered (USFWS 2012a). The spikedace critical habitat designation includes eight units based on river sub basins, including the Verde River, Salt River, San Pedro, Bonita Creek, Eagle Creek, San Francisco River, Blue River, and Gila River sub basins (see USFWS 2012a for additional detail on occupancy by sub basin). Critical habitat has been designated in each of these sub basins (see USFWS 2012a for additional detail). Primary Constituent Elements of Critical Habitat When critical habitat was designated in 2012, the U.S. Fish and Wildlife Service determined the PCEs for spikedace. PCEs include those habitat features required for the physiological, behavioral, and ecological needs of the species. The PCEs describe appropriate flow regimes, velocities, and depths; stream microhabitats; stream gradients; water temperatures; and acceptable pollutant and nonnative species levels (see USFWS 2012a).

Status within the Bar X Allotment

Designated critical habitat for spikedace does not occur on the Bar X Allotment.

Status within the Driveway

In the Driveway, Spring and Rock creeks are the only two streams designated as critical habitat for spikedace. Approximately 3.0 stream miles of Spring Creek, just north of its confluence with Rock Creek and south of Flying W Ranch intersects the Driveway. A small reach of Rock Creek also crosses the Driveway, about 0.8 stream miles near its confluence with Spring Creek.

Status Adjacent to the Project Area

Beyond the project area, there is an additional three miles along Rock Creek and 10.1 miles along Spring Creek of designated critical habitat for spikedace. The critical habitat along Spring Creek is split into sections north of (6.9 miles) and south of (3.2 miles) the Driveway project area.

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[15] For life history information on the spikedace, please visit https://drive.google.com/drive/folders/0BwLs0i-QWFsseXdrQWZaVmpBNkU

[16] For detailed information on primary constituent elements of spikedace critical habitat visit https://www.govinfo.gov/content/pkg/FR-2012-02-23/pdf/2012-3591.pdf

Gila Trout (Oncorhynchus gilae g.)[17]

ESA Status:	Threatened, July 18, 2006
Recovery Plan:	September 10, 2003
Critical Habitat:	No
Effects Finding (species):	May Affect, Likely to Adversely Affect

Status within the Bar X Allotment

Currently, there are no extant populations of Gila trout on the Bar X Allotment. However, Arizona Game and Fish Department is working on plans to establish a recovery population of Gila trout into the headwaters of Haigler Creek. A total of 3.2 miles of the proposed introduction reach intersects the Bar X Allotment.

Status within the Driveway

Currently, there are no extant populations of Gila trout within the Driveway. However, as described above, Arizona Game and Fish Department plans to establish a recovery population into the headwaters of Haigler Creek. When this occurs, there will be approximately 0.7 stream miles of occupied habitat within the Driveway (See Figure 24).

Status Adjacent to the Project Area

The proposed area along Haigler Creek that will become a recovery population for Gila trout is entirely encompassed within the Bar X and Driveway project areas. There is, however, a possibility of Gila trout being flushed downstream below the fish barrier during periods of high-water flow. This could lead to Gila trout being present in the lower 11.5 miles of Haigler creek to its confluence with Tonto Creek, as well as possibly being present in 8.3 miles of Tonto Creek (upstream and downstream of confluence) that lies adjacent to the Project area.

Mexican Wolf (Canis lupus baileyi)

ESA Status:	Non-essential experimental population, January 12, 1998
Recovery Plan:	2015, First Revision
Critical Habitat:	No
Effects Finding (species):	Not Likely to Jeopardize

Status within the Project Area

The Bar X Allotment and Driveway is within the Mexican Wolf Experimental Populations Area (MWEPA) which is a defined geographic area that encompasses Arizona and New Mexico from Interstate 40 south to the international border Mexico. This area includes the Apache-Sitgreaves National Forest, Tonto National Forest and Gila National Forests. Mexican wolves living in the MWEPA are designated as a nonessential experimental population which allows for greater management flexibility to address wolf conflict situations such as livestock depredations and nuisance behavior, so long as those management actions are still in accordance with the ultimate recovery of the species. In 2015, the U.S. Fish and Wildlife Service announced the final Revision to the Regulations for the Nonessential Experimental

[17] For life history information on the Gila trout, please visit https://drive.google.com/drive/folders/0BwLs0i-QWFssUFRGcjRrTmVveDA

Population of the Mexican Wolf under section 10(j) of the Endangered Species Act (ESA). One of the revisions identifies Zones 1, 2, and 3 as different management areas within the MWEPA:

- Zone 1 is where Mexican wolves may naturally disperse into and occupy, and where Mexican wolves may be initially released or translocated. It includes all the Apache, Gila and Sitgreaves National Forests; the Payson, Pleasant Valley and Tonto Basin Ranger Districts of the Tonto National Forest; and the Magdalena Ranger District of the Cibola National Forest.
- Zone 2 is an area within the MWEPA into which Mexican wolves will be allowed to naturally disperse and occupy, and where Mexican wolves may be translocated. Translocations in Zone 2 will be focused on suitable Mexican wolf habitat that is contiguous to occupied Mexican wolf range.
- Zone 3 is where neither initial releases nor translocations will occur, but Mexican wolves will be allowed to disperse into and occupy. Zone 3 is an area of less suitable Mexican wolf habitat where Mexican wolves will be more actively managed under the authorities of this rule to reduce human conflict.

The Bar X Allotment and Driveway falls within Zone 1 of the MWEPA. Currently, there are no plans to re-introduce or translocate wolves onto the Tonto National Forest and there are no established Mexican wolf packs or denning and rendezvous sites on the Tonto National Forest. Observations of wolves in or adjacent to the project area represent a few transient animals from various packs to the far NE corner of the forest and project area. Most recent observations are from 2016 and 2018 near Canyon Creek Hatchery. All dispersing animals were reported to have moved off the Tonto National Forest shortly after they were reported (P. Greer personal communication 2019).

Effects Analysis – Alternative A – No Grazing

Chiricahua leopard frog (Lithobates [Rana] chiricahuensis)

Under this alternative, there would be no direct effect to frogs because there would be no livestock grazing operations within occupied Chiricahua leopard frog habitat and no structural improvements constructed. The lack of maintenance or construction of water developments would likely have a negative impact on the existing metapopulations within the project area. Indirect impacts to their habitat (water permanency) on the Bar X Allotment and Driveway would be anticipated.

Narrow-headed Gartersnake (*Thamnophis rufipunctatus*)

Under this alternative, there would be no livestock grazing operations in occupied or suitable gartersnake habitat or proposed critical habitat, nor would there be any construction or maintenance to structural improvements. As a result, there would be no direct or indirect effects to narrow-headed gartersnakes or their habitats on the Bar X Allotment and Driveway.

Mexican Spotted Owl (Strix occidentalis lucida)

Under this alternative, there would be no livestock grazing operations in occupied or suitable MSO habitat or designated critical habitat, nor would there be any construction or maintenance to structural improvements. As a result, there would be no direct or indirect effects to MSO or their habitats on the Bar X Allotment and Driveway.

Designated Critical Habitat for Spikedace (*Meda fulgida*)

Under this alternative, there would be no livestock grazing operations in designated critical habitat for spikedace, nor would there be any construction or maintenance to structural improvements. As a result, there would be no direct or indirect effects to designated critical habitat for spikedace on the Bar X Allotment and Driveway.

Gila Trout (Oncorhynchus gilae g.)

Under this alternative, there would be no livestock grazing operations in occupied Gila trout habitat, nor would there be any construction or maintenance to structural improvements. As a result, there would be no direct or indirect effects to Gila trout or its habitat on the Bar X Allotment and Driveway.

Mexican Wolf (Canis lupus baileyi)

Under this alternative, there would be no livestock grazing operations in occupied or suitable Mexican wolf habitat, nor would there be any construction or maintenance to structural improvements. As a result, there would be no direct or indirect effects to Mexican wolves or their habitats on the Bar X Allotment and Driveway.

Effects Analysis – Alternative B – Proposed Action

The analysis and determinations will be confirmed upon selection of the preferred alternative by the deciding officials. Additional changes to the analysis and determinations may occur following the completion of section 7 consultation with the U.S. Fish and Wildlife Service.

Chiricahua leopard frog (Lithobates [Rana] chiricahuensis)

Throughout their range, CLFs are often found living in earthen stock tanks. These tanks are used by livestock, especially cattle. When managed poorly, livestock grazing activities can negatively impact this species and its habitats. Under the proposed action, livestock use would occur in occupied or suitable habitats and be managed with conservative utilization levels.

Grazing effects on CLF habitat can include both the creation of habitat and the loss or degradation of habitat (Sredl and Jennings 2005). Livestock grazing can cause a decline in diversity, abundance, and species composition of riparian herpetofauna communities from direct or indirect threats. These can include: declines in the structural richness of the vegetative community; losses or reductions of the prey base; increased aridity of habitat; loss of thermal cover and protection from predators; and a rise in water temperatures to levels lethal to larval stages of amphibian and fish development (Belsky et al. 1999); trampling of egg masses, tadpoles, and frogs; erosion and/or siltation of stream courses; elimination of undercut banks that provide cover for frogs; and spread of disease. Despite these potential effects, the CLF is known to coexist with grazing activities at most sites where it is found (USFWS 2007: 32-34). One large and healthy population of Chiricahua leopard frogs co-exists with cattle and horses on the Tularosa River in New Mexico (Randy Jennings, Western New Mexico University, personal communication, 1995) as well as many stock tanks across Arizona's national forests. These indirect effects will be minimized by following conservative utilization levels and implemented conservation measures included in the proposed action.

Direct effects of livestock grazing to CLFs include direct mortality or injury. Eggs, tadpoles, and metamorphosing CLFs may suffer direct mortality or injury through trampling by cattle along the perimeter of stock tanks and in pools along streams (USFWS 2007: 34); this has been documented in the

literature in other amphibians (see Bartelt 1998, Ross et al. 1999), but most likely occurs to amphibian egg masses than metamorphosed frogs. Trampling of Chiricahua leopard frogs by livestock has not been documented; however, it may occur, particularly in confined, simple habitats such as earthen stock tanks with limited structural components that provide protection. Metamorphosed frogs can probably avoid trampling when they are active, however, leopard frogs are known to hibernate on the bottom of ponds (Harding 1997) where they may be subject to trampling during the winter months. We are reasonably certain there is an increased risk of trampling to hibernating frogs in late fall or early winter at sites that are occupied or may become occupied by frogs during the life of the project. Trampling of egg masses may occur at any time of year but most often from March through September. Typically, utilization levels in pastures with riparian areas are met within 1 to 2 months and the proposed rotational grazing strategy allows for up to 24 months of non-use before being grazed again. For these reasons, any anticipated direct impact to CLFs or suitable habitat will be temporary and minimal.

Indirect effects of grazing can include elevated levels of sedimentation, loss of wetland and riparian vegetation, and changes in water quality in stock tanks. We are reasonably certain that effects to bankside and aquatic vegetation in occupied habitat, causing loss of cover for frogs, will occur at some level during the duration of this proposed action. We anticipate these indirect effects could occur on any of the current or future occupied habitats within the Bar X Allotment and Driveway.

Sedimentation of deep pools used by frogs decreases the quality of habitat and alters primary productivity. The proposed action includes conservative utilization levels (30-40%) in upland areas combined with no more than 239 adult head and 67 yearlings dispersed across 27,423 acres on Bar X Allotment and 313 adult head and 93 yearlings dispersed across 33,780 acres on Driveway Due to topography, some areas may be inaccessible to livestock, especially those areas just below the Mogollon Rim, potions of Colcord Canyon, Gordon Canyon Creek, Spring Creek, and Haigler Creek. The distribution of grazing across such a large area should provide adequate residual ground cover to mitigate some sedimentation into suitable frog habitats. Perennial and intermittent streams flow through portions of the Bar X Allotment and Driveway and not all sedimentation can be mitigated. Loss of wetland and riparian vegetation has the potential to decrease hiding and shade cover but Tonto National Forest riparian utilization guidance will be followed which should lead to improved riparian areas over the long run by limiting riparian utilization of woody species to <50% of terminal leaders on top 1/3 of plants that are accessible to livestock (<6.0 ft. tall). Herbaceous species will be limited to 40% of plant species biomass for deergrass and maintain 6-8 inches of stubble height for emergent species such as rushes, sedges, cattails, and horsetails. Additionally, cattle would be moved when riparian utilization levels are met, therefore, minimizing any negative indirect effects of grazing and providing time for riparian area and stream channel condition to improve. Degraded water quality and reduced vegetation in stock tanks will likely occur as no tanks are fenced or partially fenced at this time. Part of the season of use includes summer monsoons, which would increase stock tank water levels and improve water quality through dilution.

Routine maintenance of existing fencing and creation of new fencing will have minimal impacts on Chiricahua leopard frogs. Livestock fencing is not often placed near riparian habitat but on the uplands. Fence repair often consists of replacing or tightening barbed wire or replacing t-posts. This can involve the use of chainsaws to remove fallen debris or off-highway vehicles (OHVs) for hauling heavy materials. In most cases, it normally takes about 1-3 days to repair damaged fence line. There may be disturbance through human activity and mechanized equipment, but the disturbance is expected to be in short

duration. 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 16-18 inches off the ground and a total height of 42 inches or less.

Improvements like construction of new water sites or cleaning of existing tanks described above in the proposed action can have beneficial effects to native aquatic species by creating new suitable habitat and securing perennial water necessary for breeding. These improvements can also facilitate dispersal and support and strengthen metapopulation dynamics of frogs. According to the proposed action, seven areas have been identified for the construction of new earthen tanks and all sites are restricted to the northernmost portions of the Bar X Allotment and Driveway. Although these locations are more than five miles from an occupied frog population or future introduction site, these new tanks could support frogs overtime if frogs colonize northern waters. Most times, tank maintenance (removal of sediment/dredging) occurs once a tank is completely dry and therefore not likely occupied by leopard frogs, however, there are times when excavation of sediment is removed when soils are still moist. Despite lack of surface water in a drying tank, maintenance of tanks with moist sediment can result in mortality or injury of frogs seeking cover from desiccation. Arizona Game and Fish Department biologists have observed Chiricahua leopard frogs taking refuge in cracks formed by drying mud on numerous occasions; frogs were found between three to eight inches down in mud cracks [Recovery Unit 4 – Agate Mine Tank (2009), Recovery Unit 2- Greaterville Tank (2012), Recovery Unit 5 - Moore Tank 4 (2014)] (A King 2009. personal communication, 08 April; C Akins 2012, personal observation, 01 June; C Akins 2014, personal observation, 28 May). Tanks with saturated mud will not be cleaned until surveyed by a permitted biologist. Given cleaning generally occurs when tanks are completely dry, we anticipate routine tank maintenance to have little negative impact to the frog once populations on Bar X Allotment or Driveway become established. Both currently occupied sites are in lotic systems; however, all four introduction sites are earthen stock tanks. According to the permittee, these four tanks are not currently in need of maintenance and have held water year-round. Typically, tanks are cleaned every 10-15 years if water permanency at the site is unstable. Construction of new tanks will benefit the frog by 1) increasing livestock distribution, 2) provide additional dispersal sites for frogs, and 3) strengthen metapopulations dynamics of frogs. New tank locations will likely be along existing roads to collect roadside run-off and will not be located in drainage bottoms. Often times, they will be constructed during winter or dry months like May and June when frogs are not likely to be dispersing overland. Concern when creating new water sites is that they can sometimes create suitable habitat for nonnatives like bullfrogs and crayfish. New tank locations, separate from the seven previously identified areas, will be selected by Range and Wildlife staff in coordination with the permittee to ensure tanks will not be colonized by nonnative species and the Tonto National Forest will continue to work with the CLF Local Recovery Group to remove nonnative threats when identified. Ongoing surveys will aid in discovering new bullfrog populations that may become established over the course of the project; all new waters will receive protocol surveys twice annually. The permittee is actively involved in all CLF RU5 Local Recovery Group meeting and will notify the group if nonnative species are detected during routine operations.

If funding becomes available, the Tonto National Forest will work with the permittee, USWFS, and Arizona Game and Fish Department to determine where to install wildlife friendly wire or pipe rail fence to partially exclude livestock from portions of occupied sites once frogs become established at introduction sites. It is expected that installation of partial fencing will occur when frogs are present at

the site, thus may cause short term disturbance to frogs. In most cases, a standard wildlife-friendly pipe rail fence will be created by using black steel pipe for the rails and stays. Post holes will be dug or drilled, and pre-mixed concrete will be used to secure posts. Any livestock exclusion fence installed at occupied sites will be constructed around an agreed upon area and would still allow livestock to access portions of the site. To minimize disturbance and direct impacts to hibernating frogs, installation will occur during the active season when frogs have a higher likelihood of escaping for cover.

In partnership with the U.S. Fish and Wildlife Service and U.S. Geological Survey, the Arizona Game and Fish Department collected two water samples in part to test for chytrid fungus, but results are not yet available. Chytrid fungus has been documented within RU5 and the Gentry Creek Management Area. If chytrid is present within the project area, it is possible that cattle could spread the fungus when moving between habitats in close proximity to each other.

Although the potential effects described above are not insignificant, we believe that negative impacts will be offset by the creation of new suitable habitat and protection of existing habitat. Maintenance and creation of range improvements within Bar X Allotment and Driveway will strengthen dynamics of the Naegelin Canyon – Cherry Creek metapopulation and possibly allow the RU5 LRG team to expand this metapopulation by introducing frogs to perennial waters across Bar X Allotment and the Driveway. Further, negative effects will be reduced through 1) consistent monitoring using protocol surveys, 2) conservation measures described under the proposed action, 3) short duration access to pastures with riparian areas (about 1 to 2 months), 4) adaptive management, and 5) conservative utilization levels.

Determination of Effects – Chiricahua Leopard Frog

Guidance and criteria from the 2015 *Framework for Streamlining Grazing Consultations* (USFS 2015) was used to evaluate effects to Chiricahua leopard frogs from livestock grazing and maintenance or construction of range improvements.

We have determined that the proposed action on Bar X Allotment and Driveway, **may affect and is likely to adversely affect** the Chiricahua leopard frog.

We base our determination upon the following:

- Livestock grazing in or around occupied sites could result in direct mortality of egg mass, thus reducing recruitment of the site.
- Livestock grazing in or around occupied sites could result in indirect impacts to riparian and upland vegetation used for various life history needs.
- Results from water samples collected to test for chytrid fungus in the project area are not yet available. If chytrid fungus is present, livestock may contribute to the spread of disease when moving from one water to another.
- The adherence to the proposed conservative utilization guidelines (31 – 40%) will ensure residual vegetation remains in the uplands to reduce runoff, maintain or improve soil condition and watershed health, however, livestock will have access to graze occupied sites.
- Permittee will notify USFS Range and Wildlife staff when bullfrogs are detected at any water while completing routine operations.
- Permittee will notify USFS Range and Wildlife staff 60 days prior to the maintenance cleaning of any stock tank occupied by or within dispersal distance of occupied sites.

- Permittee will ensure that any livestock that are observed in unscheduled areas associated Chiricahua leopard frog habitat are removed from those areas within 48 hours of their discovery. If fence repairs are needed, they will be completed repairs immediately.
- New watering developments (earthen stock tanks, above ground drinkers, troughs, etc.) would not be developed within 400 ft. of perennial streams. In coordination with the RU5 LRG, the Tonto National Forest will conduct protocol VES surveys to ensure bullfrogs are not dispersing across the landscape.
- All new or existing above ground water developments will have wildlife ramps to allow for ingress and egress.
- New spring developments would be constructed with the spring box designed so that residual flow is left at spring head to prevent dewatering.
- Immediately prior to pasture use, the permittee will inspect pasture boundary and livestock exclosure fence lines that are adjacent to areas known to be occupied by Chiricahua leopard frogs. Permittee will ensure that any fence repairs are completed prior to pasture use.
- Water shall not be pumped or diverted from a site occupied by Chiricahua leopard frogs.
- Permittee will take steps to disinfect or dry equipment and footwear after cleaning tanks that have tested positive for chytrid fungus.
- Tonto National Forest and permittee will consider methods to protect suitable or occupied frog habitat through the construction of wildlife friendly partial fencing (barbed or pipe rail) and/or construction of trick tanks or double tanks when one tank is fence and the other remains open.

Narrow-headed Gartersnake (*Thamnophis rufipunctatus*)

Livestock grazing in occupied narrow-headed gartersnake habitat with a largely native aquatic community is generally compatible with conservation and recovery of gartersnakes provided potential adverse effects to primary prey species (fish) are mostly insignificant (USFWS 2014). Adverse livestock grazing effects to riparian or aquatic habitat has typically occurred as a result of unmanaged grazing. Potential effects from unmanaged grazing include declines in the structural richness of the vegetative community; losses or reductions of the prey base; increased aridity of habitat; loss of thermal cover and protection from predators; a rise in water temperature; and desertification. Similar to the proposed action, managed grazing with limited utilization ranging from light use to moderate use (i.e., <30 % of key foraging species) of riparian vegetation could take place with no significant or measurable effects to the species but should be less depending on current condition of the riparian zone (Holechek et al. 2004).

