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Forest
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Southwest Region

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Heber Allotment Analysis

Environmental Assessment

**Black Mesa Ranger District,
Apache-Sitgreaves National Forests**

Navajo and Coconino Counties, Arizona



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Chapter 1: Introduction and Need for the Action

The Forest Service has prepared this Environmental Assessment in compliance with the National Environmental Policy Act (NEPA) and other relevant federal and state laws. The Heber Allotment is listed on the Rescissions Schedule adopted under the 1995 Rangeland Rescission Act, and thus environmental analysis is required in order to comply with that law. The Forest Service is using the environmental analysis process to consider environmental impacts in the project area, propose alternatives to the current management, and provide this information the public and responsible official for the project.

This Environmental Assessment discloses the direct, indirect, and cumulative environmental impacts that would result from the proposed action and reasonable alternatives. The document is organized into four chapters:

1. Introduction and Need for Action: This section includes information on the project proposal and describes the need driving the proposal by identifying gaps between existing and desired conditions. This section also details how the Forest Service informed the public of the proposal.
2. Comparison of Alternatives: This section provides a detailed description of the agency's proposed action as well as alternative methods for achieving the stated purpose.
3. Environmental Consequences: This section describes the environmental effects of implementing the proposed action and other alternatives. This analysis is organized by resource area. Within each section, the affected environment is described first, followed by the effects of the No Action Alternative that provides a baseline for evaluation and comparison of alternative 2.
4. Agencies and Persons Consulted: This section provides a list of preparers and agencies consulted during the development of the environmental assessment.

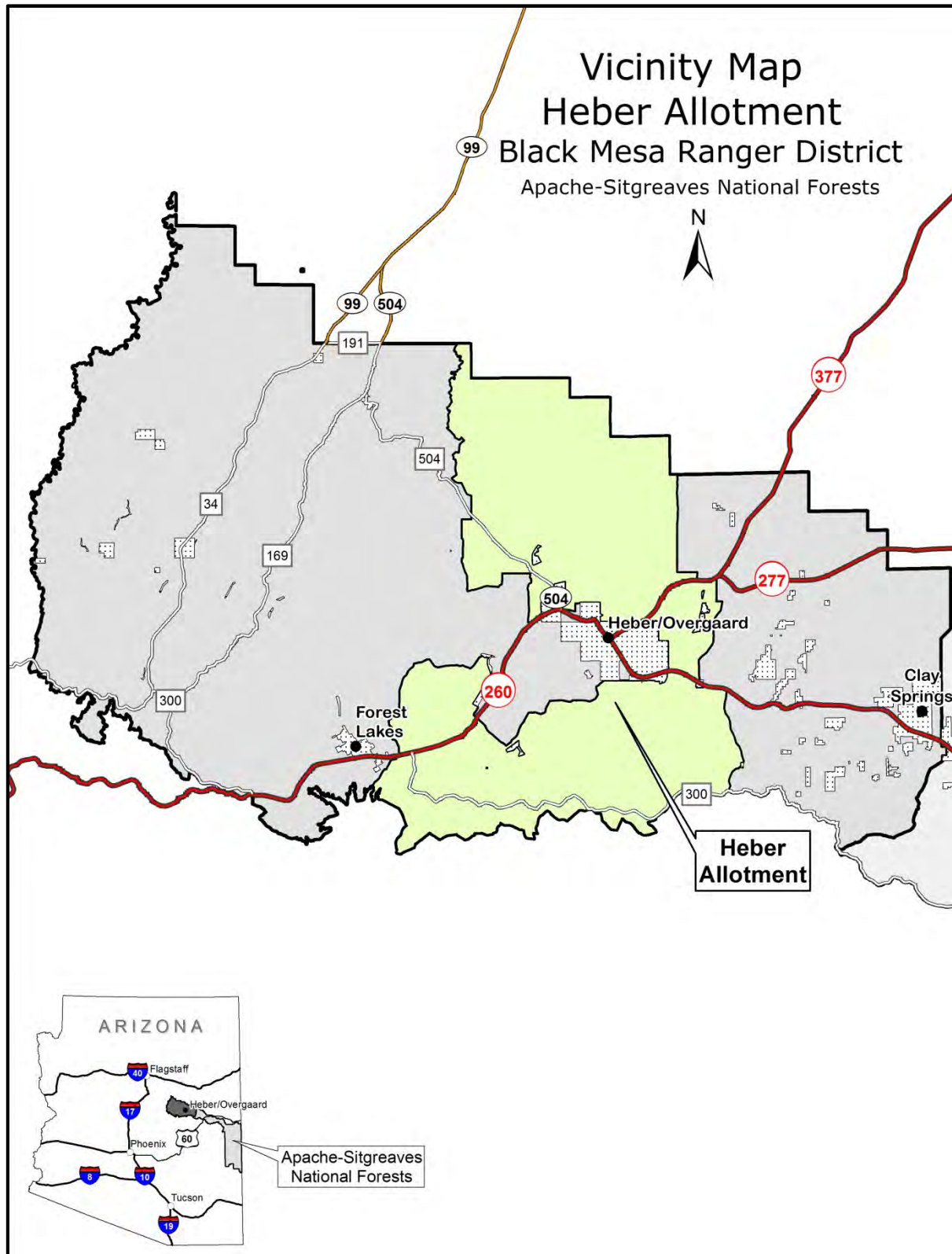
Project Area Description & Project Background