Haigler Creek and Canyon Creek are considered extant populations. Under the proposed action, grazing will occur in occupied streams as well as riparian areas that have not been extensively surveyed for snakes using the state and federal unofficial protocol of five consecutive day trapping efforts (Spring Creek, Rock Creek, Cherry Creek, and Walnut Creek). Without these extensive surveys targeting gartersnakes across the entire project area, we are unable to confirm whether narrow-headed gartersnakes occupy perennial waters other than Haigler Creek and Canyon Creek. Even though the trampling of a black-necked gartersnake has been photo-documented on the Apache-Sitgreaves National Forest, there is no evidence to suggest that death or injury to gartersnakes by trampling is common or reasonably certain to occur. If narrow-headed gartersnakes are present, effects on the species include the slight risk for gartersnakes to be trampled by livestock. Nonetheless, gartersnakes

should easily be able to evade livestock even if they are basking or hunting for fish within streams. Narrow-headed gartersnakes are somewhat resilient to physical habitat disturbance where harmful nonnative species are absent (USFWS 2014). Unfortunately, perennial reaches within the project area inhabit a variety of native and nonnative aquatic species (Arizona Game and Fish Department unpublished data). Based on utilization guidelines and past observations made by Range Staff and the permittee, livestock on the Bar X Allotment and Driveway will graze riparian areas in short durations (about 1-2 months). Also, three segments totaling approximately one mile of Haigler Creek are inaccessible to livestock because of steep terrain or locations of private inholdings. Due to the presumed low-population density of the species across the project area, short duration of livestock presence in gartersnake habitat and the inaccessibility of Haigler Creek, direct effects from livestock grazing to narrow-headed gartersnakes is not likely to be significant and therefore discountable.

In general, palatability, species richness, density of forage and water availability in uplands adjacent to riparian corridors is high from February to May (Rosgen 1994). This increase in forage quality and water in the uplands reduces the concentration of livestock on streamside vegetation, therefore potentially decreasing livestock use in riparian areas. Rest following early grazing allows for plants and grasses time to recover from grazing for the rest of the growing season (Rosgen 1994). As the season progresses into drier months, the relatively cool, damp, and shady aquatic habitats favored by fish preyed on by narrow-headed gartersnakes, are those favored by livestock over the surrounding drier uplands. Although it is unlikely for livestock to directly impact the snake, impacts to habitat used by gartersnakes and fish will be minimized by 1) following utilization guidelines and conservation measures, 2) using a rest-rotation and monitoring approach, and 3) decreasing livestock distribution in riparian areas through creation of new upland waters and existing upland stock tanks. Incidentally, the opportunity for livestock to directly impact gartersnakes, fish prey base, and riparian habitat is lessened because reaches of Haigler Creek are inaccessible to livestock. Three segments consisting of one stream mile of Haigler Creek, below Alderwood Campground, are inaccessible to livestock because of rugged topography or location of private inholdings.

Narrow-headed gartersnakes are strictly piscivorous, meaning they feed exclusively on fish. Given that livestock will have access to areas where fish are present, it is likely that livestock could increase sedimentation in those habitats not protected by bedrock and cobble, potentially lowering macroinvertebrate populations, thus impacting fish communities. Watershed condition data collected by the Tonto National Forest classified all perennial waters within the project area as functioning at risk except for the Pleasant Valley watershed which received an impaired function classification. Perennial waters with a functioning at risk classification are considered in fair condition with moderate geomorphic, hydrologic, and biotic integrity relative to natural potential condition. The aquatic habitat condition indicator for streams with this classification reveal that the watershed supports medium to small blocks of contagious habitat; some high-quality aquatic habitat is available, but stream channel condition may show signs of being degraded (Potyondy 2011; Potyondy and Geier 2011). Increases in sedimentation caused by livestock is a concern because it may impact aquatic invertebrates which can potentially impact the fish communities' snakes rely on for food. There is large variability and uncertainty in data available from research describing the effects of sedimentation on aquatic invertebrates. Exposed respiratory organs of benthic invertebrates can be damaged as sediments move through the water channel and some aquatic invertebrates may become more susceptible to predation through dislodgement. Sediment can also increase invertebrate drift, clog feeding structures, and reduce feeding efficiency of aquatic invertebrates. (Bilotta and Brazier 2008). Sediment transport is a natural function of perennial, intermittent or ephemeral waters but it is reasonable to believe that livestock could increase sedimentation beyond what is natural in the system. It is difficult to predict

whether sedimentation caused by livestock will negatively impact the snakes prey base through temporary decreases in invertebrates because there are multiple factors that influence the effect sedimentation has on aquatic biota. These factors include the concentration of suspended solids, the duration of exposure to suspended solid concentrations, chemical composition, and the particle size distribution of suspended solids. Under the proposed action, measures and strategies are in place to minimize sedimentation wherever possible and livestock will typically have access to pastures with riparian areas for short durations (1 to 2 months). Conservative to moderate utilization guidelines described in the proposed action on key species follow utilization guidance recommended (Holecheck, 2012*)* for grazing range types (semiarid grassland and shrub, oak woodland-Juniper, pine forest) within the Bar X Allotment and Driveway. These recommendations are based off carefully analyzed available research and allow for maintenance and recovery of plants, aid in soil stability and protects streamside banks from increased erosion. Utilization limits for herbaceous riparian vegetation are intended to protect plant vigor and provide physical protection of streambanks (Holechek 2011). In addition to monitoring techniques described under the proposed action, utilization of deer grass will be monitored because it is the most common native riparian obligate, perennial grass on the Tonto National Forest. 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). Not all sedimentation caused by livestock can be mitigated, however, utilization guidelines and both riparian and upland monitoring are in place to ensure sedimentation does not significantly impact perennial streams or aquatic invertebrates. Other measures to reduce soil erosion include rest-rotation practices, supplement strategies, and use of adaptive management.

Fish abundance at the Spring Creek Ranch to Rock Creek confluence is high in native/non-native soft rayed fish; Spring Creek (Rock Creek confluence downstream) is moderate; Rock Creek is high; Haigler Creek (Headwaters to Marsh Creek confluence) is high with 100% soft rayed from headwaters to large falls downstream of Alderwood; Haigler Creek (Marsh Creek to Tonto Creek confluence) is moderate; Canyon Creek is high; Cherry Creek headwater is high with lower sections being moderate (C. Gill personal communication, 2018). Given the abundance of fish (native and nonnative soft rayed) within occupied streams or proposed critical habitat streams, the armored nature of most reaches, only temporary disturbances to invertebrate populations, utilization guidelines, conservation measures and monitoring, we do not anticipate that grazing at the landscape level across the Bar X Allotment and Driveway will adversely affect the snake's prey base of native and nonnative fish.

Gartersnakes may be indirectly impacted by the loss of protective vegetative cover which could result in higher predation rates by native and nonnative predators and the loss of thermoregulatory options within microhabitat. Certain plant species, like willows, may be more important than other riparian plants to narrow-headed gartersnakes. For example, bankside willows are often used by narrow-headed gartersnakes as convenient basking sites given their low branches and potential for large root masses. Laying across branches above the water surface allows snakes to bask, yet quickly escape into the water at the first sign of danger. Following guidance in the Tonto National Forest Plan and Tonto National Forest Riparian Area Management Utilization Guidelines, riparian utilization of woody species will be limited to <50% of terminal leaders on top 1/3 of plants that are accessible to livestock (<6.0 ft. tall). This size class of willows is likely too small to provide an ecological benefit to narrow-headed gartersnakes and therefore we expect any potential direct effect to willow trees to be insignificant for the narrow-headed gartersnakes, especially sub-adult and adult snakes.

Herbaceous species will be limited to 40% of plant species biomass for deergrass and maintain 6-8 inches of stubble height for emergent species such as rushes, sedges, cattails, and horsetails. Additionally, riparian areas will not be used as holding facilities, for trailering livestock, or for drought relief. When possible, riparian areas will be used during the winter when regeneration is more successful. Limiting the utilization rate of woody species to 50% or below and herbaceous species to 40% or below will facilitate the growth of seedlings, and sapling tree species into larger size classes (USDA 2002) that will provide both thermal and escape habitat for narrow-headed gartersnakes. Out of 498 unique recorded cover objects from three sites in New Mexico, narrow-headed gartersnakes used rocks the most (56 percent) followed by earthen burrows (9 percent), debris pile (8 percent), stumps/logs (6 percent) and vegetation (3 percent) (Jennings and Christman 2012, p. 15); the remaining 18 percent of detections were of snakes in the water or on the ground surface. Rock structure is not expected to be affected by the proposed livestock grazing.

Construction or maintenance of off-channel waters is not likely to impact narrow-headed gartersnakes because earthen livestock tanks are not considered optimal habitat; they primarily occupy lotic systems occupied by fish. The seven identified locations for new earthen stock tanks are not in close proximity of any occupied snake stream. Conservation measures under the proposed action state that new water developments on Bar X and Driveway will be monitored twice per year to ensure any bullfrog in the project area does not colonize new waters and threaten the suitability of occupied snake streams. In addition to VES surveys, the RU5 LRG will initiate a bullfrog removal strategy prior to release of any CLFs into the project area to eliminate bullfrogs from the area. For the life of the project, creation of any additional water development will follow conservation measures built into the proposed action. Routine maintenance of existing fencing and creation of new fencing will have minimal impacts on gartersnake for the same reasons described above for the Chiricahua leopard frog.

Allotment management has the potential to impact narrow-headed gartersnakes within the project area and/or suitable habitat. Livestock will have access to graze in occupied streams, around proposed critical habitat, riparian areas containing suitable habitat for gartersnakes and reaches where snakes could occur in extremely low densities. The proposed action may impact individuals through minor and temporary alterations to their terrestrial habitat where shedding, brumation, thermoregulation, gestation, and other needs are met. However, we anticipate overall impacts to the narrow-headed gartersnake to be insignificant because as described above, livestock use in pastures with riparian areas will be short in duration (about 1 to 2 months), utilization guidelines and both riparian and upland monitoring are in place to ensure sedimentation does not significantly impact perennial streams, aquatic invertebrates or the snakes prey base, important terrestrial cover types like rock crevices and boulder piles are unlikely to be damaged or destroyed by livestock, and conservation measures under the proposed action allow for plant maintenance, growth, or recovery (Holechek 2011).

Proposed Critical Habitat

PCE No.1: Aquatic or riparian habitat that includes:

PCE No. 1a Perennial or spatially intermittent streams with sand, cobble, and boulder substrate and low or moderate amounts of fine sediment and substrate embeddedness, and that possess appropriate amounts of pool, riffle, and run habitat to sustain native fish populations;

Effect: It is likely for livestock to alter existing substrate or change stream dynamics such as riffle, pool and run habitat in areas accessible to cattle not protected by large cobble and bedrock. Cattle using

riparian areas may walk into stream habitat and create hoof imprints in mud or fine sediment. In a flowing stream, this disturbance can cause uplift of sediment to be carried downstream. This disturbance will be temporary and limited along Haigler Creek where three segments consisting of one stream mile are inaccessible to livestock because of rugged terrain or location of private inholdings. In rugged terrain, livestock will tend to concentrate in flatter areas that are more convenient to access (Holechek 2011) and tend to avoid large gullies, stony or rocky terrain, and rock outcropping (USDA, 2005; Cooper et al. 2008). We anticipate more disturbance along the bank where flatter ground exists, creating a potential for fine sediment to be deposited into the stream. Temporary disturbance to invertebrate populations from increases in sedimentation should not negatively impact fish populations or habitat because utilization limits for herbaceous riparian vegetation are intended to protect plant vigor and provide physical protection of streambanks (Holechek 2011). Further, the Tonto National Forest operates grazing permits under monitored limits and provides resting periods for riparian areas.

Although sometimes difficult to recognize, sheet erosion is the uniform removal of soil in thin layers and can occur when rain fall intensity is greater than infiltration. There is concern that sheet erosion can 1) fill in interstitial spaces in rocky stream substrates which can limit tail anchoring opportunities for gartersnakes and can 2) reduce visibility in the water column affecting foraging success. Sheet erosion is more likely to occur in areas where ground cover and organic matter has been removed or where there is low permeability of the substrate. Under the proposed action, riparian vegetation grazing is limited to 40 % of plant biomass and stubble must be maintained at 6-8 inches for deer grass (provides stream-side cover and inhibits channelization and erosion), thus maintaining cover, reducing erosion, and providing shading for aquatic species. Changes in livestock distribution will be based on utilization monitoring and resources condition with standards and guidelines developed to protect sensitive riparian vegetation, soils, sensitive species, and reduce grazing impacts to perennial waters and water quality (TNF Forest plan 1985, FSH 2209.13). Grazing in pastures with riparian areas will be short in duration (about 1 to 2 months) and portions of proposed critical habitat in Haigler Creek are inaccessible to livestock. Permitted numbers of livestock will be adjusted during drought conditions to maintain proper utilization. For these reasons, we do not anticipate components of this PCE to be altered in such a way that it no longer supports gartersnakes or its prey base.

PCE No. 1b: A natural, unregulated flow regime that allows for periodic flooding or, if flows are modified or regulated, a flow regime that allows for adequate river functions, such as flows capable of processing sediment loads;

Effect: It is not likely the livestock will alter the natural flow of the Haigler Creek or Canyon Creek. There will be no withdrawal of water from lotic drainages and there are adjacent stock tanks within the project area that can be used in severe drought conditions.

PCE No. 1c: Shoreline habitat with adequate organic and inorganic structural Allotment Complexity (e.g., boulders, cobble bars, vegetation, and organic debris such as downed trees or logs, debris jams), with appropriate amounts of shrub-and sapling-sized plants to allow for thermoregulation, gestation, shelter, protection from predators, and foraging opportunities; and);

Effect: Shoreline habitat will be temporarily affected as livestock use, specifically vegetation, amounts of shrub-and sapling-sized plants and levels of organic debris. To prevent damage to vegetation, utilization in riparian areas will be limited to <50% of terminal leaders on top 1/3 of plants that are accessible to livestock (<6.0 ft. tall). Herbaceous species will be limited to 40% of plant species biomass for deergrass

and maintain 6-8 inches of stubble height for emergent species such as rushes, sedges, cattails, and horsetails. Limiting the utilization rate of woody species to 50% or below and herbaceous species to 40% or below will facilitate the growth of seedlings, and sapling tree species into larger size classes (USDA, 2002) that will provide both thermal and escape habitat for narrow-headed gartersnakes and minimize impacts to riparian vegetation. Although vegetation is an important feature to narrow-headed gartersnakes, they depend very heavily upon streamside rock structure such as crevices, medium- to large-sized boulders, adjacent talus, etc. as critical cover types. It is unlikely for livestock to alter PCE features such as boulders, downed trees and debris jams. There are also shoreline areas along Haigler Creek that are inaccessible (large waterfalls, rolling bedrock sheets) to livestock and grazing in pastures with riparian areas will be short in duration (about 1 to 2 months).

PCE No. 1d: Aquatic habitat with no pollutants or, if pollutants are present, levels that do not affect survival of any age class of the narrow-headed gartersnakes or the maintenance of prey populations.

Effect: Livestock in riparian areas can alter water quality through excessive excrement, resulting in elevated levels of nitrogenous compounds (ammonia). In addition, fecal contamination may cause eutrophication of water and an increase in planorbid snail numbers, number of nematode parasites, and the rate of some parasites. (Johnson *et al*. 1999). Critical habitat for narrow-headed gartersnakes within the project area makes up only lotic sites, thus, any pollutants by cattle will not be concentrated and only be temporary because the system has perennial flow at rates that fluctuate depending on the season. Grazing in pastures with riparian areas will be short in duration (about 1 to 2 months) and portions of proposed critical habitat in Haigler Creek are inaccessible to livestock. For these reasons, we do not anticipate any pollutants by livestock to drastically alter the snakes prey base or impact individual gartersnakes.

PCE No. 2: Adequate terrestrial space (600 feet (182.9 meters) lateral extent to either side of bankfull stage) adjacent to designated stream systems with sufficient structural characteristics to support life-history functions such as gestation, immigration, emigration, and brumation.

Effect: Livestock use in upland areas to Haigler Creek and Canyon Creek will not remove structural characteristics like boulders where narrow-headed gartersnakes may seek cover. However, livestock may decrease vegetation cover on the floodplain used by snakes. Upland 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.

PCE No. 3: A prey base consisting of viable populations of native fish species or soft-rayed, nonnative fish species.

Effect: Haigler Creek and Canyon Creek reaches within the project area are known to support viable populations of native fish as well as wild salmonids; these streams are also stocked by Arizona Game and Fish Department Sportfish Stocking Program. Fish assemblage in Haigler Creek consists of desert sucker, longfin dace, speckled dace, and chub and nonnatives including rainbow trout, brown trout, and green sunfish (USFWS 2011, p. 8-163 – 8-164; Goode 2016, p. 2; C. Gill personal communication, 2018). Most recent survey results found that chub may be extirpated above a natural barrier site that occurs downstream of Alderwood Campground (Mosher et al. 2012, p. 3–4; Vasey et al. 2012, pp. 3–4). During the 2018 gartersnake trapping efforts, Arizona Game and Fish Department incidentally captured longfin

dace, desert sucker, brown trout, rainbow trout, and fathead minnow (R. O'Donnell, personal communication, 2018). Fish assemblage in Canyon Creek consists of speckled dace, desert sucker, and brown trout and occasionally rainbow trout (Arizona Game and Fish Department, unpublished data). Livestock use in these reaches could alter fish habitat in areas not protected by bedrock, rock outcroppings or large cobble, however it is not anticipated that livestock use will reduce native and nonnative fish populations because fish prey bases will not be indirectly adversely affected through temporary disturbance to aquatic invertebrate populations caused by sedimentation. Utilization limits for herbaceous riparian vegetation are intended to protect plant vigor and provide physical protection of streambanks (Holechek 2011). Not all sedimentation caused by livestock can be mitigated, however, utilization guidelines and both riparian and upland monitoring are in place to ensure sedimentation does not significantly impact perennial streams, aquatic invertebrates or the snakes prey base. Other measures to reduce soil erosion include rest-rotation practices, supplement strategies, and use of adaptive management. Grazing in pastures with riparian areas will be short in duration (about 1 to 2 months) and portions of proposed critical habitat in Haigler Creek are inaccessible to livestock (three segments consisting of one stream mile).

PCE No. 4: An absence of nonnative fish species of the families Centrarchidae and Ictaluridae, bullfrogs (Lithobates catesbeianus), and/or crayfish (Orconectes virilis, Procambarus clarki, etc.), or occurrence of these nonnative species at low enough levels such that recruitment of narrow-headed gartersnakes and maintenance of viable native fish or soft-rayed, nonnative fish populations (prey) is still occurring (USFWS 2013).

Effect: Haigler Creek is known to inhabit crayfish and sunfish, but bullfrogs have not been reported. There are no reports of species of Centrarchidae, Ictaluridae, bullfrogs or crayfish in Canyon Creek. Livestock are not known to carry/transport nonnative predators from one site to another and therefore will not increase the spread of nonnative fish, crayfish or bullfrogs throughout the area. Although actions like building new tanks could create suitable habitat for nonnatives like bullfrogs, there are only three known locations within the project area occupied by bullfrogs (Grasshopper Tank, Ruth Tank and Spring Creek). Conservation measures under the proposed action state that new water developments on Bar X and Driveway will be monitored twice per year to ensure any bullfrog in the project area do not colonize new waters and threaten the suitability of occupied snake streams.

Determination of Effects – Narrow-headed Gartersnake

Guidance and criteria from the 2015 *Framework for Streamlining Grazing Consultations* (USFS 2015) was used to evaluate effects to proposed critical habitat from livestock grazing and maintenance or construction of range improvements.

We have determined that the proposed action on the Bar X Allotment and Driveway, **May affect, but is not likely to adversely affect** the narrow-headed gartersnake.

We base our determination upon the following:

- Grazing will occur in pastures with riparian areas but in short durations (about 1 to 2 months) in Haigler Creek where snakes are likely to occur. There are no reported extant narrow-headed gartersnake populations in Canyon Creek above Canyon Creek Fish Hatchery. If snakes are present, they are presumed to be in extremely low numbers.
- Trampling of gartersnakes by livestock is not common or reasonably certain to occur.

- Streamside rock structures, medium to large boulders and talus slopes important to narrow-headed gartersnakes are not expected to be affected by the proposed action.
- Native and nonnative fish prey bases will not be indirectly adversely affected through loss of aquatic invertebrate populations caused by sedimentation. Sedimentation by livestock will be minimized by the following actions: rest, rotation, salting practices, utilization limits, timing of grazing, and short duration grazing in pastures with riparian areas (about 1 to 2 months).
- Permittee will ensure that any livestock that are observed in unscheduled areas in occupied gartersnake habitat are removed from those areas within 48 hours of their discovery. If fence repairs are needed, complete repairs immediately.
- Improvements to increase water permanency will have little to no effect on narrow-headed gartersnakes because lentic sites are not considered suitable habitat; snakes do not currently occupy lentic sites within the project area.

Determination for Narrow-headed Gartersnake Proposed Critical Habitat

Guidance and criteria from the 2015 *Framework for Streamlining Grazing Consultations* (USFS 2015) was used to evaluate effects to proposed critical habitat for narrow-headed gartersnakes from livestock grazing and maintenance or construction of range improvements.

We have determined that the proposed action on the Bar X Allotment and Driveway, **May affect, but is not likely to adversely affect** narrow-headed gartersnake critical habitat.

- Even though livestock will have some seasonal access to pastures with proposed critical habitat throughout the project area it will be short in duration (about 1 to 2 months).
- Canyon Creek is free of harmful nonnative predators found in the families of Centrarchidae or Ictaluridae; bullfrogs or crayfish are also absent from Canyon Creek.
- Much of proposed critical habitat along Haigler Creek is inaccessible to livestock given topography, large boulders and bedrock waterfalls (three segments consisting of one stream mile).
- The proposed action will not increase occupancy of harmful nonnative predators.
- Although some riparian vegetation will be removed, utilization limits will minimize impacts allowing for available cover for snakes; removal of vegetation will not impact narrow-headed gartersnakes ability to seek cover given their higher selection of rock crevices or entering the water channel when evading predators.
- Utilization guidelines and both riparian and upland monitoring are in place to ensure sedimentation does not significantly impact perennial streams, aquatic invertebrates or the snakes prey base. Other measures to reduce soil erosion include rest-rotation practices, supplement strategies, and use of adaptive management.
- Improvements to increase water permanency will not take place in proposed critical habitat.

Mexican Spotted Owl (Strix occidentalis lucida)

Under the proposed action, livestock grazing could occur in eight MSO PACs on Bar X Allotment (including two PACs that extend onto the Driveway) and an additional three PACs on the Driveway during the breeding season (March 1st – August 31st)[18].

The presence of humans and noise associated with livestock management activities during the breeding season could result in temporary or permanent nest abandonment. Given this potential negative effect, the following activities will not be permitted inside of PACs during the breeding season unless U.S. Fish and Wildlife Service protocol surveys have confirmed non-nesting or infer absence for that breeding season:

1. the use of mechanized equipment such as chainsaws
2. operating ATV/UTVs other than on existing roads
3. use of permanent or temporary corrals
4. maintenance of corrals, earthen livestock tanks, or buildings

On a case by case basis, exceptions may occur where above actions 2, 3, and 4 may take place during the breeding season when nesting is confirmed, and a nest site is located; this case by case exception does not apply to action 1. Actions 2, 3, and 4 could occur inside a PAC if the action takes place at least one quarter mile away from the known nest site and the District Wildlife Biologist and U.S. Fish and Wildlife Service confirm that nesting birds will not be disturbed from noise or human activity.

No matter the time of year, use or maintenance of corrals in PACs will be extremely limited because only one permanent corral is located inside a PAC; the Naegelin Canyon Corral falls directly on the southwestern boundary of the Lost Salt MSO PAC. At this time, there are no known buildings in any PAC located in the project area. Under the proposed action, any new corral or structure constructed over the next 10 years will not be located inside a PAC. Unless surveys confirm non-nesting or infer absence, or the District Wildlife Biologist and U.S. Fish and Wildlife Service determine nesting birds will not be disturbed, grazing-related activities in PACs during the breeding season (March 1 – August 31) would be limited to routine herding in an effective manner that reduces time in PAC.

Impacts due to routine maintenance of fences will have no effect to owls in 6 of the 11 PACs because pasture fences do not intersect them. The remaining five PACs (Lost Spring (new), Haigler Creek (new), Upper Gordon, Reservation and Parallel) all have fences that intersect a portion of the PAC or nest core. Despite fence locations in PACs or nest cores, disturbance to owls will be minimal because routine maintenance of fences will be not be permitted in the breeding season unless non-nesting is confirmed, or the action will not disturb nesting owls. Routine maintenance of existing fence completed outside the breeding season could have a small effect on vegetative cover and soil conditions in suitable spotted owl foraging habitat when ATV/UTVs are used off-road along fence lines, when fencing material may be stock piled or when fence lines are brushed to remove fallen debris or vegetation growing through fence lines. This disturbance will be extremely localized and will be short in duration, therefore, we do not anticipate prey populations occurring around pasture fences to be affected.

[18] Number of PACs described in effects analysis differ from baseline status because of 2018 TNF MSO PAC revisions and PAC establishments.

Under the proposed action, locations of seven new earthen tanks, one corral, and one cattle guard have been identified and will be constructed within the first two years of the project. All proposed earthen stock tanks are located outside PACs, however, 4 of 7 are located within one quarter mile of a PAC boundary. The proposed corral is over one quarter mile away from the closest known PAC. Disturbance to owls from these seven water developments, one corral and one cattle guard will be minimal because construction would not occur during the breeding season when noise from heavy equipment might disturb nesting owls (exceptions may occur on a case by case basis where recent surveys indicate non-breeding or infer absence).

Over the life of the project, additional range improvements described in the proposed action may be constructed but will follow appropriate conservation measures. For example, new waters would be farther than one quarter mile from any known PAC and would not negatively impact nest/roost recovery habitat or PCEs of designated critical habitat. Heavy equipment would be restricted to existing roads and locations of new waters beyond the seven described above would be adjacent to roads in areas where the removal of large snags, downed logs, and large mature trees would not be necessary.

Potential effects from concentrations of livestock in suitable spotted owl foraging habitat including wet meadows and other forest openings could result in trampling of vegetation and compaction of soil, reducing foraging habitat quality by reducing hiding cover and food resources for prey. Water quality of streams, springs, wetlands, and earthen stock tanks could potentially be impacted by grazing and result in effects to hiding cover and food resources for prey species. Potential effects to herbaceous cover under the proposed action would be managed through the length of the grazing period (how long plants are exposed to livestock grazing), frequency of grazing (how often plants are exposed to livestock grazing), grazing intensity (how much of a plants growth to date is removed during the grazing period; determined at the end of the grazing period), and forage utilization guidelines (how much of a plants annual growth is removed; determined at the end of the growing season). Typically, livestock will graze pastures with riparian areas in short duration (about 1 to 2 months). Timing of grazing and rotational grazing management descried throughout this document will minimize effects to herbaceous height and cover for prey species. These practices allow for herbaceous plant growth and recovery to occur under favorable climatic conditions as livestock are moved between pastures. Additionally, grazing intensity on summer or winter range browse species would be managed up to moderate levels (30-50% utilization). Herbaceous utilization would be managed at conservative levels (30-40%). Management at these levels would provide sufficient herbaceous forage and hiding cover for owl prey and to maintain soil conditions and, therefore, water quality. Potential effects from livestock grazing to suitable foraging habitat in reaches of Haigler Creek would be reduced given portions of the creek are inaccessible to livestock due to rugged topography or creek-side private property excluding use. If needed, congregation of livestock in these riparian areas and near other water sources could also be mitigated through the placement of salt or mineral supplements in less sensitive areas such as uplands.

The Mexican Spotted Owl Recovery Plan encourages managing habitat for a diversity of prey species to help buffer against population fluctuations of individual prey species and provide a more constant food supply for the spotted owls (USFWS 2012). The amounts of remaining vegetative biomass resulting from different levels of grazing have shown varying intensities of effects on small mammal populations important to Mexican spotted owls. Shifts among small mammal prey species on the Bar X Allotment and Driveway would be expected to occur in areas with livestock grazing (10 – 50% utilization) especially those close to water, salt, or mineral blocks. We anticipate there will be little to no shift in small

mammal prey species in areas with decreased intensity to no grazing (0 – 10%) in areas farther from water or inaccessible to livestock (i.e. steep slopes and canyons or private inholdings). Managing grazing intensity and utilization of herbaceous vegetation at conservative levels (30 – 40%) would help meet this objective.

Grazing that significantly reduces herbaceous ground cover and increases shrubs and small trees can decrease the potential for beneficial low-intensity ground fires while increasing the potential for destructive high-intensity crown fires. Grazing would occur through a rotational system, either deferred or rest-rotation grazing, which would allow grasses the opportunity for growth or regrowth. Pasture use may be deferred in order to accomplish resource goals related to fire, fuels and habitat in addition to recovery for grazing schedules. A total of 30,579 acres of the Bar X Allotment and Driveway overlap two prescribed burn projects, the Spring Prescribed Burn (02EAAZ00-2018-I-0905) and Parallel Prescribed Burn (02EAAZ00-2015-I-0002-R001). Under the Spring and Parallel Prescribed Burn proposed actions, when prescriptions are met over the next 15 years, low or low to moderate prescribed burning will occur in MSO recovery habitat, critical habitat and potentially MSO PACs. Low-intensity ground fires prevent fuel accumulation, stimulate nutrient cycling, promote grasses and forbs, discourage shrubs and trees, and perpetuate the patchiness that supports prey species diversity important to MSO. The Fuels, Range, and Wildlife staff coordinate annually with the permittee to strategize pasture use and timing around burning schedules.

Critical Habitat

Forest or Riparian Habitat PCEs

PCE No 1. A range of tree species, including mixed conifer, pine-oak, and riparian forest types, composed of different tree sizes reflecting different ages of trees, 30 to 45 percent of which are large trees with diameter at breast height (dbh) (4.5 feet above ground) of 12 inches or more;

Effect: Livestock grazing will likely have little to no effect on diversity and size classes of mixed conifer and pine-oak because these species have low palatability to grazing livestock, especially cattle due to resin, turpentine, oleoresins commonly found in pines and conifers (Sampson and Jesperson 1963). Conversely, riparian forest types may be affected by livestock foraging on woody riparian species, however riparian utilization guidelines which limit to 50% of leaders browsed on upper 1/3 plants up to 6 feet tall should not change species richness or obstruct riparian woody species ability to develop in to large trees. If an area is heavily grazed, livestock can impact germination rates of riparian species directly and indirectly through foraging, soil compaction, trampling, limiting reproduction, and removing germination sites of riparian trees. However, some ground disturbance by livestock can increase microhabitat for germination and aid in stability of steep banks. Livestock can reduce or lower slopes of incised banks, making banks more suitable for vegetation to become established (Poff et. Al 2012). Although pine and conifer components of this PCE will likely not be affected by livestock, we anticipate some adverse impacts to the riparian tree germination and recruitment.

PCE No 2. A shade canopy created by the tree branches covering 40 percent or more of the ground;

Effect: Livestock will likely have no effect on shade canopy given they primarily feed on grasses and some palatable browse species.

PCE No 3. Large, dead trees (snags) with a dbh of at least 12 inches.

Effect: Livestock grazing will likely have no effect on the presence of large, dead trees (snags).

PCE No 4. High volumes of fallen trees and other woody debris;

Effect: Livestock will likely have little effect to volume of fallen trees and other woody debris (snags). Overtime, livestock may trample or crush smaller diameter logs or woody debris, but this disturbance would not result in substantial loss in volume.

PCE No 5. A wide range of tree and plant species, including hardwoods; and

Effect: Although livestock grazing can temporarily reduce plant biomass, grazing will likely have no effect on the range of plant species across critical habitat.

PCE No 6. Adequate levels of residual plant cover to maintain fruits and seeds, and allow plant regeneration

Effect: Livestock grazing following utilization guidelines (browse species up to moderate levels (30-50% utilization) and herbaceous utilization at conservative levels (30-40%)) should minimize any adverse effect to plant cover and provide sufficient adequate levels of plant cover to trap fruit and seed as well as allow plant regeneration. Utilization levels described above allow for facilitation of growth and recovery of the plant (USDA 2002). As mentioned above, if an area is heavily grazed, livestock can impact germination rates of riparian species directly and indirectly through foraging, soil compaction, trampling, limiting reproduction, and removing germination sites of riparian trees. However, some ground disturbance by livestock can increase microhabitat for germination and aid in stability of steep banks. Livestock can reduce or lower slopes of incised banks, making banks more suitable for vegetation to become established (Poff et. Al 2012).

Construction or maintenance of earthen stock tanks or other range improvements will follow conservation measures built into the proposed action. Following these measures ensures that PCEs of critical habitat are not disturbed or negatively impacted.

Canyon Habitat PCEs

Presence of water (often providing cooler temperatures and higher humidity than the surrounding areas);

Effect: We do not anticipate livestock to negatively impact the presence of water across the project area. Under the prosed action, the construction of at least seven new waters (earthen stock tanks) will occur in the first two years, as well as maintenance of existing tanks to increase water permanency. A total of 3.4 miles of perennial Haigler Creek is inaccessible to livestock due to rugged topography or creek-side private property excluding use. If needed, congregation of livestock in riparian areas or near other water sources can be mitigated through the placement of salt or mineral supplements in less sensitive areas such as uplands.

Clumps or stringers of mixed-conifer, pine-oak, pinyon-juniper, and/or riparian vegetation; and

Effect: Livestock will not change the structure of mixed conifer stringers, pine-oak, or pinyon-juniper habitats because they forage on grasses and palatable browse species. Grazing will likely reduce riparian vegetation when livestock have access. Grazing in pastures with riparian areas will be in short duration (about 1 to 2 months). Riparian utilization guidelines that limit use up to 50% of 1/3 terminal leaders on top 1/3 of plants facilitate the growth of seedlings, and sapling tree species into larger size classes, thus minimize impacts to riparian vegetation. Further, allotment management plans include annual

monitoring programs for riparian vegetation utilization to prevent overuse and adverse impacts to streams and riparian habitats.

Canyon walls containing crevices, ledges, or caves; and,

Effect: Livestock grazing will have no effect on canyon crevices, ledges or caves.

High percent of ground litter and woody debris.

Effect: Livestock grazing following utilization guidelines (browse species up to moderate levels (30-50% utilization) and herbaceous utilization at conservative levels (30-40%)) should minimize any affect negative effect to ground litter and woody debris. Presence of livestock will likely break down litter and woody debris into smaller pieces but not completely remove these features.

Determination of Effects – Mexican Spotted Owl

Guidance and criteria from the 2015 *Framework for Streamlining Grazing Consultations* (USFS 2015) was used to evaluate effects to Mexican spotted owls from livestock grazing and maintenance or construction of range improvements.

We have determined that the proposed action on the Bar X Allotment and Driveway, **May affect but is not likely to adversely affect** Mexican spotted owls.

- Tonto National Forest Riparian utilization guidance will be followed which limits riparian utilization of woody species to <50% of terminal leaders on top 1/3 of plants that are accessible to livestock (<6.0 ft. tall). Herbaceous species will be limited to 40% of plant species biomass for deergrass and maintain 6-8 inches of stubble height for emergent species such as rushes, sedges, cattails, and horsetails. Additionally, cattle would be moved when riparian and upland utilization levels are met, therefore, minimizing any negative, effects of grazing and providing time for range and stream channel condition to improve. This will ensure cover for prey species will not be adversely affected and the range would be maintained for potential for surface fire when desired.
- Livestock grazing or livestock management activities will occur within PACs, but some activities will be prohibited in PACs during the breeding season unless surveys indicate non-breeding or infer absence. Prohibited activities can only occur in a PAC during the breeding season if the District Wildlife Biologist and U.S. Fish and Wildlife Service determine nesting owls will not be disturbed.
- Livestock grazing and livestock management activities within PACs in the project area, will be managed for levels that maintain or enhance prey availability, maintain potential for beneficial surface fires while inhibiting the potential for destructive stand-replacing fire.
- Livestock grazing in pastures with riparian area will be short induration (about 1 to 2 months).
- Locations of seven proposed earthen tanks have been identified and will be constructed within the next two years. These tanks are located outside PACs will be constructed during the non-breeding season unless non-nesting is indicated or absence inferred. All other future range improvements to increase water permanency will follow conservation measures built into the proposed action.

Determination for Mexican Spotted Owl Critical Habitat

Guidance and criteria from the 2015 *Framework for Streamlining Grazing Consultations* (USFS 2015) was used to evaluate effects to designated critical habitat for Mexican spotted owls from livestock grazing and maintenance or construction of range improvements.

We have determined that the proposed action on the Bar X Allotment and Driveway, **May affect, but is not likely to adversely affect** Mexican spotted owl critical habitat.

- Tonto National Forest Riparian utilization guidance will be followed which limits riparian utilization of woody species to <50% of terminal leaders on top 1/3 of plants that are accessible to livestock (<6.0 ft. tall). Herbaceous species will be limited to 40% of plant species biomass for deergrass and maintain 6-8 inches of stubble height for emergent species such as rushes, sedges, cattails, and horsetails. Additionally, cattle would be moved when riparian and upland utilization levels are met, therefore, minimizing any negative, effects of grazing and providing time for range and stream channel condition to improve. This will ensure cover for prey species will not be adversely affected and the range would be maintained for potential for surface fire when desired.
- Livestock grazing will have little to no effect on PCEs of forested or canyon MSO habitat pertaining to tree diameter, canopy closure, uneven-aged character, multi-layered canopy of overstory trees, snag basal area, and woody debris, or canyon ledges and crevices. Effects to riparian woody species, plant cover and woody debris will be mitigated by Tonto National Forest upland and riparian utilization guidelines described above.
- Range improvements will follow conservation measures built into the proposed action; no PCEs will be negatively impacted.

Designated Critical Habitat for Spikedace (*Meda fulgida*)

PCE 1: Habitat to support all egg, larval, juvenile, and adult spikedace, which includes: Perennial flows with *a stream depth generally less than 3.3 feet, and with slow to swift flow velocities between 1.9 and 31.5 inches per second; Appropriate stream microhabitat types including glides, runs, riffles, and the margins of pools and eddies, and backwater components over sand, gravel, and cobble substrates with low or moderate amounts of fine sediment and substrate embeddedness; Appropriate stream habitat with a low gradient of less than approximately 1.0 percent, at elevations below 6,890 feet; and Water temperatures in the general range of 46.4 to 82.4 °F.*

Effect: Livestock grazing and maintenance or construction of water developments and fences will not alter perennial flows, stream velocity or depth, stream microhabitat like riffles, runs or glides, stream temperature or stream gradient. Livestock grazing may alter substrates near backwater pools, but this will be minimized because livestock will only graze in pastures with riparian areas in short durations (about 1 to 2 months) and cattle have very limited access to designated critical habitat. Spring Creek has very steep and rugged terrain, making it inaccessible to livestock in most areas. In the three mile stretch of critical habitat, there are only five access points were livestock water (C. Wills, personal communication, October 2018). Conservative utilization guidelines will be followed, and cattle would be moved when riparian utilization levels are met, therefore, minimizing any negative indirect effects of grazing and providing time for riparian area and stream channel condition to improve.

PCE 2: An abundant aquatic insect food base consisting of mayflies, true flies, black flies, caddisflies, stoneflies, and dragonflies.

Effect: Livestock will have access to perennial waters so it is likely that livestock could temporarily increase sedimentation in those habitats not protected by bedrock and cobble. Increases in sedimentation caused by livestock is a concern because it may impact aquatic invertebrates. As noted above, there is large variability and uncertainty in data available from research describing the effects of sedimentation on aquatic invertebrates. Sediment transport is a natural function of perennial, intermittent or ephemeral waters but it is reasonable to believe that livestock could increase sedimentation beyond what is natural in the system. It is difficult to predict whether sedimentation caused by livestock will cause decreases in invertebrates because there are multiple factors that influence the effect sedimentation has on aquatic biota. These factors include the concentration of suspended solids, the duration of exposure to suspended solid concentrations, chemical composition, and the particle size distribution of suspended solids. Under the proposed action, measures and strategies are in place to minimize sedimentation wherever possible and livestock will typically have access to pastures with riparian areas for short durations (1 to 2 months). Conservative to moderate utilization guidelines described in the proposed action on key species follow utilization guidance recommended (Holecheck, 2012) for grazing range types (semiarid grassland and shrub, oak woodland-Juniper, pine forest) within the Bar X Allotment and Driveway. These recommendations are based off carefully analyzed available research and allow for maintenance and recovery of plants, aid in soil stability and protects streamside banks from increased erosion. Utilization limits for herbaceous riparian vegetation are intended to protect plant vigor and provide physical protection of streambanks (Holechek 2011). In addition to monitoring techniques described under the proposed action, utilization of deer grass will be monitored because it is the most common obligate, riparian, native, perennial grass on the Tonto National Forest. 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). Not all sedimentation caused by livestock can be mitigated, however, utilization guidelines and both riparian and upland monitoring are in place to ensure sedimentation does not significantly impact perennial streams or aquatic invertebrates. Other measures to reduce soil erosion include rest-rotation practices, supplement strategies, and use of adaptive management.

PCE 3: Streams with no or no more than low levels of pollutants.

Effect: Livestock in riparian areas can alter water quality through excessive excrement, resulting in elevated levels of nitrogenous compounds (ammonia). In addition, fecal contamination may cause eutrophication of water and an increase in planorbid snail numbers, number of nematode parasites, and the rate of some parasites. (Johnson *et al*. 1999). We do not anticipate livestock presence to significantly impact pollutant levels in Spring Creek because they only have access to pastures with riparian areas for about 1 to 2 months and a majority of the reach is inaccessible because of rugged topography. Critical habitat for spikedace within the project area makes up only lotic sites, thus, any pollutants by cattle will not be concentrated and only temporary because the system has perennial flow at rates that fluctuate depending on the season. Further, grazing strategies that disperse rather than concentrate livestock are in place to attack cattle away from streamside areas. These strategies include placing supplements,

herding, creation of upland development, and location of pasture fences. For these reasons, we do not anticipate any pollutants by livestock to negatively impact this PCE.

PCE 4: Perennial flows, or interrupted stream courses that are periodically dewatered but that serve as connective corridors between occupied or seasonally occupied habitat and through which the species may move when the habitat is wetted.

Effect: Livestock grazing and construction or maintenance of water developments will not impact this PCE. The proposed action does not include dewatering of any perennial stream and all new waters will follow conservation measures under the proposed action. For example, new watering developments (earthen stock tanks, above ground drinkers, troughs, etc.) would not be developed within 400 ft. of perennial streams and new spring developments would not dewater the spring and must maintain a residual flow for riparian obligate vegetation and wildlife species.

PCE 5: No non-native aquatic species or levels of non-native aquatic species that are sufficiently low as to allow persistence of spikedace.

Effect: Spring Creek is known to inhabit a variety of native and nonnative aquatic species. These include chub (*Gila* species), desert sucker (*Catostomus clarki*), speckled dace (*Rhinichthys osculus*), fathead minnow (*Pimephales promelas*), mosquito fish (*Gambusia affinis*), yellow bullhead (*Ameiurus natalis*), green sunfish (*Lepomis cyanellus*), brown trout (*Salmo trutta*) and American bullfrogs (*Lithobates [Rana] catesbianus*) within the system (Burger et al. 2002, Holycross et al. 2006, Voeltz 2002, Arizona Game and Fish Department Unpublished data). Livestock are not known to carry/transport nonnative predators from one site to another and therefore will not increase the spread of nonnative fish, crayfish or bullfrogs.