The Heber Allotment is located on the Black Mesa Ranger District of the Apache-Sitgreaves National Forests (hereafter, ASNFs). See Figure 1. The allotment covers approximately 157,000 acres and surrounds the community of Heber-Overgaard on the north, east, and south sides extending from the Fort Apache Indian reservation boundary on the south boundary to the forest boundary on the north. The allotment is composed of 12 pastures: Gentry, Bunker and Phoenix Park, located south of State Highway 260, as well as Nelson, Halter Cross, Oil Well, North Ancient, South Ancient, Red Knoll, Mud Tank, Squaw, and Bigler, located north of State Highway 260.

The last planning effort for the allotment occurred in 1989 with the development of a Range Management Plan (RMP). At that time, the allotment consisted of nine pastures and was approximately 135,000 acres. A neighboring allotment has since been incorporated, adding additional acres and pastures, forming the Heber Allotment as it currently exists.

The allotment has been identified as suitable for livestock grazing in the 2015 ASNFs Forest Plan and the associated Final EIS for the Forest Plan. This analysis incorporates the Forest Plan and Final EIS for the Forest Plan by reference, and all analysis contained in this document is tiered to that programmatic analysis. The allotment is currently authorized under a permit that allows for 905 head of cattle (cow/calf) for six months from May 1 to October 31. Based on knowledge of past actions of a similar nature, as well as existing and desired conditions, we believe that our proposed action for the Heber Allotment will not have a significant effect of the quality of the human environment as defined in 40 CFR 1508.27. Accordingly, we have prepared this project-level Environmental Assessment and an associated Finding of No Significant Impact (FONSI) to document our determination that no preparation of an Environmental Impact Statement is necessary, and that we have gathered and analyzed information in sufficient detail for the responsible official to make a decision regarding ongoing grazing and related management actions on the Heber Allotment.