PCE 6: Streams with a natural, unregulated flow regime that allows for periodic flooding or, if flows are modified or regulated, a flow regime that allows for adequate river functions, such as flows capable of transporting sediments.

Effect: Livestock grazing, and construction or maintenance of new waters will not alter the natural flow regime. The proposed action does not include activities that will modify or regulate any perennial water within the project area.

Determination of Effects – Designated Critical Habitat for Spikedace

Guidance and criteria from the 2015 *Framework for Streamlining Grazing Consultations* (USFS 2015) was used to evaluate effects to designated critical habitat for spikedace from livestock grazing and maintenance or construction of range improvements.

We have determined that the proposed action on the Bar X Allotment and Driveway **May affect but is not likely to adversely affect** designated critical habitat for spikedace.

- Although livestock have access to Spring Creek, much of the reach is inaccessible due to rugged and steep topography.
- Any impact to designated critical habitat will be limited in location, frequency, and duration because livestock grazing in pastures with riparian areas will be short in duration (about 1 to 2 months). Substrate alteration in backwater pools, temporary decreases in invertebrate populations, and localized increases of pollutants are expected but not at levels that would

diminish the ability of critical habitat to contribute to the conservation and recovery of spikedace.

- Grazing strategies that disperse rather than concentrate livestock are in place to attract cattle away from streamside areas. These strategies include placing supplements, herding, creation of upland development, and location of pasture fences.
- The proposed action will not increase occupancy of harmful nonnative predators or levels of sedimentation beyond natural occurring levels seen in the Spring Creek watershed.
- Livestock grazing and maintenance or construction of water developments and fences will not alter perennial flows, stream velocity or depth, stream microhabitat like riffles, runs or glides, stream temperature or stream gradient.
- Allotment management plans include annual monitoring programs for riparian vegetation utilization to prevent overuse and adverse impacts to streams and riparian habitats for sensitive and protected aquatic species. Monitoring is used to develop each year's annual operating instructions that ensure adaptive management under changing environmental conditions. This strategy provides for annual review of grazing management and ensures appropriate use to maintain watershed function and condition.
- The proposed action does not include dewatering of any perennial stream and all new waters will follow conservation measures under the proposed action.

Gila Trout (Oncorhynchus gilae g.)

Livestock will graze riparian areas including Haigler Creek which has been identified as a future Gila trout recovery stream. There will be potential impacts to Gila trout and its habitat caused by the presence of livestock. The planned Gila trout recovery introduction reach is estimated conservatively at four miles from the barrier on private property, upstream to the headwaters of Haigler Creek. Of this four-mile reach, 0.6 miles is located on private land. Livestock are not able to access the private parcel so we do not anticipate any direct impacts to habitat or trout in this specific area. An additional half mile of Haigler Creek located on Tonto National Forest is inaccessible to livestock because of topography. Once introduced, livestock will have access to approximately three miles of habitat occupied by Gila trout upstream of the barrier to the headwaters.

There is another four-mile reach of Haigler Creek within the project area downstream of the barrier. There are no plans to stock Gila trout below the barrier, however, in high flow events, it is possible for individuals to be flushed downstream. Of this four-mile downstream reach, approximately one mile is located on private property. Livestock are not able to access the private parcel so if individual trout are flushed downstream, we do not anticipate any direct or indirect effects to trout or its habitat in this specific area. If trout are present downstream of the barrier, there will be about one mile of stream (made up of several discontinuous segments) accessible to livestock. Potential direct effects of livestock grazing to Gila trout include trampling of eggs, alevins (during spawning and incubation periods, from March to June), and juvenile or adult fish. Potential indirect effects to Gila trout include elevated levels of sediment loading and reduction of stream channel stability and function. Increased sedimentation could impact spawning gravels, hyporheic flow, and stream production thus altering the macroinvertebrate prey base and impacting incubating eggs and alevins. These alterations could lead to lowered spawning success and recruitment of Gila trout.

Any impact to Gila trout and its habitat will be short term and limited in location, frequency, and duration because of conservative utilization levels; livestock grazing in pastures with riparian areas will be short in duration (about 1 to 2 months) Further, adjacent pastures to the creek (Colcord, Haigler, Bar X and Westhole) contain substantial off channel troughs or earthen tanks that help move cattle away from sensitive riparian areas. Grazing strategies that disperse rather than concentrate livestock are in place to attract cattle away from streamside areas. These strategies include placing supplements, herding, creation of upland water developments, and location of pasture fences.

Although the potential effects described above are not insignificant, we believe that negative impacts will be reduced by conservation measures, management strategies, and monitoring under the proposed action. These measures and strategies described above are in place to reduce adverse effects and provide protections for Gila trout and their habitats (both occupied and unoccupied). Stocking rates are determined by annual utilization monitoring that is based on standards and guidelines developed to protect sensitive riparian vegetation, soils, special status species, and reduce grazing impacts to perennial waters and water quality (U.S. Forest Service 1985, FSH 2209.13). The proposed action includes monitoring of grazing vegetation utilization within riparian areas as well as soil, watershed, and water quality impacts. The allotment management plan is developed with the permittee and includes criteria for desired habitat conditions, range utilization standards, and monitoring plans. Annual monitoring ensures that these standards are not exceeded and annual operating instructions provide for appropriate rest-rotation schedules to adaptively manage and respond to changing climate and range conditions that may affect sensitive species and their habitats.

Part of the proposed action includes addition of range improvements like the construction or maintenance of water developments or fencing. All new waters will follow conservation measures under the proposed action. Improvement actions like construction or maintenance of water developments is not likely to impact Gila trout because water developments will be 400 feet away from any perineal reach. Gila trout do not occupy any lentic site within the project area so they will not be impacted when existing tanks are cleaned. Heavy equipment will stay on existing roads where present and not cross perennial drainages occupied by Gila trout.

Determination of Effects – Gila Trout

Guidance and criteria from the 2015 *Framework for Streamlining Grazing Consultations* (USFS 2015) was used to evaluate effects to Gila trout from livestock grazing and maintenance or construction of range improvements.

We have determined that the proposed action on the Bar X Allotment and Driveway **May affect and is likely to adversely affect** Gila trout.

- Livestock will have access to Haigler Creek, a stream identified as a Gila trout recovery stream population in the near future. Once introduced, livestock will have access to three miles of recovery reach segments upstream of the fish barrier and one mile downstream of the barrier. Livestock may cause trampling of eggs, alevins, and juvenile or adult fish.
- Although direct and indirect impacts will occur, they will be limited in location, frequency, and duration because livestock grazing in pastures with riparian areas will be short in duration (about 1 to 2 months).

- Grazing strategies that disperse rather than concentrate livestock are in place to attract cattle away from streamside areas. These strategies include placing supplements, herding, creation of upland water developments, and location of pasture fences.
- Allotment management plans include annual monitoring programs for riparian vegetation utilization to prevent overuse and adverse impacts to streams and riparian habitats for sensitive and protected aquatic species. Monitoring is used to develop each year's annual operating instructions that ensure adaptive management under changing environmental conditions. This strategy provides for annual review of grazing management and ensures appropriate use to maintain watershed function and condition.
- Utilization guidelines and both riparian and upland monitoring are in place to ensure sedimentation does not significantly impact perennial streams, aquatic invertebrates or native fish. Other measures to reduce soil erosion include rest-rotation practices, supplement strategies, and use of adaptive management.
- The proposed action does not include dewatering of any perennial stream and all new waters will follow conservation measures under the proposed action.

Mexican Wolf (Canis lupus baileyi)

Given there are currently no established wolf packs, denning or rendezvous sites on the Tonto National Forest, impacts from the proposed action are likely to occur only to transient animals dispersing overland. At this time, there have been no confirmed wolf/livestock depredations on the Tonto National Forest. The project area contains suitable habitat for wolves reintroduced under the ESA 10(j) rule and as described above, wolves from recovery efforts have been known to use the project area. Wolf-livestock conflicts have the potential to occur in the project area and can occur at any time of the year during the length of the proposed action.

The proposed action incorporates management flexibility by providing a range of authorized livestock numbers that reflect variations in resource conditions and are necessary for the achievement of management objectives and desired conditions. Within this range, annually authorized livestock numbers will be specified in the AOIs. Changes in stocking would occur as a result of changes in resource conditions, drought, climate change and infrastructure conditions in consideration of management objectives. Herd movements would be based on water availability, forage conditions, grazing intensity and forage utilization levels and will be specified in AOIs. A new AMP will be developed for each allotment. The AMP will include mitigation measures and BMPs to avoid or minimize effects to wildlife, soil and water quality. Monitoring of forage availability, utilization, range readiness and resource conditions will be used to determine whether management is being properly implemented and whether the actions are effective at achieving or moving toward desired conditions.

Proposed adaptive management measures and range improvement infrastructure will minimize wildlife and livestock conflicts (i.e., Mexican wolf). The proposed water developments in the project area will provide a level of management flexibility that will be responsive to wolf and livestock interactions in a timely manner through an AOI amendment. Having more water dispersal will allow greater control of grazing activities within a specific pasture. The proposed pasture division fences, existing traps and corrals will provide greater management flexibility and control of livestock to help minimize wolf

livestock conflicts. These proposed improvements are not only beneficial during Mexican wolf denning periods but also throughout the year in response to potential wolf and livestock interactions.
In the event wolves are observed or establish a territory inside the project area and livestock conflicts occur over the next 10 years, the Payson Ranger District will continue to coordinate with the affected livestock permittees and the Mexican Wolf Interagency Field Team (IFT) to mitigate any additional conflicts. Examples of management actions that may be considered on the Payson Ranger District include but are not limited to;

- Flight, GPS and ground tracking wolf location updates to aid in preventing wolf/livestock conflicts.
- Providing the affected permittees with a telemetry tracking device to determine when collared wolves are in proximity to an actively grazed area. Telemetry equipment is provided to permittees at the discretion of U.S. Fish and Wildlife Service.
- Placing temporary restrictions around a wolf den site to reduce disturbance potential.
- Wolf range-rider program implementation to provide additional human presence where wolf livestock interactions have a high potential of occurrence.
- Coordination with IFT who may haze wolves away from sensitive livestock areas, such as calving pastures, holding pastures, or other areas.
- Modify AOIs to change pasture or allotment rotations to reduce conflicts

The reintroduced Mexican Wolf population has been designated as a non-essential experimental population pursuant to section 10(j) of the Endangered Species Act. By definition, a non-essential experimental population is not essential to the continued existence of the species. Therefore, no proposed action impacting a 10(j) population so designated could lead to a jeopardy determination for the entire species. Consequently, proposed livestock grazing and livestock management activities in the 10(j) area with Mexican wolves are not likely to jeopardize the continued existence of the wolf.

As defined in the ESA §10 (j) rule for the Mexican wolf, “disturbance causing land use activity” means any land use activity that the U. S. Fish and Wildlife Service determines could adversely affect reproductive success, natural behavior, or survival of Mexican wolves. The following activities are specifically excluded from this definition under the ESA §10 (j) rule for the Mexican wolf:

1. Legally permitted livestock grazing and use of water sources by livestock;
2. Livestock trailing or drives (only if no reasonable alternative route exists);
3. Vehicle access over established roads to private property and to areas on public land where legally permitted (only if no reasonable alternative route exists);
4. Use of lands within the national park or national wildlife refuge systems as safety buffer zones for military activities;
5. Prescribed fire and associated management actions (except in the vicinity of wolf release pens);
6. Any authorized, specific land use that was active

Determination of Effects – Mexican Wolf

Livestock grazing and livestock management activities in the 10(j) area with Mexican wolves are **Not Likely to Jeopardize** the continued existence of the wolf. Using Adaptive Management provides flexibility to mitigate wolf-livestock interactions within and across allotment boundaries.

Forest Service Sensitive Wildlife, Plants, and Fish

Sensitive species are defined as "those plant and animal species identified by a Regional Forester for which population viability is a concern, as evidenced by: (a) significant current or predicted downward trends in population numbers or density, or (b) significant current or predicted downward trends in habitat capability that would reduce a species' existing distribution (FSM 2670.5(19))." It is the policy of the US Forest Service regarding sensitive species to: (1) assist states in achieving their goals for conservation of endemic species; (2) as part of the National Environmental Policy Act process, review programs and activities, through a biological evaluation, to determine their potential effect on sensitive species; (3) avoid or minimize impacts to species whose viability has been identified as a concern; (4) if impacts cannot be avoided, analyze the significance of potential adverse effects on the population or its habitat within the area of concern and on the species as a whole (the line officer, with project approval authority, makes the decision to allow or disallow impacts, but the decision must not result in loss of species viability or create significant trends toward Federal listing); and (5) establish management objectives in cooperation with the state when projects on National Forest System lands may have a significant effect on sensitive species population numbers or distributions.

The most recent Tonto National Forest Sensitive species list, dated February 2015, was used in determining which, if any, sensitive species may be affected by the proposed action. Forest Service sensitive species known to occur or have suitable habitat within the project area are described below. All Tonto National Forest sensitive species were considered, however, only sensitive species that are known to occur or have suitable habitat within the project area will be included in greater detail.

The most current and available data on species, available habitat, survey history, biologist's knowledge and experience, and a review of the Arizona Game and Fish Department's 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.

Affected Environment

American Peregrine Falcon[19]

The Arizona Game and Fish Department has completed four rounds of formal monitoring for the American peregrine falcon. Efforts across the state started in 2006 and have been replicated on three-year intervals. Breeding areas or nest sites included in the monitoring program were initially identified if they had been occupied at least once from 1999 to 2002.

Status within the Bar X Allotment

There are no known American peregrine falcon breeding areas or nest sites in the Bar X Allotment.

[19] For life history information on the American peregrine falcon, its distribution and pictures, please visit https://drive.google.com/drive/folders/0BwLs0i-QWFssaXNDUGNYbW5xSUk

Status within the Driveway

There are no known American peregrine falcon breeding areas or nest sites in the Driveway

Status Adjacent to the Project Area

There are three observations of breeding sites adjacent to the project area; Mule Creek, Al Fulton Point, and Gentry Mountain. Of the three breeding areas, Mule Creek and Al Fulton nest sites were included in the formal monitoring conducted by Arizona Game and Fish Department. The tables below show data collected from those surveys up until 2015 efforts (Abbate and Ingraldi 2015). The Gentry Mountain non-breeding observation was reported in 2012 and the site has not been formally monitored since. In additional to the Al Fulton Point data below, the Forest has monitored the nest site in 2017 and 2018 and both years, an adult pair was observed.

Table 24 PEFA Al Fulton Point Occupancy Data[20]

2005	2006	2009	2012	2015
O	O	O	O	O

Table 25 PEFA Mule Creek Occupancy Data

2005	2006	2009	2012	2015
N/A	N/A	N/A	N/A	PO

Northern Goshawk[21]

Status within the Bar X Allotment

There is one known Post Fledgling Area (PFA) within the Bar X Allotment; Colcord Estates. The most recent observation was from 2016 when an incidental audio was reported inside the PFA. See Appendix C for more detailed information on monitoring within this PFA.

Status within the Driveway

There is one known Post Fledgling Area (PFA) within the Driveway; Marsh Creek. The most recent observation was from 2010 when a pair with two young were reported inside the PFA. See Appendix C for more detailed information on monitoring within this PFA.

Status Adjacent to the Project Area

There are two known PFAs or incidental northern goshawk observations adjacent to the project area; Hunter Creek and Sheep Corral. The most recent observation from Hunter Creek PFA was from 2004 when a reported inside the PFA and a pair with two young in Sheep Corral in 2009. See Appendix C for more detailed information on monitoring within these PFAs.

[20] O = 2 adults or evidence of reproduction confirmed – site occupied

PO = 1 PEFA detected near site during one or more visits – site possibly occupied

NO = no PEFA activity detected during at least two visits – site not occupied

[21] For life history information on the Northern goshawk, and its distribution, please visit https://drive.google.com/drive/folders/0BwLs0i-QWFssTHplR0Rra3hOdGs

Aquatic Species

Status of aquatic species will be described separately, but effects to all aquatic species will be discussed together.

Desert Sucker[22]

Status within the Bar X Allotment and Driveway

According to geospatial stream data edited by several Arizona agencies since 1988, there are seven prominent perennial streams within the Bar X and Driveway boundaries; Haigler Creek, Spring Creek, Rock Creek, Canyon Creek, Cherry Creek, Gordon Canyon Creek, and Walnut Creek. Desert suckers are currently known from Cherry Creek, Rock Creek, Haigler Creek, Canyon Creek, Rock Creek, and Spring Creek.

Status Adjacent to Project Area

Spring Creek, Rock Creek, Canyon Creek, and Haigler Creek extend beyond the Bar X and Driveway boundaries and have reports of desert suckers.

Headwater /Roundtail Chub[23]

On April 6, 2017 the U.S. Fish and Wildlife withdrew the proposed listing for headwater chub (Gila nigra) and roundtail chub (Gila robusta) in the Lower Colorado River Basin due to the findings of the Joint Committee on the Names of Fishes. These findings concluded that the two formerly proposed species as well as the currently listed Gila chub (Gila intermedia) are no longer valid species and should be all considered roundtail chub. The U.S. Fish and Wildlife Service is still working internally to clarify the process that will be taken for this species. Roundtail and headwater chub have no current federal listing status but are still on the Regional Forester's sensitive species list as separate entities and therefore will be analyze as sensitive species but group into a single analysis.

Status within the Bar X Allotment and Driveway

According to geospatial stream data edited by several Arizona agencies since 1988, there are seven prominent perennial streams within the Bar X and Driveway boundaries; Haigler Creek, Spring Creek, Rock Creek, Canyon Creek, Cherry Creek, Gordon Canyon Creek, and Walnut Creek. Chub are currently known from Cherry Creek, Rock Creek and Spring Creek.

Status within the Project Area

Spring Creek, Rock Creek, and Cherry Creek extend beyond the Bar X and Driveway boundaries and have reports of Chub. Additionally, chub can be found in Marsh Creek to the west of the project area.

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[22] For life history information on the desert sucker, its distribution and picture, please visit https://drive.google.com/drive/folders/0BwLs0i-QWFssUkZLOThLRVRUTVk

[23] For life history information on the roundtail chub, and its distribution, please visit https://drive.google.com/drive/folders/0BwLs0i-QWFssS3dpRldvM3B6Q3c

Lowland Leopard Frog[24]

Status within the Bar X Allotment and Driveway

There are 75 range management improvement features within the project area that could be suitable breeding or dispersal habitat for frogs if located within the species elevational range, hold permanent water and lack nonnative invasive species; these features include earthen stock tanks, springs, wells, above ground drinkers, or Arizona Game and Fish Department wildlife waters. According to the Arizona Game and Fish Department Ranid Frog Project's Riparian Herpetofauna Database, there are no historical reports or known extant populations of within the project area.

Lowland leopard frogs require perennial water for breeding. According to geospatial stream data edited by several Arizona agencies since 1988, there are seven prominent perennial streams within the Bar X and Driveway boundaries; Haigler Creek, Spring Creek, Rock Creek, Canyon Creek, Cherry Creek, Gordon Canyon Creek, and Walnut Creek. These streams could be potential suitable habitat for lowland leopard frogs if within the elevational range of the species and absent of aquatic nonnative species like crayfish and bullfrogs.

Status Adjacent to the Project Area

There is one historical record of lowland leopard frogs in Spring Creek from 1950. The record is north of the southernmost edge of the Driveway boundary. A more recent report comes from Buzzard Roost Canyon in 2006 approximately three miles from the southwestern boundary of the project area.

Disease

The presence of chytrid fungus (Batrachochytrium dendrobatidis) has been known to occur within the Gentry Creek Management Area (CLF management boundary which overlaps with the project area). Although no strategized sample efforts have taken place, Arizona Game and Fish Department has opportunistically collected 63 samples from sites where amphibians are present or taken water samples from eight localities adjacent to the project area, six of which came back positive for chytrid at three sites. These sites are located just north of the project area in the Naegelin Canyon-Cherry Creek area.

Net-wing Midge[25]

Status within the Bar X Allotment and Driveway

There are no known records of net-wing midge in the project area, however, little is known about the species and its distribution. Given very few targeted surveys have taken place across the Tonto National Forest, the species may be present in the project area. Net-wing midge is confined to areas in the immediate vicinity of rapidly flowing streams within the pinyon-juniper woodland community at elevations between 6,000 to 9,300 feet. Larvae and pupae occur on smoothed-faced rocks and boulders in swiftly moving torrential waters, often in waterfalls (AGFD 2003). As a result of this species having

[24] For life history information on the Lowland leopard frog, its distribution and picture, please visit https://drive.google.com/drive/folders/0BwLs0i-QWFssNHdIVHAxV19Id1E

[25] For life history information on the net-winged midge and its distribution, please visit https://drive.google.com/drive/folders/0BwLs0i-QWFssQnk3czBIVEFmcm8

high habitat specificity for fast flowing streams above 6,000 feet, it is unknown the extent of available habitat within the project area.

Status Adjacent to the Project Area

There is one historic observation from 1991 of net-wing midge within the project area at an unnamed drainage near Squaw Mesa and Graveyard Canyon.

Bat Species

Status of bats will be described separately, but effects to all bats will be discussed together.

Currently, there are four bat species on the Tonto National Forest Sensitive Species List; Allen's lappet browed bat, western red bat, spotted bat, and Townsend's big-eared bat. Arizona Game and Fish Department's Heritage Data Management System (HDMS) was used to determine which species inhabit or have suitable habitat within the project area. Of the four species, western red bat and Allen's lappet browed bat were identified.

In recent years, there have been limited surveys to monitor bats within the project area. However, in 2018, the Tonto National Forest implemented acoustic bat monitoring protocols described in *A Plan for the North American Bat Monitoring Program* (NABat) in three designated priority grid cells across the Payson and Pleasant Valley Ranger Districts. Although none of these cells fell within the project area, the southwestern quadrant of grid cell 342 was located adjacent to the project area above the Mogollon Rim near Military Sinkhole Trailhead. A Wildlife Acoustics SM4 was used to record full-spectrum echolocation files in four quadrants of grid cell 342 from May 18-22. Resulting call files of sufficient quality were identified to species or species group by Bat Conservation International (BCI). According to BCI, Allen's lappet browed and western red bats were recorded approximately two miles from the project area. In addition to these sensitive species, species, spotted bats were also recorded. We have added spotted bat to our project analysis in light of these recent findings.

Allen's Lappet Browed Bat[26]

Status within the Bar X Allotment and Driveway

There are no known Allen's lappet browed bat roosts within the project area but suitable habitat does exist and surveys have been limited. The Allen's lappet-browed bat roosts in caverns, cliffs, and rock fissures, large boulder piles, under exfoliating bark on ponderosa pine snags and in abandoned mines. It is an insectivorous bat, which feeds mostly by gleaning moths and stationary insects from surfaces (Brown and Lewis 2005). This species is highly tied to available water due to their high rate of evaporative water loss and usually roost near water. This bat generally occurs in Mojave desert-scrub at 2,600 to fir forests at 9,800 feet, but mostly found in oak-juniper woodlands and ponderosa pine forest at altitudes between 3,500 and 7,500 feet. In addition to the positive acoustic records for Allen's lappet browed bat two miles north of the project area, there is one bat netting record near Mule Creek where the species was captured. The record is from 1993 and again in 2003 and has been described as a foraging area.

[26] For life history information on the Allen's lappet browed Bat, its distribution and picture, please visit https://drive.google.com/drive/folders/0BwLs0i-QWFssaERRemNXdTlsUkk

Western Red Bat[27]

Status within the Bar X Allotment and Driveway

There are no known western red bat roosts within the project area but suitable habitat does exist and surveys have been limited. The western red bat occurs statewide, except in desert areas, but primarily along riparian corridors among oaks, willows, sycamores and cottonwoods and along other waterways (Bolster 2005). It is a solitary roosting species, primarily found in the foliage of trees or shrubs. In Arizona, the red bat is thought to be a summer resident only. While red bats occasionally roost in cavities, they are more typically found roosting in dense clumps of foliage in riparian or other wooded areas. Roost sites are shaded above and tend to be open below, permitting the bats to drop into flight. Potential habitat could include Cherry Creek, Rock Creek, Spring Creek, and Haigler Creek. In addition to the positive acoustic records for western red bat two miles north of the project area, there is one historical bat netting record near Spring Creek where the species was collected in 1962.

Spotted Bat[28]

Status within the Bar X Allotment and Driveway

There are no observations of this species within the project area, however survey and monitoring information is limited and suitable habitat may occur. Habitat associations vary over this species' range but has mostly been captured in dry desert scrub and sometimes in ponderosa pine forest; roost sites are poorly known, but they seem to prefer roosting in crevices and cracks in cliff faces (A. McIntire, personal communication, 11/09/2017). Spotted bats were recorded during 2018 NABat monitoring approximately two miles north of the project area. There are no other records reported on the Tonto National Forest.

Plants – Riparian Obligates[29]

Status of riparian obligate plants will be described separately, but effects to all riparian obligate plants will be discussed together.

Blumer's Dock

Status within the Bar X Allotment and Driveway

In the 1980s, Blumer's dock was transplanted to 17 localities within the Tonto National Forest, largely from seed or seedlings taken from native populations in the Sierra Ancha Mountains on the Pleasant Valley Ranger District (Harris and Gobar 1993). Occurrences pulled from Arizona Game and Fish Department's HDMS within the project area include Haigler Creek and Canyon Creek. Translocations occurred in the late 1980s with more consistent monitoring up the early 1990s. Currently, status of transplanted populations in both creeks unknown. However, botanists suspected a number of plants were extirpated by wildfires since the 1990's along with post fire impacts like flooding and erosion. This

[27] For life history information on the Western red bat, its distribution and picture, please visit https://drive.google.com/drive/folders/0BwLs0i-QWFssUXhROGRBcXJ5V2s
[28] For life history information on the spotted bat and its distribution and picture, please visit https://drive.google.com/drive/folders/0BwLs0i-QWFssQVRkQWJmUm9IOXM

[29] [29] For more information on sensitive plants discussed in this biological evaluation, please visit https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/fsbdev3_018579.pdf

species selects for mid to high elevation wetlands with moist, organic soil adjacent to perennial springs or streams in canyons or meadow situations. They can be found in moist, loamy and organic soils from 4,480 – 9,660 feet elevation. There are no historical or extant populations of Blumer's dock adjacent to the project area.

Sierra Ancha Fleabane (Mogollon Fleabane)

Status within the Bar X Allotment and Driveway

There are no known populations within the project area. This species selects for mid to high elevation wetlands with moist, organic soil adjacent to perennial springs or streams in canyons or meadow situations. They can be found in moist, loamy and organic soils from 4,480 – 9,660 feet elevation. There is only one historical record of Sierra Ancha fleabane adjacent to the project area. In 1973, a specimen was collected from Bear Flat near Christopher Mountain. This record is almost five miles from the project area.

Senator Mine Alumroot

Status within the Bar X Allotment and Driveway

There is one historical record within the project area near Valentine Ridge from 1954. This species can be found on moist shaded slopes in ponderosa pine forests and canyons, mostly in inaccessible terrain; species can also be found on rocky slopes. Surveys have been limited and suitable habitat does exist. There is one historic record for this species adjacent to the project area along Christopher Creek. This record is almost five miles from the project area.

Tonto Basin Agave

Status within the Bar X Allotment and Driveway

There are no historical or extant populations of Tonto Basin agave in the project area. General distribution on the forest includes about 90 clones near Young, Arizona to San Carlos Reservoir, foothills of Mazatzal and Sierra Ancha mountains, the Sunflower areas, and near Oak Creek. The greatest concentration of sites occurs along the south end of Tonto Creek near the northwest end of Roosevelt Lake in Tonto Basin. The species is known to occur on 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. There is one historic record of this species northwest of Soldier Mountain approximately four miles from the project area.

Effects Analysis - Alternative A – No Grazing

Under Alternative A, there would be no livestock grazing or construction/maintenance of structural range improvements across the project area. Therefore, there would be no direct effects in suitable or occupied habitat for American peregrine falcons, northern goshawks, Lowland leopard frogs, desert suckers, headwater/roundtail chub, net-winged midge, Allen's lappet browed bat, spotted bat, western red bat, Blumer's dock, Sierra Ancha fleabane, Senator Mine alumroot, and Tonto Basin agave, or bald and golden eagles. There would also be no indirect impacts to these species from noise and human disturbance when implementing routine range management operations.

Conversely, as stated earlier, water from sources like stock tanks, will become less available overtime as the stock tanks fill with sediment. Current Term Grazing permits require grazing permittees to maintain

stock tanks, when livestock are on or off the allotment. This allows water to be available for wildlife use regardless of livestock presence on the allotment. Stock tanks and other developed waters are used for various life history needs (watering, foraging, breeding, etc.) for sensitive species and their prey base. As these areas become dry, indirect effects may occur and impact individuals as prey may become harder to find, breeding areas for aquatic species may be reduced and foraging quality may diminish.

Effects Analysis – Alternative B – Proposed Action

American Peregrine Falcon

Nesting habitats are not likely to be impacted by activities under the proposed action because peregrine falcons prefer nest sites located high in cliff faces that are inaccessible to livestock. There could be minor indirect impacts through modification of foraging habitat and disturbance to prey species. Peregrine falcons feed almost exclusively on birds but do not depend entirely on one small group of birds. The Bar X Allotment and Driveway have foraging habitat (ponderosa pine, mixed conifer, pinyon-juniper, and grasslands) that contain commonly taken prey species such as jays, woodpeckers, mourning doves, band-tailed pigeons, flickers and various songbirds. It is reasonable to expect that the proposed action will provide and maintain satisfactory vegetation, watershed (riparian), and soil condition. Conservation measures under the proposed action will minimize any indirect impacts to foraging peregrines and their prey species. Any disturbance to prey species will be short in duration and minimized by use of a rotational grazing systems and conservative utilization levels which would allow habitats used by prey species the opportunity for growth or regrowth.

There may be human disturbance during routine livestock operations but this disturbance will be extremely localized and short in duration. Activities under the proposed action such as maintenance or development of waters and fences will have minimal impacts on nesting American peregrine falcons given they nest on cliff faces where these improvements are not located. New water developments would not be constructed at any special status (federally listed or Forest Service sensitive species (species of conservation concern) or species occupied site or protected habitat or constructed during sensitive breeding seasons where the action can disrupt breeding behavior or recruitment. Tank cleaning or creation usually takes no more than two days and depending on distance and terrain while fence maintenance and creation can take up to two weeks (Kelly Bedson, personal communication, September 2017)

Determination

We have determined that the proposed action may temporarily impact individuals but is not likely to result in federal listing or loss of viability American peregrine falcon.

Northern Goshawk

We anticipate presence of livestock will have no direct effects to goshawks or key habitat features like snags, downed logs, and high canopy cover. Indirect effects from livestock grazing can cause a loss of habitat or habitat quality for northern goshawk prey (ground dwelling small mammals and birds). When rodent prey decreases in response to reduced vegetative cover, their avian predators decrease as well (Bock et al. 1993). Livestock grazing can directly impact rodents by trampling and collapsing burrows or compacting soils which hinders burrow construction, and by removing rodent food sources such as seed heads (Heske and Campbell 1991; Hayward et al. 1997; Adler and Lauenroth 2000). Avian prey species are also indirectly affected by impacts grazing has on vegetation (Bock et. al. 1993). Livestock can reduce

forage production which reduces litter production, increases soil compaction, and reduces infiltration. These changes to the soil, and consequently the vegetation, may affect breeding birds (goshawk prey), especially those that depend on dense herbaceous ground cover (Saab et al. 1995). A reduction in herbaceous vegetation can lead to an increased chance for nest predation, nest parasitism, exposure to elements, and ultimately nest failure. Timing of grazing and rotational grazing management descried throughout this document will minimize effects to herbaceous height and cover for prey species. These grazing practices allow for herbaceous plant growth and recovery to occur under favorable climatic conditions as livestock are moved between pastures. Additionally, grazing intensity on summer or winter range browse species would be managed up to moderate levels (30-50% utilization). Herbaceous utilization would be managed at conservative levels (30-40%). Management at these levels would provide sufficient herbaceous forage and hiding cover for rodents and ground dwelling birds and to maintain soil conditions. Thus, we do not anticipate any long-term effects to the potential habitat for this species or its prey.

Activities under the proposed action such as maintenance or development of waters and fences will have minimal impacts on nesting northern goshawks. Of the two known goshawk areas in the project area, no existing pasture fences run through the PFAs. Further, any existing fence is more than one quarter mile away from one of the two PFA boundaries; existing fence does abut to two isolated areas of the second PFA. Under the proposed action, new construction of waters will not occur inside of PFAs. There are no existing or proposed water developments in with PFA.

Determination

We have determined that the proposed action may impact individuals but is not likely to result in federal listing or loss of viability to the northern goshawk.

Aquatic Species

Both desert suckers and chub are known to occur within deeper, perennial sections of Spring Creek, Rock Creek, and Cherry Creek and of the two, only suckers have been reported in Haigler Creek. Desert suckers and chub have persisted within these riparian habitats with past grazing pressure. Potential threats related to the action include direct harm through trampling leopard frog egg masses or spawning habitats and trampling of larvae and juvenile fish or frogs; damage to riparian vegetation resulting in increased water temperatures, sedimentation, and reduced channel stability; and flow diversion or withdrawals for watering within the occupied watersheds. Management approaches under the proposed action are anticipated to provide protections for aquatic species and their habitats (both occupied and unoccupied). Cattle stocking rates are determined by annual utilization monitoring that is based on standards and guidelines developed to protect sensitive riparian vegetation, soils, protected species, and reduce grazing impacts to perennial waters and water quality (Tonto National Forest, Forest plan 1985, FSH 2209.13). The proposed action includes monitoring of grazing vegetation utilization within riparian areas as well as soil, watershed, and water quality impacts. Annual monitoring ensures that these standards are not exceeded and annual operating instructions provide for appropriate rest-rotation schedules to adaptively manage and respond to changing climate and range conditions that may affect sensitive species and their habitats.

Part of the proposed action includes addition of range improvements, such as off channel water developments or fencing that reduces the need for cattle to access sensitive riparian areas and watersheds, thus further protecting aquatic species habitats. Activities under the proposed action such

as maintenance or development of waters and fences will have minimal impacts on native fishes and amphibians. New water developments would not be built within 400 feet of perennial streams. New spring developments would be constructed with the spring box designed so that residual flow is left at spring head to prevent dewatering. It is unlikely that heavy equipment would cross perennial waters unless traveling on an existing road bed.

Improvements like construction of new water sites or cleaning of existing tanks described above in the proposed action can have beneficial effects to native aquatic species by creating new suitable habitat and securing perennial water necessary for breeding, especially for amphibians. These improvements can also facilitate dispersal and support and strengthen metapopulation dynamics of frogs. Concern when creating new water sites is that they can sometimes create suitable habitat for nonnatives like bullfrogs and crayfish. New tank locations will be selected by Range and Wildlife staff in coordination with the permittee to ensure tanks will not be colonized by nonnative species. Ongoing amphibian surveys will aid in discovering new bullfrog populations that may become established over the course of the project and all new waters will received protocol surveys twice annually. Even though there are no known extant populations of Lowland leopard frogs in the project area, overtime, it may be possible for frogs from adjacent habitats to disperse into the project area. Similar to the effect's analysis for the Chiricahua leopard frog, we anticipate routine tank maintenance to have little negative impact to the lowland leopard frogs if populations become established on Bar X Allotment or Driveway. Typically, tanks are cleaned every 10-15 years if water permanency at the site is unstable.

Determination

We have determined that the proposed action may impact individuals but is not likely to result in federal listing or loss of viability to the desert sucker, roundtail / headwater chub, and Lowland leopard frog.

Net-wing Midge

It is possible that the net-wing midge inhabits perennial waters within the analysis area. According to geospatial stream data edited by several Arizona agencies since 1988, there are seven prominent perennial streams within the Bar X and Driveway boundaries; Haigler Creek, Spring Creek, Rock Creek, Canyon Creek, Cherry Creek, Gordon Canyon Creek, and Walnut Creek. Increases in sedimentation caused by livestock is a concern because it may impact aquatic invertebrates. There is large variability and uncertainty in data available from research describing the effects of sedimentation on aquatic invertebrates. Exposed respiratory organs of benthic invertebrates can be damaged as sediments move through the water channel and some aquatic invertebrates may become more susceptible to predation through dislodgement. Sediment can also increase invertebrate drift, clog feeding structures, and reduce feeding efficiency of aquatic invertebrates. (Bilotta and Brazier 2008). Sediment transport is a natural function of perennial, intermittent or ephemeral waters but it is reasonable to believe that livestock could increase sedimentation beyond what is natural in the system. It is difficult to predict whether sedimentation caused by livestock will cause decreases in invertebrates because there are multiple factors that influence the effect sedimentation has on aquatic biota. These factors include the concentration of suspended solids, the duration of exposure to suspended solid concentrations, chemical composition, and the particle size distribution of suspended solids. Under the proposed action, measures and strategies are in place to minimize sedimentation wherever possible and livestock will typically have access to pastures with riparian areas for short durations (1 to 2 months). Conservative to

moderate utilization guidelines described in the proposed action on key species follow utilization guidance recommended in *Range Management Principles and Practices (Sixth Edition)* for grazing range types (semiarid grassland and shrub, oak woodland-Juniper, pine forest) within the Bar X Allotment and Driveway. These recommendations are based off carefully analyzed available research and allow for maintenance and recovery of plants, aid in soil stability and protects streamside banks from increased erosion. Utilization limits for herbaceous riparian vegetation are intended to protect plant vigor and provide physical protection of streambanks (Holechek 2011). In addition to monitoring techniques described under the proposed action, utilization of deer grass will be monitored because it is the most common obligate, riparian, native, perennial grass on the Tonto National Forest. 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). Not all sedimentation caused by livestock can be mitigated, however, utilization guidelines and both riparian and upland monitoring are in place to ensure sedimentation does not significantly impact perennial streams or aquatic invertebrates. Other measures to reduce soil erosion include rest-rotation practices, supplement strategies, and use of adaptive management.

Determination

We have determined that the proposed action may impact individuals but is not likely to result in federal listing or loss of viability for the net-wing midge.

Bat Species

There are no known caves, maternity roosts, or bat colonies within the project area but it is reasonably to believe that bats are using the project area for a variety of life history needs. Based on roost selection by Allen's lappet browed bat, spotted bats, and western red bats, we anticipate direct impacts caused by the presence of livestock to only affect western red bats on rare occasions. Most Lasiurine bats typically roost 15 to 19 meters above the ground in the overstory canopy of trees (Perry 2012). Although not documented in Western red bats, Eastern red bats have been observed hibernating among leaf litter during below freezing events (Mormann, et al. 2004). It is reasonable to believe that western red bats may behave similarly, and if so, on rare occurrence, livestock may inadvertently trample an individual western red bat in torpor.

Disturbance to western red bats, Allen's lappet-browed bats, and spotted bats (if present in the project area) may occur when noise from range activities such as personnel and vehicles are present or mechanized equipment are in use within close enough proximity to roost locations. Noise disturbance at certain intensities can disturb bats in their roosts and result in premature exiting or unnecessary arousal from hibernation. Since hibernating bats often have only enough fat reserve to bring them out of hibernation once, disturbance during the winter can trigger bats to arouse from hibernation, only to resume hibernation without enough fat reserves to come back out in the spring. Noise disturbance of long duration can cause temporary or permanent roost abandonment. We expect these types of disturbances to be reduced for Allen's lappet-brown bats and spotted bats given they primarily roost in abandoned mines, cliff crevices or caves which livestock cannot readily access and improvements are not likely to occur. Further, noise disturbance will be reduced for western red bats because new waters will not be placed within 400 feet of a riparian areas. Activities under the proposed action such as

maintenance or development of waters and fences would occur during the day when bats are likely to be in day time roosts and often times are not constructed in rugged and steep, cliffed areas. Tank cleaning or creation usually takes no more than two days and depending on distance and terrain, fence maintenance and creation can take up to two weeks (Kelly Bedson, personal communication, September 2017). New waters will benefit this species for both foraging and providing more sources for drinking.

Negative impacts to water quality in stock tanks could potentially occur reducing habitat quality for macro-invertebrates that the bats prey on. These potential effects to vegetation and water quality would be managed by limiting the length of grazing of a pasture in a given year, using a rotational grazing management system, managing grazing intensity at conservative levels and forage utilization at conservative levels (30-40%).

Livestock grazing and the subsequent reduction in host plants can negatively affect insects that insectivorous bats eat. Aboveground macroarthropods (insects and arachnids) experienced large decreases with moderate or heavy grazing, but conversely with light grazing showed slight increases (Milchunas et al. 1998). On the other hand, beneficial impacts would be expected through maintenance of existing structural improvements like stock tanks and drinkers with wildlife ramps. This maintenance would improve or maintain available waters on the allotment, which provides drinking water and forage areas for bats. The western red bat and spotted bat feeds mostly on moths (Adams 2003) however, Allen's lappet browed bat forages on small moths, but among other insects, feeds on dung beetles. Dung beetles are associated with cattle dung and their presence will be an additional food source to Allen's lappet browed bat.

Determination

We have determined that the proposed action may impact individuals but is not likely to result in federal listing or loss of viability to the western red bat, Allen's lappet-browed bat, and spotted bat.

Riparian Obligate Plants

Grazing by both livestock and wildlife was identified as a primary threat to Blumer's dock. Direct grazing and trampling have been documented at two sites on the Coronado National Forest and to a lesser degree on the Tonto National Forests (Harris and Gobar 1993). If Blumer's dock or Sierra Ancha fleabane are present where livestock graze, these species could be directly affected by grazing or trampling. When grazed, Blumer's dock has been shown to exhibit reduced vigor and abundance as well as inhibited seed production (Brooks 1999). Direct disturbance to either species would be reduced if present in Haigler Creek because various segments encompassing three miles of the creek are inaccessible to livestock. Under the proposed action, utilization guidelines and livestock stocking rates are determined by annual utilization monitoring that is based on standards and guidelines developed to protect sensitive riparian vegetation, which will minimize impacts to this species (Tonto National Forest, Forest plan 1985, FSH 2209.13). Utilization guidelines under the proposed action are based off carefully analyzed available research and allow for maintenance and recovery of plants, aid in soil stability and protects streamside banks from increased erosion.

Activities under the proposed action such as maintenance or development of waters and fences will have minimal impacts on Blumer's dock or Sierra Ancha fleabane. New waters would not be built within 400 feet of perennial streams. New spring developments would be constructed with the spring box designed so that residual flow is left at spring head to prevent dewatering. It is unlikely that heavy

equipment would cross perennial waters unless traveling on an existing road bed. Location selection of new waters will be made by the District Wildlife Biologist and Range staff in coordination with the permitee and sites will be surveyed for sensitive plants prior to implementation.

Determination

We have determined that the proposed action may impact individuals but is not likely to result in federal listing or loss of viability to Blumer's dock and Sierra Ancha fleabane.