Figure 1: General Location of Heber Allotment, Black Mesa Ranger District



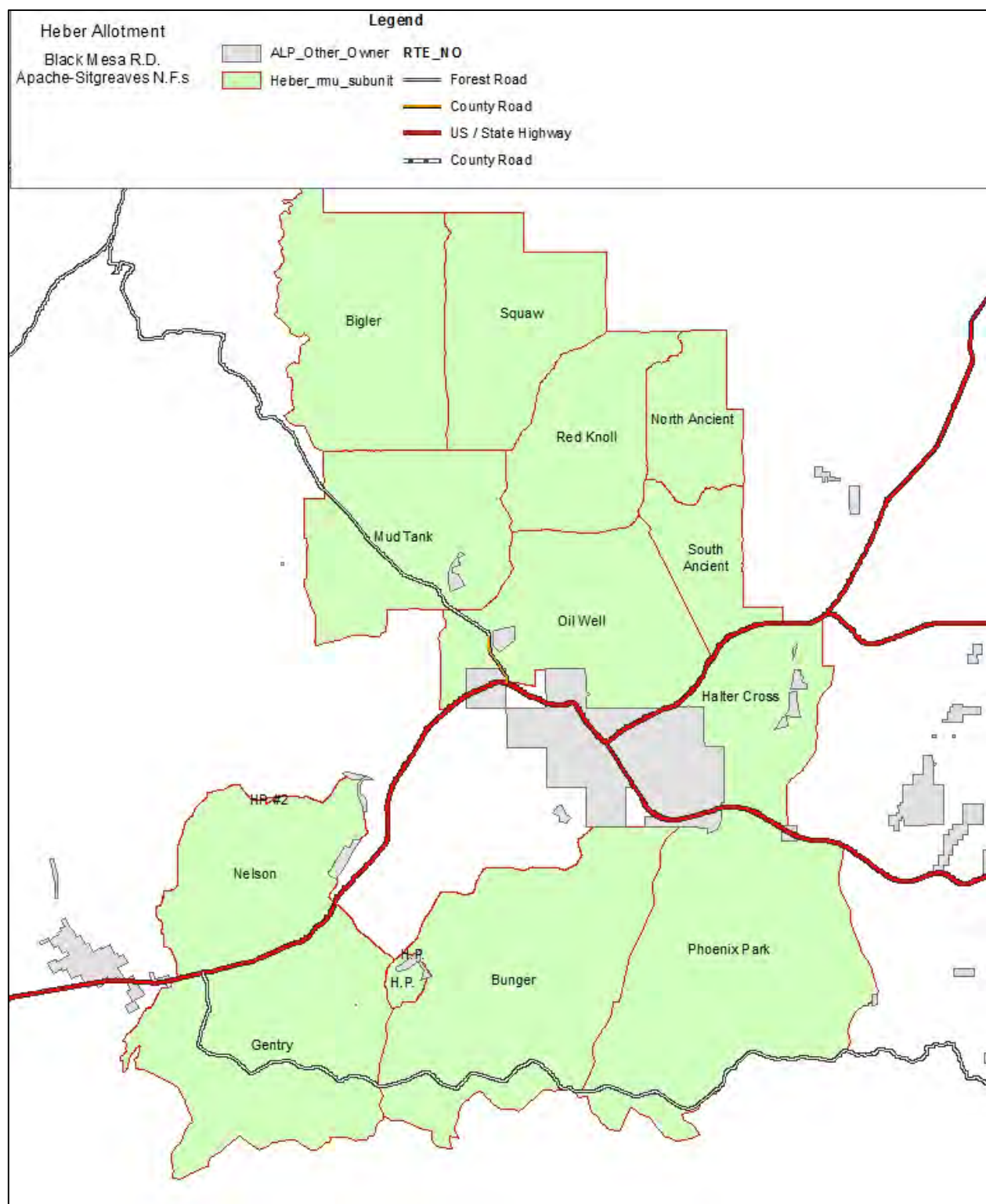


Figure 2: Pastures in Allotment

Existing and Desired Conditions for Project Area

Resources chosen to illustrate the existing and desired condition for this project are indicators of range management: rangeland vegetation and grazing, soils, fire and fuels, and watershed conditions. Desired conditions describe the goals for resources, as defined in the 2015 Forest Plan. The forest plan set of documents is incorporated by reference, with the applicable desired conditions derived from the planning process presented in summary form below. These collectively form the basis of the agency's proposal.

Existing Conditions for Rangeland Vegetation and Grazing

The allotment is currently permitted for 905 head of cattle for six months from May 1 to October 31 resulting in 5430 Animal Unit Months, or AUMs. Livestock grazing typically begins in the southern pastures in the spring/early summer and moving to the northern pastures in the late summer.

Table 1: actual grazing use since 2001 with average utilization since 2002, & total years of rest 2001 - 2014.

Pasture	Actual Use (AUM's)	Average Utilization (%)	Years of Rest, '01-'14
North Ancient	80 to 304	5	7
South Ancient	70 to 304	12	6
Oil Well	160 to 568	12	1
Red Knoll	80 to 349	8	4
Mud Tank	241 to 465	8	1
Squaw	133 to 621	8	2
Bigler	167 to 705	4	5
Halter Cross	160 to 605	5	4
Nelson	292 to 732	22	2
Gentry	579 to 1017	15	6
Bunger	597 to 1017	11	4
Phoenix Park	460 to 843	11	4

Table 2: Existing acres, by cover type, and the % of the project area that each cover type represents

Cover Type	Cover Type Acres	% of Project Area
Ponderosa Pine	61,306	39%
Pinon-Juniper Woodland	60,289	39%
Great Basin Grassland	18,307	12%
Mixed Conifer	2,109	1%
Oak Woodland	244	<1%
Dry Stream	99	<1%
Wetland, Reservoir, and Rock Pit	62	<1%
Unidentified/Unknown*	14,112	9%

**Last category falls within areas where stands have not been recently updated to reflect a cover type.*

The vegetative types were developed from Terrestrial Ecosystem Survey Terrestrial Ecosystem Unit Inventory (TES/TEUI) surveys, aerial photo interpretation, satellite imagery, and on-the-ground observations. The status of existing range vegetation is described by a sample of transects analyzed under the Common Non-Forested Vegetation Sampling Protocol (CNVSP). This condition is disclosed below to provide an overview of the status of comparative health of rangeland vegetation in the project area. The attributes measured and disclosed below include the composition of the ground cover, and the quantified relative composition and diversity of species that occur on the ground.