Senator Mine Alumroot

Impacts may potentially occur to any individuals of this species growing in the project area. Although the species can be found in rocky terrain less accessible to livestock, suitable habitat also exists in forested riparian and upland areas where livestock grazing is expected. Direct effects include trampling of plants if present. Livestock grazing may indirectly impact this species if present by degrading or altering potential habitat as a result of soil compaction, erosion, increased water runoff and decreased water infiltration. Additionally, disturbed areas may precipitate the introduction and spread of invasive species which could compete with the alumroot for resources. The proposed action includes adaptive management and rest rotation of pastures which will help mitigate adverse impacts to this species if present within the project area. Best management practices for range will decrease the likelihood of long-term impacts to this species. Activities under the proposed action such as maintenance or development of waters and fences will have minimal impacts on Senator Mine alumroot. Heavy equipment used to repair or create waters or fences are likely to stick to existing roads or two-tracks. Location selection of new waters will be made by the District Wildlife Biologist and Range staff in coordination with the permitee and sites will be surveyed for sensitive plants prior to implementation.

Determination

We have determined that the proposed action may impact individuals but is not likely to result in federal listing or loss of viability to Senator Mine Alumroot.

Tonto Basin Agave

Potential direct impacts to this species are not likely because the species is not known to occur within the analysis area. If the species is found to occur, Tonto Basin agave specimens present within the project area may be directly affected by trampling. The incidence for disturbance or mortality is likely higher for agave pups on the exterior of clumps compared to individuals within the center. Also, for these reasons, larger clumps or clonal groups may be more protected from livestock disturbance (personal communication; R. Madera, 2018).

Indirect impacts on potential habitat for Tonto Basin agave include livestock disturbances to soils from vehicles and heavy equipment, installation and maintenance of fences and human-made water sources. Heavy equipment used to repair or create waters or fences are likely to stick to existing roads or two-tracks. Location selection of new waters will be made by the District Wildlife Biologist and Range staff in coordination with the permitee and sites will be surveyed for sensitive plants prior to implementation.

Determination

We have determined that the proposed action may impact but is not likely to result in federal listing or loss of viability to Tonto Basin Agave.

Bald and Golden Eagle Protection Act

Affected Environment

Bald Eagle

Bald eagles inhabit coastal areas, estuaries, unfrozen inland waters, and some arid areas of the western interior and southwestern portion of the U.S. They like areas with high water-to-land edge, and areas with unimpeded views including both horizontal and vertical aspects. Areas selected for as wintering habitat will have an adequate food supply, and have open water such as river rapids, impoundments, dam spillways, lakes, and estuaries.

Bald eagles will use guard and foraging perches for loafing. Communal roosts are common in the winter and found in areas that provide protection from adverse weather conditions and may be comprised of several individuals. These include sheltered valleys, forested bottomlands, and coniferous trees.

Breeding habitat of bald eagles in central Arizona occurs mainly within two of the biotic life zones described by C.H. Merriam (1890-1910: in Lowe 1976 and in Hildebrandt 1981): Lower and Upper Sonoran life zones. There are no known breeding or wintering populations of bald eagles within the project area. The lack of breeding observations is likely due to absence of suitable foraging areas close to large bodies of water with adequate food supply. The closest breeding pair to the project area was discovered in 2018, near Canyon Creek but the nesting attempt was not successful. A second and productive breeding pair occurs near Woods Canyon Lake above the Mogollon Rim. The closest winter population is approximately two miles north of the project acre near Willow Springs Lake.

Golden Eagle

Golden eagles are usually found in open country, in prairies, arctic and alpine tundra, open wooded country and barren areas, especially in hilly or mountainous regions. They nest on rock ledges, cliffs or in large trees. The pair may have several alternate nests and they may use the same nests in consecutive years or shift to alternate nest used in different years. In Arizona they are found in mountainous areas and are virtually vacant after breeding in some desert areas.

There are five known golden eagle breeding observations inside the project area and directly adjacent. Specific timing information about egg laying and fledging time frames for these nest sites is unknown, however, statewide surveys can be used to determine the most sensitive times for these birds. From 2011 to 2014, the Arizona Game and Fish Department conducted statewide aerial occupancy and nest survey efforts for cliff-nesting golden eagles (McCarty and Jacobson 2011, 2012; McCarty et al. 2013, 2014). Specific to golden eagle, and based on 2015-2017 data collected during these surveys, the statewide average for egg-laying was February 18 (range January 25 to March 14), average for hatch date was April 4 (range March 11 to April 28), and average fledging was June 13 (range May 20 to July 7). Other sensitive times for golden eagles includes the period prior to egg-laying when adults are nest-building, copulating and the post-fledge period, normally 4-6 weeks after fledging. (Personal communication, K. McCarty 2018, McCarty et al. 2017).

Table 26: Golden Eagle Occupancy and Nest Survey Data

Locality	First Observation	Last Observation	Source	Observation Type	Site Notes
Pleasant Valley: Walnut Creek	4/11/2014	6/16/2014	AGFD/USFS	Breeding	N/A
Green Valley: W of Fuller Mesa	5/23/1998	5/20/2000	USFS/AGFD	Breeding	Historic site not occupied in over 10 years.
Pleasant Valley: Walnut Creek (Spring Creek 6NE039).	4/23/2013	4/23/2013	AGFD/USFS	Observation/ Breeding	Four cliff nests associated with the territory. Nest failed in 2014 and inactive in 2016.
Pleasant Valley: Buzzard Roost Mesa	3/5/2014	4/11/2014	AGFD/USFS	Breeding	N/A
Tonto Creek: Big Ridge	5/21/2013	6/14/2016	AGFD/USFS	Observation/ Breeding	N/A

Effects Analysis - Alternative A – No Grazing

See *Effects Analysis* - Alternative A – No Grazing under Forest Service Sensitive Wildlife, Plants, and Fish.

Effects Analysis - Alternative B – Proposed Action

There are at least five known breeding areas for golden eagles within or directly adjacent to the project area one new pair of bald eagles. Resource protection measures will be used to minimize or avoid “take” when implementing the proposed action. This will include annual coordination between the Tonto National Forest, the US Fish and Wildlife Service, and the Arizona Game and Fish Department to review occupied bald and golden eagle nest sites and assess the appropriate design features and resource protection measures for avoiding disturbance and take. This coordination effort will include reviewing at least five known golden eagle nests sites and one bald eagle nest site. Topography, vegetation, and current on-going baseline activities would be assessed to adjust nest buffers to account for ongoing activities, avoid disturbance impacts from new activities, and ensure compliance with the law.

We do not anticipate any impacts to nesting eagles or productivity because range management activities within one mile of nest sites will not occur during the breeding season (January 1 to July 31st) unless the District Wildlife Biologist, U.S. Fish and Wildlife Service, and Arizona Game and Fish Department confirm 1) inactivity/non-nesting, 2) nest failure or 3) that impacts from activities would not result in loss of productivity or eagle survival. Additionally, range management actions near golden or bald eagle nest trees and/or cliff platforms would be designed to protect eagles from disturbance. Spatial and temporal buffers for the breeding season (January 1st to July 31th) will be determined on a site-specific and annual basis in coordination with U.S. Fish and Wildlife Service and Arizona Game and Fish Department.

New construction or maintenance of fence or water developments will not occur within one mile of an occupied bald or golden eagle nest during the breeding season (January 1st to July 31th) unless the District Wildlife Biologist, Arizona Game and Fish Department and U.S. Fish and Wildlife Service determine that disturbance from the action will not cause injury, loss in productivity or cause nest

abandonment. These buffers and timing restrictions may be lessened or increased after consulting with Arizona Game and Fish Department and U.S. Fish and Wildlife Service on a case by case basis.

Although we do not anticipate impacts to nesting birds, range management actions like construction of water developments or fence taking place in potential roost or foraging areas may cause a disturbance or disruption to eagles if present. This disruption can interfere with feeding and sheltering, thus reduce chances of survival and productivity (USFWS, 2007b). There may be disturbance to foraging birds during or outside the breeding season, but impacts are expected to be short in duration since tank cleaning or creation normally takes no more than two days and fence repair no more than three days (Kelly Bedson, personal communication, September 2017).

Determination: We have determined that the proposed action will not violate the Bald and Golden Eagle Protection Act for the following reasons.

- Range management activities near golden or bald eagle nest sites would be designed to protect them from disturbance. Spatial and temporal buffers for the breading season (January 1st to July 31th) will be determined on a site-specific and annual basis in coordination with U.S. Fish and Wildlife Service and Arizona Game and Fish Department.
- The Forest Service will coordinate with U.S. Fish and Wildlife Service and Arizona Game and Fish Department to ensure that golden and bald eagle nest location data are updated annually or as new data are collected.
- Range management activities (significant human activity) will not occur within one mile of an occupied golden or bald eagle nest during the breeding season (January 1st to July 31th) unless the District Wildlife Biologist, Arizona Game and Fish Department and U.S. Fish and Wildlife Service determine that disturbance from the action will not cause injury, loss in productivity or cause nest abandonment. These buffers and timing restrictions may be lessened or increased after consulting with Arizona Game and Fish Department and U.S. Fish and Wildlife Service on a case by case basis.

General Wildlife, Management Indicator Species, and Migratory Birds

Affected Environment

General Wildlife

The project falls entirely within Game Management Unit 23 and hunting of these species is a popular activity that occurs throughout the project area. Big game in the area include black bear, elk, mule deer, whitetail deer, javelina, Merriam's turkey and mountain lion. Elk herds in the project area have remained stable despite drought over recent years and are high in Canyon Creek, Colcord Mountains, Naegelin Canyon, Turkey Peak and Christopher Mountain. Whitetail deer numbers are improving within the project area and can be found in most drainages. Within the project area, mule deer tend to inhabit isolated areas along Naegelin Canyon and Valentine Ridge. Javelina can be found throughout the project area but are more prevalent in the lower elevations. Mountain lions and black bears are abundant throughout unit 23 showing no preference for the area within the Bar X Allotment and Driveway. Similar to other game species, turkey populations within the project area are stable with many observations in Naegelin Canyon, Canyon Creek, Colcord Mountain, Turkey Peak and Christopher Mountain. (Dave Daniels, personal communication, 2019).

Game birds and small game found in the project area include quail, band-tailed pigeon, mourning dove, white-winged dove, cottontail rabbits, black tailed jackrabbits and tree squirrels. Most small game populations rely heavily on rainfall and populations can fluctuate annually. Populations of small game are currently stable with no concerns. Predators such as coyotes and grey fox are common in the project area and bobcats are less frequently observed (Dave Daniels, personal communication, 2018). Non-game species include a large variety of birds, mammals, reptiles and amphibians.

Management Indicator Species

Management indicators species (MIS) are identified in the Land and Management Plan for the Tonto National Forest. Management indicator species are addressed in order to implement National Forest Management Act (NFMA) regulations. They are selected because their population changes are believed to indicate the effects of management activities (36 CFR 219.19(a)(1). The MIS approach is designed to function as a means to provide insight into effects of forest management on plant and animal communities. Species are selected to represent several categories, such as commonly hunted or fished species, non-game and threatened and endangered species (TES). They may be used as a tool for assessing changes in specialized habitats, formulating habitat objectives, and establishing standards and guidelines to provide for a diversity of wildlife, fish, and plant habitats.

To evaluate potential effects of a project on MIS, only those species with habitats identified in the project area and that could be affected by the proposed action have to be addressed. In order for a trend in MIS habitat to occur, the proposed action must result in a change to the vegetation (or vegetative feature) that the MIS represents. Simply implementing the proposed action within a vegetation type, without changing the vegetative structure would not necessarily result in discernable changes to habitat trend. Species where this is the case will be excluded from further analysis. Fifteen of the 30 MIS species that have habitat in the project area were omitted due to lack of effects on habitat components they are indicators of. For example, we do not anticipate the proposed action to impact vertical diversity, snags, old-growth ponderosa pine, cavity nest habitat, general ponderosa pine forest condition, successional stages of ponderosa pine, tree density, successional stage of pinyon – juniper, juniper berry production, and vegetation aspect. Further, due to a lack of desert grassland, desertscrub, and low elevation riparian habitat, an additional eight MIS associated with these habitats were excluded. Table 27 contains seven MIS included in this analysis and the reason for selection. All selected MIS species occur and range far beyond a local scale such as a project analysis area. These species were selected based upon their associations with the habitat present in the project area and their suitability as indicators of habitat changes brought about by the proposed action. Discussion on Management Indicator Species can be found in the Wildlife Specialist Report located in the project record.

Table 27: Tonto National Forest MIS Selected for the Bar X Allotment and Driveway

Habitat Type	Reason for Selection
Pinyon/Juniper Woodland	
Ash-throated flycatcher	Ground cover
Chaparral	
Spotted towhee	Shrub density
Black-chinned sparrow	Shrub density

Habitat Type	Reason for Selection
Riparian (high and low)	
Black hawk	Riparian streamside
Western wood pewee	Medium overstory
Arizona gray squirrel	General riparian
Aquatic	
Macro-invertebrates	Water quality and fisheries habitat

Migratory Birds and Important Birding Areas

Executive Order 13186, January 10, 2001, directs federal agencies to support migratory bird conservation and to "ensure environmental review processes evaluate the effects of actions and agency plans on migratory birds, with emphasis on species of concern". A Migratory Bird Treaty Act Analysis was included in the Wildlife Specialist Report and is available in the project record. Of the 40 migratory birds that may occur on Tonto National Forest, 25 were analyzed based on vegetation communities present on the Bar X Allotment and Driveway. Those species include Cordilleran flycatcher, olive-sided flycatcher, Northern goshawk, golden-crowned kinglet, flammulated owl, Mexican spotted owl, band-tailed pigeon, red-naped, sapsucker, red-faced warbler, McGillivray's flycatcher, Grace's warbler, olive warbler, Lewis's woodpecker, golden eagle, peregrine falcon, bald eagle, gray flycatcher, pinyon jay, juniper titmouse, gray vireo, black-throated gray warbler, black-chinned sparrow, northern beardless tyrannulet, common black hawk, and yellow warbler.

The Important Bird Areas Program (IBA) is a global effort to identify and conserve areas that are vital to birds and other biodiversity. These IBAs are sites that provide essential habitat for one or more species of bird, including sites for breeding, wintering, and/or migrating birds. There are no designated IBAs within the project area. The closest designated IBA is over six miles from the project area. The Mogollon Rim Snow Melt Draws state ranked IBA encompasses drainages in close proximity to the edge of the Rim where an increase of precipitation is expected due to the air currents along the cliffs. This IBA includes Ponderosa pine, white fir, Douglas fir, southwestern white pine, quaking aspen, and Gambel oak.

Effects Analysis - Alternative A - No Grazing

General Wildlife

With the removal of grazing from the landscape, a vegetation response is expected, with more forage available for wildlife. However, there are many other factors that contribute to the changes in a plant and grass community.

It is expected that herbaceous plant vigor and diversity in upland key areas, overall watershed, and soil conditions across the project area would continue to improve or remain stable. Specific to aquatic biological resources, the no-action alternative would likely maintain or improve riparian conditions on all riparian areas not currently seasonally restricted or excluded from livestock use. Riparian areas in proper functioning condition would remain in proper functioning condition, assuming the absence of natural events such as flooding and wildfire. Riparian reaches currently impacted by grazing would see improvements with the absence of future grazing. Within portions of the functioning at risk reaches

there would be less utilization of riparian species with an increase in both species composition and vigor. The spatial and temporal extent of natural surface waters would likely increase in some areas (for example, developed springs) since water withdrawals specific to livestock grazing would not occur. In addition, soil compaction from historic and current livestock grazing would likely decrease over time. 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 Bar X Allotment and Driveway.

Any livestock competition with wildlife would be eliminated under this alternative and reduce the likelihood of game species avoiding livestock congregation areas. Upland habitat for game species such as deer, elk, bear, and javelina would generally increase in vigor and density. Small game and non-game species would generally increase over time with a rise in herbaceous cover and probable increase in grass species diversity.

In general, livestock permittees are responsible for developing and maintaining water improvements. Under alternative A, improvements contributing to resource protection or enhancement, such as water developments important for wildlife, would be maintained where feasible using other Forest Service program funds, but many water developments may not be maintained. Developments such as dirt stock tanks, developed springs, and troughs are important habitats for several amphibian species in the project area. A negative effect of alternative A to wildlife would be the removal or lack of maintenance of these water developments. Wildlife, particularly frogs and other aquatic species that have benefitted from these developments could be forced to move to other areas. It is possible that metapopulation dynamics of amphibian populations may be disrupted or become less stable if once permanent water sources become ephemeral due to lack of maintenance. In addition to providing habitat for aquatic species, these developments provide water for terrestrial wildlife and more importantly, increase livestock distribution across the landscape. There is some criticism that man-made water developments in the arid southwest may not be as beneficial to wildlife and at times, have adverse effects by attracting predators, direct mortality, increasing competition or causing health issues from poor water quality. An extensive literature review summarized that the following species/populations rely on or benefit from water developments: Merriam's turkey, some populations of desert sheep, elk, mule deer, white-tailed deer, bats, birds (raptors, shorebirds, passerines, waterfowl), and herpetofauna like turtles, gartersnakes and numerous amphibians (Rosenstock et al. 1999).

Management Indicator Species

Under Alternative A, there would be no livestock grazing or construction and maintenance of structural range improvements in mixed conifer, ponderosa pine habitats, pinyon juniper woodland, chaparral, or juniper grassland habitats. With the elimination of livestock, there would be no impact to key habitat components of MIS. Trampling of herbaceous cover from grazing would be reduced and the quality of forage for MIS or their prey is expected to remain stable or potentially improve during periods of favorable climatic conditions. Improvement in soil and vegetation conditions would benefit wildlife habitat in all vegetation types. 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 restricted or excluded.

It is expected there would be reduced maintenance of the existing improvements and result in a lack of surface water. This could reduce the amount of aquatic macroinvertebrates and areas where MIS find reliable water.

Determination

Under this alternative, key habitat components of management indicator species described above would not be impacted. Therefore, there would be no Forest-wide vegetation alteration or change in population trend.

Migratory Birds and Important Bird Areas

Under alternative A, there would be no livestock grazing or construction and maintenance of structural range improvements in mixed conifer, ponderosa pine habitats, pinyon juniper woodland, chaparral, or juniper grassland habitats. Since there would be no short duration noise disturbance or competition with livestock for spring forage or reductions in the herbaceous cover from grazing or trampling, the quality of forage ad cover for birds would be expected to remain stable or potentially improve during periods of favorable climatic conditions. Conversely, operation and maintenance of existing structural range improvements would not occur under alternative A. This would result in a long-term loss of water as stock ponds fill with sediment.

Determination

Alternative A would not result in unintentional take of individuals and would not lead to a decline in migratory bird populations.

Effects Analysis - Alternative B - Proposed Action

General Wildlife

Information on impacts of grazing on individual wildlife species in the southwest is lacking in scientific and government literature (USDA 2005). In the absence of scientific literature, information on life history, ecology and habitat selection can be used to understand effects. Wildlife in the project area may be affected by the proposed action, primarily during human activities related to range management actions. Implementation of conservation measures and riparian utilization guidelines are intended to reduce effects described below and maintain or increase existing riparian and upland vegetation.

Human Disturbance

Activities associated with the management of the Bar X Allotment and Driveway include permitted livestock grazing, actions related to the movement of livestock, and construction and maintenance of infrastructure such as stock tanks, pasture and boundary fences, and cattle guards. These activities can directly affect wildlife species when ranch employees, vehicles, livestock and dogs disturb individuals that are present in the allotment. Most bird, mammal, reptile and aerial invertebrate species are mobile and are capable of dispersing from disturbance. However, disturbance that is frequent or of long duration can result in the abandonment of an area by some wildlife species, which is equivalent to the loss of habitat. Individuals incapable of dispersal (nestlings or other young, terrestrial invertebrates) or individuals unwilling to disperse (adults with immobile young) can experience negative effects including trampling and crushing, collection and handling, increased physiological stress, flushing of birds from

incubating eggs thus increasing potential for eggs to become unviable, premature fledging of young from nests and increased potential for predation. Long duration noise disturbance can cause temporary or permanent abandonment of nests, roosts and dens.

For bats, high intensity noise disturbance (e.g. chainsaws used for logging/fuelwood cutting) can result in premature exiting of roosts or unnecessary arousal from hibernation. Since hibernating bats often have only enough fat reserve to bring themselves out of hibernation once, disturbance during the winter can leave bats with insufficient fat reserves to come out of hibernation a second time in the spring.

Water Developments

There will be an overall net benefit to aquatic and terrestrial wildlife from the creation or maintenance of water developments. Creation or maintenance of water developments may indirectly cause noise disturbance and wildlife avoidance during construction or cleaning but this impact will be short in duration this work takes 1-2 days. Although some believe that water developments increase predator – prey interactions, data is anecdotal and little scientific information exists on predator abundance and predation rates at water developments (Rosenstock et al., 1999). Above ground troughs will be fitted with wildlife ramps to allow for egress and ingress and reduce direct mortality of birds, small mammals and herpetofauna.

Fencing

Fencing is generally intended to restrict movement of livestock, but incidentally may impede wildlife access to critical resources (e.g. water, forage, fawning grounds, cover) or restrict escape or migratory routes essential to the wellbeing of individuals and populations. Impacts can vary based on the animal's age, season, and resource availability. The impact of a fence design on a species is largely determined by the animal's agility and behavior (AZGFD, 2011). Fencing can also be of concern for wildlife as they can become entangled or impaled on fencing materials. Existing fencing will be maintained to ensure cattle stay in scheduled areas. New fencing would follow the wildlife guidelines in the Forest Plan to avoid and minimize these impacts to wildlife.

Birds

Birds are affected by the impacts grazing has on vegetation (Saab et al., 1995). Domestic and wild ungulates reduce forage production, which in turn may reduce litter production, increase soil compaction, and reduce infiltration. These changes to the soil and consequently the vegetation can lead to negative effects for some breeding birds such as those that require dense herbaceous ground cover for nesting and/or foraging. During the breeding season, grazing can reduce herbaceous vegetation necessary for concealing nests of ground nesters, resulting in an increased risk of nest predation, nest parasitism, exposure to elements, and ultimately nest failure.

Small Mammals

Grazing can affect wildlife by affecting their prey. Small mammal prey is important for many species of higher trophic levels, including raptors, carnivorous mammals, snakes, and avian predators (Hayward et al., 1997; Saab et al., 1995). When rodent prey decrease in response to reduced vegetative cover, so do avian predators. Grazing can directly affect rodents by trampling and collapsing burrows, compacting soils, which hinders burrow construction, and removing rodent food sources such as seed heads (Hayward et al., 1997; Adler and Lauenroth, 2000). In a study by Adler and Lauenroth (2000), rodent burrow densities were higher in ungrazed plots when compared to grazed plots.

Numerous other studies have found the abundance of rodents is higher in ungrazed and lightly grazed areas than in moderately to heavily grazed areas (Jones and Longland, 1999; Reynolds and Trost, 1980). Indirect effects of grazing on rodents can occur when grazing changes the composition (Heske and Campbell, 1991; Hayward et al., 1997) and structure of vegetative species (Jones and Longland, 1999; Hayward et al., 1997; Adler and Lauenroth, 2000). Hayward et al. (1997) found that in southwestern riparian areas where livestock grazing was excluded there were 50 percent more small mammals when compared to areas with livestock grazing. Variations in intensity of grazing can also affect the distribution of small mammals. Ward and Block (1995) found that heavier livestock grazing could favor conditions for deer mice as they are associated with areas of little herbaceous cover and extensive exposed soil. Whereas Mogollon voles use sites with greater herbaceous cover and less exposed ground, so are more likely to be associated with areas where no grazing or only light levels occur (Ward, 2001).

Big Game

The project area provides important foraging habitat for both wild and domestic ungulates. Expected interactions between cattle and wild ungulates include social, food, and space and in most cases, the more critical interaction is related to food. Conditions that must exist for forage competition among ungulates include 1) species use of the same area, 2) species use of the same forage plants, and 3) forage plants must be in short supply (Cole 1958; Holechek 1980).

Dietary overlap and feeding habitat use overlap are measures used to evaluate resource foraging differences between cattle and wild ungulates like elk, mule deer, and white tail deer. It is important to note that even though there may be resource use overlap by cattle, elk, and deer within the project area that competition should not automatically be assumed (Berg and Hudson 1982; Keddy 1989). Even when wild and domestic ungulates consume identical diets from within the same plant communities at the same time, the interaction is often unknown and can be either competitive, complementary, or neutral (Keddy 1989; Putman 1996).

When competition is present, livestock can affect wildlife habitat directly by removing or trampling vegetation used for food or cover. Indirect effects are less understood but can result in a change in vegetation composition. Although positive benefits to wildlife from managed grazing are more likely to occur in humid and wet rangelands, light to moderate managed grazing does not generally damage wildlife habitats even in arid areas (Holecheck, 2011). Competition between cattle and wild ungulates will be reduced or minimized because the proposed action limits the length of grazing of a pasture in a given year, uses a rotational grazing management system, and includes a set forage utilization guideline of conservative use (31-40%) utilization, including wildlife use, throughout all areas. Based on utilization levels and proposed range improvements, it is expected that 1) physiological growth requirements of forage plants would be favored in key areas, 2) forage production would be maintained in average precipitation years, and 3) plant forage densities would increase (Holecheck, 2011). Proposed water developments which are important for deer, elk and other wildlife would be maintained and help disperse both cattle and wild ungulates more evenly across the landscape.

Social interactions between wild ungulates and livestock are influenced by terrain, forage availability, water distribution, and vegetation structure. Studies have shown that wild ungulates like elk, white-tailed deer, mule deer, and bighorn sheep have a social avoidance to livestock. Although wild ungulates would likely prefer grazing in pastures with no livestock, this social aversion appears to be of minor importance provided stocking rates are light to moderate (Holecheck, 2011). Under the proposed action,

stocking rates are based upon conservative utilization levels, thus, stocking rates are classified as light to conservative. The exception to this is bighorn sheep; they tend to be intolerant of livestock and avoid areas completely. We do not anticipate conflict between cattle and bighorn sheep because bighorn sheep are extremely rare in the project area with very limited sightings and unsuitable habitat (J. McFarlin and D. Darveau, personal communication 2019).

Insects

Arthropods are also an important food for various species of mammals, birds, reptiles, amphibians, and other invertebrates. Decreases in vegetative cover and diversity could potentially affect the availability of prey for some birds and bats. The main impacts from livestock grazing to aquatic systems, riparian habitats, and their associated biota are in the form of indirect effects. These include increased sedimentation into stream channels; altered macroinvertebrate assemblages; lowering of groundwater tables and decreased perennial flows; increased stream temperature; larger peak flows; stock pond impacts; and changes in channel form (Belsky et al., 1999; Fleischner, 1994). Indirect effects to macroinvertebrates may affect those species that forage on these organisms including frogs, toads, gartersnakes, insectivorous birds (flycatchers, warblers, and others), some predatory birds (black-hawks, herons, kingfishers, and others) and mammals (bats, raccoons, river otters, and others).

Rare Plants

The grazing strategy and management, authorized utilization levels, and proposed range improvements were developed in order to provide for maintaining or improving upland and riparian conditions as well as soil conditions; all of which would benefit rare plant species. Prior to the installation of any of the proposed range developments (i.e. fencing, water developments), a site-specific survey would be conducted to determine if any rare plants are within the immediate area. If discovered, a biologist or botanist would determine if the species would be directly impacted by the project or indirectly through increased livestock use within an area. If determined that the effect would negatively affect a species, the proposed improvement location or design may be modified to mitigate deleterious effects.

Management Indicator Species

Key habitat components (KHCs) vary greatly between MIS. The proposed action is not expected to alter KHCs like secondary cavities, open habitats, dense stands of chaparral or brush, brush at 3-6 feet tall, isolated groves of mature broadleaf trees or oaks, downed logs, exposed or prominent rocks, and reliable fish supply. Several KHCs like ground cover, connected stands, and relative isolation will be impacted by the proposed action. Utilization guidelines are in place to ensure that ground cover recovers after rest. Small scale fragmentation may occur through the construction of water developments or corrals but this level of fragmentation will not alter forest wide habitat. Some MIS often select for areas free from frequent human disturbance. Human disturbance caused by construction or maintenance of range developments will be short in duration and small in scale. Further, conservation measures included in the proposed action are in place ensure that special status species are not impacted by human disturbance during breeding seasons. Water quality is a KHC for macro-invertebrates. Grazing strategies that disperse rather than concentrate livestock are in place to attract cattle away from streamside areas. These strategies include placing supplements, herding, creation of upland development, and location of pasture fences. Changes in livestock distribution will be based on utilization monitoring and resources condition with standards and guidelines developed to protect

sensitive riparian vegetation, soils, sensitive species, and reduce grazing impacts to perennial waters and water quality (TNF Forest plan 1985, FSH 2209.13). Overall, impacts to KHCs described above are not substantial enough to cause the alteration of forest wide vegetation types or populations trends of MIS.

Under the proposed action, conservation measures and adherence to riparian utilization guidelines are expected to improve habitat conditions for riparian (Bell's vireo, black hawk, Arizona gray squirrel) and aquatic species (macroinvertebrates). As described, the utilization levels on the key forage species in all key areas and adjacent areas on the allotments would be considered light to moderate grazing intensity, including wildlife use, throughout all areas. This would be accomplished through adaptive management practices. Based on these use prescriptions it is predicted that the physiological growth requirements of the forage plants would be favored in all key areas and adjacent areas on the allotments. With an improvement in soils and vegetation, upland wildlife habitat is expected to improve over time, although at a slower rate and to a lesser degree than the No Grazing alternative.

Determination

Based on the analysis above, impacts from the implementation of the alternative B would not alter Forest-wide habitat and population trends for any MIS described in Table 27.

Migratory Birds and Important Bird Areas

Livestock grazing and maintenance or creation of range improvements would be authorized under alternative B. The biggest concern for migrating birds from the proposed action come from noise disturbance, reduced available forage and herbaceous ground cover, and trampling of vegetation, nests, and even individuals.

Impacts to nesting birds from grazing may occur to those species that are ground nesters. Grazing may also reduce the amount of forage availability and herbaceous ground cover for many species of migratory birds. This includes seeds for forage, the insects that use herbaceous cover, and both hiding cover and nesting cover. Utilization guidelines in the proposed action would help maintain vegetation at sufficient levels to continue to provide for the various needs described above.

Maintenance of range improvements could have both negative and positive effects for migratory birds. Negative effects may occur as a result of noise and habitat disturbance for prey through maintenance of fences, earthen stock tanks and corrals. Construction of fences or permanent corrals could result in increased potential for bird injuries or mortalities. However, fences will not be built across waterbodies, thus reducing the potential for encounters. These new fences would minimize potential effects of livestock grazing on foraging habitats at these locations. Construction of water developments or fences could cause prey to temporarily avoid these areas and reduce foraging habitat quality through reduced herbaceous cover. Such disturbances are expected to be localized across the allotment at any given time and of short duration. The herbaceous community is expected to recover under favorable climactic conditions in one or two years. Positive effects are expected to occur from maintenance of earthen stock tanks, which provide water resources for migratory birds.

Reduced forage and trampling of nests or vegetation for nesting cover could result in unintentional take of individual migratory birds. These impacts are expected to be minimized by management actions such as limiting the length of grazing of a pasture in a given year, using rotational grazing management

system, managing grazing intensity at conservative to moderate levels, and forage utilization at conservative levels. Additionally, to reduce impacts to active migratory bird nests, a wildlife biologist may survey locations of new water developments should construction occur during the nesting season of any migratory bird described above.

Determination

Although the proposed action may result in unintentional take of individual migratory birds, it would not lead to a decline in migratory bird populations. There is no association or important link between the bird communities within the proposed project area and the Mogollon Rim and Snow Melt Draws IBA. Therefore, no IBAs are affected by this project.

Cumulative Effects to Endangered, Threatened, and Sensitive Wildlife, Plants and Fish Common to Both Alternatives.

Overview

Cumulative effects include the direct and indirect effects of each alternative when added to all past, present, and reasonably foreseeable future actions. Reasonably foreseeable future actions are those for which there are existing decisions, funding, formal proposals, or which are highly probable, based on known opportunities or trends.

Analysis Area and Time Frame

Within the project area, special status species discussed above are limited in extant to the project area due to fragmented or available suitable habitat or reliance on semi-aquatic or permanent aquatic habitats for natural history needs. Cumulative effects are limited to those populations as described above or at the 6th code watershed (12-digit Hydrologic Unit Code sub-watershed).

The timeframe for analysis of cumulative impacts is the past 10 years and the coming 10 years because that is the length of time the grazing permit would authorize grazing. After 10 years, the area would be evaluated again to determine if it is appropriate to renew the permit and what management changes may be necessary.

Potential Cumulative Impacts to the Wildlife, Fish and Plants

Past, present and reasonably foreseeable actions ongoing in the cumulative impact area for wildlife include the activities and actions of livestock grazing, planned and unplanned fire, road development and use, habitat restoration treatments, construction, and recreation use.

The cumulative effects to wildlife from these past, present, and reasonably foreseeable actions may include: vegetative alternation, habitat fragmentation, increased human disturbances and the anthropogenic effects on the landscape that alters and impacts the quality, quantity and use of habitat associated with local wildlife species that utilize the analysis area for breeding, nesting, foraging, year-round use and dispersal or migration.

Grazing

The Bar X Allotment and Driveway is adjacent to eleven other livestock grazing allotments, three of which are located on the Coconino National Forest and one on the Apache-Sitgreaves National Forest.

The eleven allotments include 13 Ranch, Christopher/Ellinwood, Marsh Creek, Diamond Butte, Potato Butte, Pleasant Valley, Gentry Mountain, Red Lake and OW. All of these allotments are grazed and vary from year-long grazing to summer grazing. Based on 6th code watershed overlap of adjacent allotments; 13 Ranch and Christopher/Ellinwood allotments may have cumulative downstream effects on stream channels or riparian areas within the Bar X Allotment and Driveway. These downstream effects will differ because of varying sizes of overlap in each watershed. 13 Ranch is primarily grazed in the summer and Christopher/Ellinwood has year-long grazing. One shared drainage within the two allotments feed into portions of the project area – Gordon Canyon. Cumulative watershed effects for these allotments are anticipated to be minimal in contrast to the size and complexity of the watersheds themselves. Both 13 Ranch and Christopher Mountain/Ellinwood allotments are being implemented based on environmental analysis, so additional impacts should be reduced given utilization standards and BMPs in place to minimize impacts to the land and therefore would not contribute to cumulative effects.

Road Development, Motorized Use and Recreation

Motorized and non-motorized 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 cause avoidance of the area due to dust, noise, 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 will generally be lower, impacts to wildlife will 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.

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 Bar X Allotment and Driveway, road maintenance affects to wildlife are expected to be minimal due to the infrequent maintenance cycle (annual) of Forest Service Roads. Well maintained roads prevent erosion, help to keep human traffic on established roads, and prevent vegetative growth on roadbeds. None of these actions would measurably influence the effects described in this analysis for the livestock grazing alternatives.

There are five developed campgrounds within the analysis area. In general, the presence of people and associated noise and disturbance of habitat in dispersed areas and on non-motorized trails has negative effects on wildlife. Impacts to wildlife may 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. 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. Recreation impacts, combined with effects of the proposed action may cause an increase in human and noise disturbance to wildlife, especially terrestrial species. To minimize impacts described above, the Tonto National Forest manages several programs and designated recreation areas within the project area. Day use sites Designated campsites aim to concentrate users and provide trash and bathroom facilities. Further, programs like Leave No Trace,

Pack it In – Pack It Out are in place to encourage users to remove their litter from the land and provide education on how recreational activities can impact nature. Given these resource protection measures and BPMs, impacts from recreation would not measurably influence the effects described in this assessment for livestock grazing alternatives.

Construction

There is one bridge construction project slated for implementation in 2019-2020 directly adjacent to the project boundary. This project will replace the Colcord Road Bridge (Structure #11465) due to the existing bridge being functionally obsolete. Replacing the existing bridge with a new, wider bridge meeting current standards and requirements will improve the driving experience for the motorist and reduce future maintenance costs. A temporary staging area and detour route will be constructed adjacent to Colcord Road. The project duration is anticipated to last approximately six months (November 2019 to April 2020); however, construction is only anticipated to last four months in the winter and spring of 2020 (estimated January to April 2020). Conservation measures minimizing impacts to wildlife and their habitats were built into the proposed action.

Habitat Restoration Projects

In 2017, Arizona Game and Fish Department, in partnership with Tonto National Forest, restored and improved aquatic habitat and riparian health within two reaches of Haigler Creek. Haigler Creek is managed as a 'put and take' rainbow trout (*Onchorhynchus mykiss*) fishery and the goal of the project was to enhance the distribution of fish and increase recreational opportunities for anglers through stream habitat improvements. The project included revegetation, bank stabilization, log and boulder cover structures, and seeding to prevent erosion and sedimentation. Overall, the project created more suitable habitat for semi-aquatic or aquatic special status species analyzed in this document.

Over the next ten years, it is highly probable that the Arizona Game and Fish Department, in coordination with the U.S. Fish and Wildlife Service and Tonto National Forest, will complete planning and compliance phases as well as implement a second habitat restoration project in reaches of Haigler Creek located in the project area. This project would consist of fully eradicating nonnative trout from Upper Haigler Creek in order to establish a Gila trout recovery population. In addition, other native fish species, speckled dace, chub and desert sucker will be stocked. In order for Haigler Creek to be considered a recovery population all rainbow trout must be removed to eliminate the threat of hybridization with Gila trout. Renovation will involve removing non-native trout through the application of the piscicide rotenone. Rotenone is approved by the Environmental Protection Agency as an effective and safe means to remove target fish species from flowing water. Rotenone application, including timing, frequency, concentration and neutralization, will be implemented by the Arizona Game and Fish Department and the U.S. Fish and Wildlife Service as prescribed on the pesticide label(s) for each product. Stream renovation has been practiced successfully for decades in the southwest for re-establishing native trout and warm-water native fishes. Rotenone has been used extensively in the United States for decades for this purpose.

Rotenone application would have a localized, short-term direct impact on water quality. According to a draft environmental assessment for the project, only three miles of Upper Haigler Creek would be exposed to rotenone. Rotenone concentrations would dissipate quickly (less than 24 hours) because of dilution with water, hydrolysis, and photolytic breakdown by sunlight. In addition, potassium permanganate (neutralizer) would be applied at the downstream end of the treatment reach to

neutralize all remaining piscicide before it flows further downstream. Potassium permanganate undergoes rapid breakdown to naturally occurring compounds that are not toxic and is one of the most widely used chemicals for treating municipal drinking water. Both chemical compounds are strongly adsorbed to organic matter and sediments and show little ability to move through soil. Therefore, it is unlikely that either compound would enter groundwater (Dawson et al. 1991).

Wildlife in the immediate vicinity of the treatment reach may be temporarily disturbed, one day for each treatment, by human presence during the piscicide application. During rotenone application, terrestrial wildlife may drink or have body contact with waters containing rotenone; however, this is considered unlikely because most animals would be displaced by the disturbance associated with treatments. Alternatively, some scavengers may consume fish killed by the piscicide. The health effects of rotenone have been extensively studied. When applied at recommended doses for fish control, rotenone has low toxicity to non-aquatic organisms. Due to the relatively large size of terrestrial animals and metabolic and physiological differences, terrestrial vertebrates are not generally susceptible to rotenone. Terrestrial vertebrates do not uptake rotenone through body contact, and it is not harmful as a result of ingestion when applied at rates and formulations in accordance with product labels. Dosage rates applied per label instructions are considered safe for contact and consumption by birds and mammals.

Canyon tree frogs and gartersnakes are the other riparian-aquatic vertebrates known to occupy the treatment reach. Rotenone is toxic to gill-breathing organisms, including the larval stages of amphibians and aquatic invertebrates. Rotenone can be toxic to gill-breathing larval amphibians, though air breathing adults are less sensitive. Any reduction in tree frog abundance would be expected to be short term because of the low sensitivity of adults to rotenone and their ability to breed throughout the spring and summer period. Narrow-headed gartersnakes will not be affected by rotenone. They may experience a temporary reduction in soft-finned prey base after the removal of non-native trout but the proposed action includes stocking Upper Haigler Creek with native fish (speckled dace, desert sucker, and possibly headwater chub) as soon as it is determined the rotenone has dissipated from the treatment reach.

Overall, the purpose of this proposed project is to create a recovery stream for Gila trout. There will be short term disturbances to wildlife and aquatic species however, during planning phases, the Arizona Game and Fish Department will coordinate with the Tonto National Forest and U.S. Fish and Wildlife Service to develop conservation measures into the proposed action to minimize impacts to terrestrial and aquatic wildlife.

Planned and Unplanned Fire

Wildfire suppression activities can 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, drafting from streams), and indirect effects such as fire support aircraft noise, sedimentation in aquatic systems, and avoidance of areas with fire suppression activities. Wildfires, prescribed fires, and fire suppression activities within the watersheds are expected to continue at recent or historical levels. Fires, particularly on a large scale, alter wildlife habitat use patterns. Depending on fire severity and intensity, initial loss of habitat may drive animals into adjacent areas straining available resources. As the burned area recovers, it often becomes a magnet for wildlife as it offers early seral species not available elsewhere in the habitat. Meaningful movement of wildlife into or out of the allotments could intensify or negate anticipated changes in habitat conditions.

Climate Change

Climate change has the potential for additional impacts. According to NOAA National Climatic Data Center data, there has been a marked upward trend in the globally averaged annual mean surface temperature since the mid-1970s (Shein 2006). The Federal Advisory Committee Draft Climate Assessment Report is projecting higher temperatures and lower precipitation for the southwestern U.S. (Garfin et al. 2013). New modeling efforts for the North American monsoons indicate that the amount of monsoon moisture will change little, however, the monsoons will be delayed and most of the precipitation will come late in the season (September-October) (Cook and Seager 2013).

Summary

Past, present and foreseeable future actions within the Bar X Allotments, for the most part, are one-time events that are short in duration with a small geographical extant relative to the project area with built in conservation measures to minimize impacts to special status species, migratory birds, and management indicator species. Management practices and mitigation measures have been included in the Proposed Action to minimize any negative effects of the proposed action Bar X Allotments and Driveway to wildlife, aquatic species, and rare plants. Based on the discussion above and by following these practices, no significant effects from either alternative are expected when added to the effects discussed in this section.

Recreation, Wilderness, Visual Quality

Effects Analysis

Alternative A: No Grazing

Direct and Indirect Effects: (Common to all ecosystems unless otherwise noted.)

This alternative would have no direct or indirect effects on recreational activities available within the project boundaries. Current developed and dispersed recreational uses along with existing lands and mineral uses would be expected to continue without livestock activity.

Cumulative Effects

General recreational, land, and mineral uses may change slightly over time due to natural and social trends resulting from discontinued livestock grazing; no direct or indirect effects are anticipated therefore there would be no cumulative effects.

Alternative B: Proposed Action

Direct and Indirect Effects: (Common to all ecosystems unless otherwise noted.)

Livestock: Under this alternative the number of permitted animal unit months is more than the current authorized number. Increased numbers could result in more frequent human/cow encounters. These encounters could result in a positive or negative experience depending on the individual recreational user's attitude towards livestock and their desired recreational experience.

Grazing Schedule: Recreational users tend to utilize cooler upper elevations in summer months to escape the summer heat and lower elevations in winter months to enjoy slightly warmer temperatures. The proposed rotation may result in more frequent human/cow encounters. These encounters could

result in a positive or negative experience depending on the individual recreational user's attitude towards livestock and their desired recreational experience.

Water Developments: Range developments, such as stock tanks and watering troughs, that are maintained by the grazing permittee can be beneficial to user groups such as equestrians and hunters and improve recreational experiences. Over time proposed water related improvements could add to the recreational experience of Forest users.

Pastures and Fencing: Under this proposal several pastures which are currently closed to grazing would be included in the grazing rotation. In these areas recreationalist/cow encounters would occur when presently there were none. These encounters could result in a positive or negative experience depending on the individual recreational user's attitude towards livestock and their desired recreational experience. Proposed fencing and cattle guards would have no direct or indirect effects on recreation. Fencing would need to be added and maintained around the existing campground perimeters in order to prevent cattle in the campgrounds.

Wilderness: The Forest Plan states that Hellsgate Wilderness is to be managed for wilderness values, while providing livestock grazing and recreation opportunities that are compatible with maintaining wilderness values and processes.

Cumulative Effects

Recreation Opportunity Spectrum: The proposed action would not change the current recreation opportunity spectrum classifications and the ROS would remain in standard with the Forest Plan and a plan amendment would not be needed.

Developed Recreation: Under this alternative, recreational users at developed sites may experience increased encounters with cows. This could be mitigated by installing or maintaining fence lines around developed sites and coordinating cow movement through these areas with the District Recreation staff. Each campground area would need to have fencing around the perimeter and it would need to be maintained through coordination by the Range staff and the permittee.

Dispersed Recreation: Presence of livestock grazing within dispersed recreation sites does not preclude or prevent other recreational opportunities. However, due to the increased number of proposed cattle and opening of several currently closed pastures, it would be expected that there would be an increase in recreationalist/cow encounters. These encounters could result in a positive or negative experience depending on the individual recreational user's attitude towards, livestock and their desired recreational experience. Fencing of popular dispersed recreation corridors or scheduling cows to avoid popular dispersed areas during the busiest recreation months could help mitigate these encounters.

Lands and Minerals: Under this alternative there would be no direct or indirect effects to lands or minerals. Use of these resources would continue with little to no change. No cumulative effects are anticipated.

Roads and Trails: Under this alternative there would be no direct or indirect effect to roads or trails. No new roads, trails, or mileage is proposed and use would continue with no anticipated cumulative effects.

Heritage

Affected Environment

To date, one hundred-seventy-six (176) archaeological sites have been identified in the project area. All recorded sites in the Bar X Allotment are present within the Heritage GIS layer and about half of the sites in the Heber-Reno Sheep Driveway. There are eighteen (18) documented but unrecorded sites in the project area. Of the remaining sites, one hundred-one (101) contain evidence for prehistoric occupation, forty-two (42) contain evidence for historic period occupation, and five (10) contain evidence for both occupation types. At least three of the prehistoric sites appear to be pithouses (individual and village). The remainder of the prehistoric sites located in the project area appear to consist of either rockshelter, agricultural features, lithic procurement sites or artifact scatters. These sites contain material spanning a large time period, and most likely saw repeated use throughout their occupation. The historic record is also quite extensive including mescal pits and Basque sheep camps. Three mine related sites has been recorded. Three historic roads, and a camp (Haigler creek) associated with the CCC have also been identified.

Twenty-four archaeological sites (24) are considered NRHP-eligible, thirteen (13) have been assessed as not eligible for the NRHP, and one hundred thirty-nine (139) have not been evaluated against NRHP significance criteria. Summary information on the archaeological sites, as well as maps showing the locations of the cultural resources, will be presented in an upcoming report. The Tonto National Forest Heritage Inventory Forms (on file with the Tonto National Forest) provide more detailed descriptions of each of the archaeological sites.

Priority Heritage Asset

There is one archaeological site that is considered a priority heritage asset within the Bar X allotment. The site is an Apache camp that dates between 1500 and 1875 AD and has 12 or more structural elements.

Hebe-Reno Sheep Driveway

The Heber-Reno Sheep Driveway encompasses an area which has had very little formal archaeological investigation. The 95,569-acre Heber-Reno Sheep Driveway consists of 74,209 acres located on the Tonto National Forest and 21,360 acres located on the Apache portion of the Apache-Sitgreaves National Forest. Although it has not been formally designated, the Reno-Heber Sheep Driveway is recognized as an historic site and is informally considered eligible for the National Register of Historic Places by the Arizona State Historic Preservation Officer. The historic use of sheep driveways goes back to the late decades of the nineteenth century. By the early 1890s the use of driveways to herd sheep from the mountains to desert for seasonal pasturage was occurring on a regular basis, and it is assumed that these routes largely correspond to the current Reno-Heber Driveway which was formalized by the Forest Service in the 1910s. In 1922, 65,000 head of sheep were utilizing the Reno-Heber Driveway. It is reasonable to assume that comparable numbers were typical at least up till World War II and likely decreased after that time when formal road building became common place and vehicle transportation to seasonal pasturage became more economical.

Sheep driveways are a unique type of heritage property. They belong to that class of properties known as “cultural landscapes,” but unlike most cultural landscapes they do not simply represent a single event

or time period from the past. In fact, they are created and maintained by the continuation of their original historic use and thus are still evolving in a cumulative manner. Because of this continuing use, the Heber-Reno driveway, in addition to being an historic property, is also Traditional Cultural Property for the Basque ethnic community in Arizona who see it as a tangible and important part of their history over the last century. The significance of the driveway as an historic site is thus enhanced by its additional status as a TCP, essentially guaranteeing that it is eligible for the National Register of Historic Places.

As a landscape, sheep driveways, including the Heber-Reno, often include various other unrelated heritage properties that may have been affected by the activities associated with the use of the driveways. Physically, they are recognized on the ground by a variety of things and to greater or lesser degrees as a result of those effects. The Heber-Reno has several different boundary delineating features – in some places it is fenced and signed, in others just signed, in others there is no physical delineation at all or just occasional cairns along the principal trails. Within it, there are features associated with its use, primarily at the camp sites where there may be fire rings or even massive masonry fireplaces, trash deposits, privies, but also at specialized activity areas where there may be traps, pens, watering troughs and other features. Finally, the driveway can be recognized in some places only by fairly ephemeral changes to the landscape – narrow parallel trails, wool caught in the catclaw, or deposits of sheep byproduct surrounding the camp areas (Schroeder and Wood 2010).

Environmental Effects

Legal and Regulatory Compliance

While numerous federal laws and executive orders are in place that address historic preservation and tribal consultation on federal lands, the National Historic Preservation Act (NHPA) of 1966, as amended sets the legal framework for heritage resource management on this project. NHPA Section 106 directs all Federal agencies to consider the effects of their undertakings (actions, financial support, and authorizations) on properties included in or eligible for the NRHP. Advisory Council on Historic Preservation regulations at 36 CFR 800 implement NHPA Section 106, and these regulations contain the definitions utilized to determine the potential effect, if any, any given undertaking will have on cultural resources. The Area of Potential Effect (APE) for a given project is defined as "… the geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties… The area of potential effects is influenced by the scale and nature of an undertaking and may be different for different kinds of effects caused by the undertaking." [36 CFR 800.16(d)]. An Effect to a cultural resource is defined as "…alteration to the characteristics of a historic property qualifying it for inclusion in or eligibility for the National Register." [36 CFR 800.16(i)]. An Adverse Effect is found "when an undertaking may alter, directly or indirectly, any of the characteristics of a historic property that qualify the property for inclusion in the National Register in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association." [36 CFR 800.5(a)(1); see subsection (a)(2)]. Effects to cultural resources may be either Direct or Indirect.

Forest Service Manual 2360 and Forest Service Handbooks 1509 and 2309 are the documents through which the Washington Office outlines implementation of 36 CFR 800, providing the foundation for agency policy and procedures. Owing to the complexity and diversity of heritage or cultural resources on the National Forests, the Forest Service Manual does not specify one overarching desired future

condition. However, FSM 2364.02 lists as the first three objectives for the protection and stewardship of Heritage resources:

1. Protect cultural resources in a manner consistent with their National Register qualities and management allocations.
2. Avoid or minimize the effects of FS or FS-authorized land use decisions and management activities on cultural resources.
3. Safeguard cultural resources on National Forest System lands from unauthorized or improper uses and environmental degradation.

In tandem with the guidance from the Washington Office, the Southwest Region (Region 3) has generated regional amendments R3 Forest Service Manual 2360 and R3 Forest Service Handbook 2309. R3 FSM 2360 addresses the infrastructure, policies and procedures used for cultural resource management in Region 3. R3 Forest Service Handbook 2309 contains the standards and guidelines for cultural resource management in the region.

In accordance with 36 CFR 800.14(b)(2), federal agencies have the option to pursue "Program Programmatic Agreements", which allow the agency to create a Section 106 process that differs from the standard review process and that will apply to all undertakings under a particular program. These agreements are typically used by agencies with programs that have undertakings with similar or repetitive effects on historic properties in order to avoid the need for a separate Section 106 review for each project. Long-term consultation with SHPO and Region 3 policy has resulted in the *First Amended Programmatic Agreement Regarding Historic Property Protection and Responsibilities between the USDA Forest Service Region 3, the State Historic Preservation Officers of Arizona, New Mexico, Texas, and Oklahoma, and the Advisory Council on Historic Preservation*, signed 12/24/03 (R3PA). This agreement, specifically, *Appendix H, Standard Consultation Protocol for Rangeland Management* developed pursuant to Stipulation IV.A of the *Programmatic Agreement*, is considered to be the "standard operating procedure" for treating potential grazing impacts to heritage resources on the Tonto National Forest.

In accordance with Appendix H, standard Section 106 process will be implemented on all range improvement and ground-disturbing management practices that are planned and have been identified at the time of the NEPA analysis. In addition to the acreage identified for improvements, analysis of impacts to Heritage resources from cattle grazing will also be undertaken. Field surveys should be conducted in areas where there are known or potential impacts to heritage resources or specific areas of concern in order to identify and assess site conditions.

> "In making the decision on the level of survey to be conducted, the Forest Archaeologist will consider the following and document the decision in the heritage resource report:
>
> A. grazing history
> B. proposed changes in grazing management practices
> C. known incidents of or high potential for damage to sites
> D. presence of grazing-sensitive sites
> E. presence of areas where cattle congregate
> F. amount of the allotment previously surveyed for cultural resources
> G. site density

H. information provided by employees, permittees, or other users" (Appendix H, II, B.2)

Once inventory has been completed, and archaeological sites have been identified, the Forest may draw from, but is not limited to, the following mitigation measures to ensure that effects to cultural resources are avoided or minimized:

1. archaeological survey will be conducted for areas proposed for surface disturbance which have no previous survey coverage or have outdated surveys which do not conform to current standards.
2. relocation or redesign of proposed range improvements and ground-disturbing management practices to avoid direct and indirect impacts to historic properties.
3. relocation of existing range improvements and salting locations sufficient to ensure the protection of historic properties being impacted by concentrated grazing.
4. fencing or exclosure of livestock from individual sensitive historic properties or areas containing multiple sensitive historic properties being impacted by grazing.
5. periodic monitoring to assess site condition and to ensure that protection measures are effective.
6. other mitigation measures involving data recovery, for example, may be developed and implemented in consultation with the SHPO as the need arises. The appropriate Tribes will be consulted if the mitigation is invasive or it affects a TCP or other property of concern for them.

In accordance with Appendix H, monitoring will be conducted as part of the day-to-day activities of the professional cultural resource specialists working in the area. Grazing allotments cover most of any given forest, and when archaeologists are in the field conducting surveys they are most likely surveying within a grazing allotment. The archaeologists will use these opportunities to observe and report on grazing activities, the effectiveness of the grazing strategy, and potential impacts to heritage resources. Any incidents of damage to historic properties from grazing will be reported, and the archaeologists will draw upon the protection measured outlined in the *Protocol* to ensure that the effects are avoided or minimized. (Appendix H, II, D)

The 1985 Forest Plan and its Amendment 21 (5/3/1995) establishes the following standards and guidelines (under Decision Unit (DU) 3) that is applicable throughout the Forest regarding the management and protection of prehistoric and historic archaeological sites and other historic properties:

> The Forest will comply with *National Historic Preservation Act (NHPA)* and with *Executive Order (EO) 11593 and* will undertake active management which recognizes Heritage (cultural) resources as equal in importance to other multiple uses. Heritage resources will be managed in coordination with the State Historic Preservation Officer (SHPO) in accordance with the R3PA regarding cultural property protection and responsibilities….
>
> During the conduct of undertakings, the preferred management of sites listed in, nominated to, eligible for, or potentially eligible for the National Register of Historic Places is avoidance and protection. Exceptions may occur in specific cases where consultation with the SHPO indicates that the best use of the resource is data recovery and interpretation…
>
> Sites listed in, nominated to, eligible for, or potentially eligible for the National Register will be managed during the conduct of undertakings to achieve a "No Effect" finding, in consultation with the State Historic Preservation Officer.

In general, this requires that any surface disturbing project can be subject to the evaluation and consultation, and clearance approval process required by the R3PA, which typically requires archaeological survey of proposed construction and disturbance activities, e.g. for range improvements. Specifically for the Bar X area, this would include the evaluation of potential impacts from grazing systems, as well as the construction and maintenance of range improvements. The Amendment goes on to add that interpretive opportunities for Heritage (archaeological and historic) resources should be pursued as a high priority when opportunities arise. Other management direction specifically applied toward the protection of archaeological and historic resources from looting or vandalism is found in the Archaeological Resources Protection Act (ARPA).

Until revision of the Forest Plan is completed, direction in this area is provided by R3PA, the Native American Graves Protection and Repatriation Act (NAGPRA) and a variety of laws, Executive Orders, Memorandums, and case law, including ARPA, the *American Indian Religious Freedom Act*, *National Environmental Policy Act*, and *National Forest Management Act*. Executive Orders and Memorandum include *1994 Government-to-Government Relations with Native American Tribal Governments*, *EO 13007 Accommodations of Sacred Sites*, and *EO 12898 Environmental Justice* as directed by the Forest Service Manual and Handbook.

Assumptions and Methodology (data limitations and data inaccuracies)

Physical accessibility to archaeological records of the Forest is inconsistent; some archaeological sites and surveys recorded prior to 2012 have been digitized into GIS. Hard-copy site and survey records appear to have been kept up to date through ~2015. Both hard-copy records and digital records were compared in order to determine data gaps; however, anything not captured in either format will be absent from the literature review. The methodology used for literature review followed current professional standards. Cultural resource surveys conducted for this project will follow methodology identified in the R3PA.

Direct and Indirect Effects for All Action Alternatives

With respect to the Bar X-Heber-Reno Sheep Driveway project, direct effects are those that will occur during project implementation. The potential for adverse impacts of grazing activities on significant cultural resources relates directly to the level of range developments (i.e. water tanks, pipelines, etc.), number and density of livestock within an allotment, length of grazing periods, and other ground disturbing activities existing and proposed within the project area, including access to range developments. While there is no common agreement among archaeologists as to how extensive the effects are, there is no disagreement that livestock grazing has the potential to adversely impact significant cultural resources through trampling, obliteration, and displacement (Horne and McFarland 1993, Osborn and Hartley n.d., Osborn et. al 1987, Shea and Klench 1993, Todd et. al 2000, and Willingham 1994). Sites located within the vicinity of livestock congregation areas, such as near water tanks, gates, along fence lines or other livestock trials, suffer the most damage. The severity of grazing impacts on cultural resources increases proportionally with the number and duration of livestock congregation. Livestock grazing requires the construction and maintenance of range improvements, including water tanks, pipelines, fences, and access roads. The installation and maintenance of range improvements typically require new ground disturbance. Projects requiring new ground disturbance, by definition, have the potential to adversely affect significant cultural resources.

In general, the direct effects on the cultural resources of the various activities that are proposed for this project are expected to be as follows:

(1) In those project areas where no historic properties (archaeological sites meeting NRHP criteria) are present, proposed project activities have **No Potential to Affect** cultural resources.

(2) In those project areas in which ground disturbing activities would be carried out as listed above, where historic and/or unevaluated properties are present, and where Site Avoidance is feasible and is implemented, the proposed project activities are expected to have **No Effect** on cultural resources.

(3) Where archaeological sites occur where site avoidance is not feasible, the Forest may use any of the mitigation measures described above and develop a mitigation plan that will result in a finding of **No Adverse Effect** on historic properties.

(4) Where archaeological sites that are located within the identified boundaries of the Heber-Reno Sheep Driveway, where proposed activities would have an adverse effect, the Forest will use any of the mitigation measures described above and develop a mitigation plan that will result in a finding of **No Adverse Effect** on historic properties.

Increased site vulnerability is expected to be the principal indirect effect to historic properties resulting from proposed activities. With application of appropriate mitigation, it is not expected that the proposed project activities will increase visitor use in those areas in which archaeological sites are located. Therefore, it is not expected that implementation of the proposed activities will have indirect effects on the historic properties.

Cumulative Effects

Since site condition assessments for heritage resources are not available for any time prior to the introduction of European livestock species to the Southwest, some level of effect is assumed to have contributed to the current condition of all sites on the allotments. Given the non-renewable nature of heritage resources – prehistoric as well as historic archaeological sites -- any portion of a given site either damaged or removed diminishes its cultural and scientific value permanently. Therefore, all effects to heritage resources are considered cumulative. Provided that appropriate mitigation measures are implemented, it is not expected that any of the proposed project activities will result in additional adverse effects to the cultural resources referenced in this report. It is expected that there will be no change in the condition of the cultural resources over the existing condition.

Air Quality

Desired Condition

Projects related to the Proposed Alternative are subject to National Ambient Air Quality Standards (NAAQS). All surface disturbing activities should strive to keep particulate matter within those standards.

Existing Condition

The project area is not a Class I airshed which is granted special protections under the Clean Air Act. It is not a nonattainment area or maintenance area for regulated air standards. Air quality for the project area is monitored by the Arizona Department of Environmental Quality (ADEQ) and air quality information for the project area can be obtained from the ADEQ website.

Effects Analysis

Particulate matter (10 microns and smaller) can be dispersed into the air during activities associated with livestock grazing management. Effects can be mitigated through proper site preparation and construction techniques and site restoration following ground disturbing activities. The daily movement of livestock can disperse particulate matter into the air in amounts dependent on surface soil moisture and distances they must move. However the amounts would be small and difficult to determine from the total particulates generated by the use of unpaved roads by passenger vehicles, road maintenance and other off-road vehicles and recreation activities in the project area. Alternative B is expected to have minimal effect on air quality in the project area (ADEQ 2012).

Climate

Desired Condition

The USDA Strategic Plan for 2010-2015 sets a goal to ensure national forests are conserved, restored and made more resilient to climate change. A plan roadmap for responding to climate change is available on the agency's website at http://www.fs.fed.us/climatechange/.

Effects Analysis

There is research that indicates that livestock grazing may affect climate through emissions of methane gas. This effect is anticipated to be minor in the project area as livestock numbers are low and distributed broadly across the landscape in the project area. It would be difficult to separate livestock emissions from those produced by the other human activities such as passenger and commercial vehicles and off-road vehicles traveling in the area, industrial/commercial activities and private fuel burning for heat and cooking. The proposed action alternative is expected to have a minimal effect on the climate in the area directly, indirectly or cumulatively.

In addition to such human and industrial activities not related to the proposed action, forests are managed to maintain a vigorous condition that supports trees and sequesters carbon long-term. The Forest Service acknowledges the trade-off between its management activities and greenhouse gas emissions. Management activities such as thinning and prescribed burning may result in a short-term release of emissions, but they will lead to increased forest resilience. They will also lead to resistance to wildfire, drought and insects and diseases that decreases the potential for and magnitude of releases in the long-term.

Climatic fluctuations, on the other hand, have a profound effect on livestock grazing. While the likelihood of various fluctuations is unknown, implementing an adaptive management strategy, as in the proposed action, would be critical for responding to these fluctuations by adjusting stocking levels as needed in periods of below or above average precipitation.

Chapter 4: Consultation and Coordination

Preparers and Contributors

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

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Federal, State, and Local Agencies:

Natural Resource Conservation Service
U.S. Fish and Wildlife Service
Bureau of Land Management
The Rocky Mountain Research Station
Arizona Game & Fish Department
Bureau of Reclamation
Arizona Dept. of Water Resources
Gila County Cooperative Extension
Gila County Supervisors

Tribes:

White Mountain Apache
Ft. McDowell Yavapai Nation
Tonto Apache Tribe
Yavapai Apache Tribe
Mescalero Apache Tribe
Pueblo of Zuni
Hopi Tribe
Salt River Pima - Maricopa Indian Community
San Carlos Apache Tribe
Gila River Indian Community

Others:

The Bar X, LLC
AZ Mule Deer Organization
Audubon Society
Western Watersheds Project
Center for Biological Diversity
Gila County Cattle Grower's Association
Foundation for Biodiversity
Sierra Club
Livestock grazing permittees
Neighbors of the Mogollon Rim
Private land owners within or adjacent to the project area
Arizona Wilderness Coalition

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