Table 3: Summary of existing and desired ground cover, desired species composition, and trend

Transect		% Veg	% Rock	% Gravel	% Litter	% Soil	% Desired Spp.	Current Trend
NATT1	Existing	8%	2%	5%	56%	31%	86%	Slightly Up
	<i>Desired</i>	<i>5 to 15%</i>	<i>0 – 5%</i>	<i>5 – 15%</i>	<i>45 – 65%</i>	<i>20 – 35%</i>	<i>52 – 90%</i>	<i>Static - Up</i>
OWTT1	Existing	10%	0%	2%	37%	52%	81%	Static
	<i>Desired</i>	<i>5 – 20%</i>	<i>0 – 5%</i>	<i>0 – 5%</i>	<i>20 – 40%</i>	<i>40 – 60%</i>	<i>60 – 90%</i>	<i>Static - Up</i>
RKTT1	Existing	9%	0%	6%	46%	38%	66%	Static
	<i>Desired</i>	<i>5 – 25%</i>	<i>0 – 5%</i>	<i>5 – 10%</i>	<i>40 – 60%</i>	<i>20 – 40%</i>	<i>60 – 90%</i>	<i>Static - Up</i>
MTTT1	Existing	8%	0%	0%	54%	39%	86%	Static
	<i>Desired</i>	<i>5 – 20%</i>	<i>0 – 5%</i>	<i>0 – 5%</i>	<i>40 – 70%</i>	<i>25 – 50%</i>	<i>52 – 95%</i>	<i>Static - Up</i>
SQTT1	Existing	9%	0%	5%	46%	41%	84%	Up
	<i>Desired</i>	<i>5 – 20%</i>	<i>0 – 5%</i>	<i>1 – 10%</i>	<i>35 – 55%</i>	<i>35 – 50%</i>	<i>60 – 95%</i>	<i>Static - Up</i>
BGTT1	Existing	7%	0%	0%	67%	27%	74%	Static
	<i>Desired</i>	<i>5 – 20%</i>	<i>0 – 5%</i>	<i>0 – 5%</i>	<i>50 – 75%</i>	<i>20 – 35%</i>	<i>51 – 90%</i>	<i>Static - Up</i>
HCTT1	Existing	12%	0%	4%	53%	30%	73%	Static
	<i>Desired</i>	<i>10 – 25%</i>	<i>0 – 5%</i>	<i>1 – 10%</i>	<i>40 – 65%</i>	<i>20 – 40%</i>	<i>55 – 90%</i>	<i>Static - Up</i>
NLTT1	Existing	6%	5%	2%	67%	17%	41%	Static
	<i>Desired</i>	<i>5 – 15%</i>	<i>1 – 10%</i>	<i>1 – 5%</i>	<i>50 – 75%</i>	<i>5 – 25%</i>	<i>30 – 75%</i>	<i>Static - Up</i>
GNTT1	Existing	7%	0%	0%	63%	30%	79%	Static
	<i>Desired</i>	<i>5 – 20%</i>	<i>0 – 5%</i>	<i>0 – 5%</i>	<i>50 – 75%</i>	<i>15 – 40%</i>	<i>55 – 95%</i>	<i>Static - Up</i>
BNTT1	Existing	20%	0%	0%	58%	23%	70%	Slightly Up
	<i>Desired</i>	<i>10 – 30%</i>	<i>0 – 5%</i>	<i>0 – 5%</i>	<i>40 – 70%</i>	<i>10 – 35%</i>	<i>40 – 85%</i>	<i>Static - Up</i>
PPTT1	Existing	10%	0%	0%	69%	21%	51%	Static
	<i>Desired</i>	<i>5 – 20%</i>	<i>0 – 5%</i>	<i>0 – 5%</i>	<i>55 – 80%</i>	<i>10 – 30%</i>	<i>35 – 85%</i>	<i>Static - Up</i>

Desired Conditions for Rangeland Vegetation and Grazing

- Livestock grazing and associated activities occur such that healthy, diverse plant communities, satisfactory condition soils, and wildlife habitat are maintained or improved.
- Livestock grazing is in balance with available forage.
- Livestock grazing contributes to the social and economic diversity and stability of rural communities.
- Incorporate flexibility into management and adapt management to changing conditions.
- Continue to manage vegetation to promote stable to upward trends, determined through monitoring.
- Reduce canopy cover of pinon-juniper in areas of encroachment to restore herbaceous vegetation.

Existing and Desired Conditions for Pinyon-Juniper Woodlands

In the project area, there are approximately 18,000 acres identified as Great Basin grassland. Many of these grassland acres have become encroached upon by pinon-juniper vegetation, resulting in higher canopy cover and a loss of herbaceous understory. Per the desired conditions set forth in the 2015 Forest Plan, the Forests aim to restore a canopy cover level 10% or less on these grasslands (ASNFs 2015, pp. 55-59).

Approximately 60,000 acres within the project area are identified as either savannas or persistent woodlands. Persistent woodlands generally have greater than 30% canopy of pinon-juniper. Approximately 56,000 acres are classified as having canopy covers greater than 30%, while desired conditions set an area of approximately 35,000 acres of persistent woodland within the project area.

Existing Conditions for Fire and Fuels

Current fuel conditions in the project area are described in terms of Fire Regime Condition Class (FRCC), a metric that quantifies how departed a system is from historical conditions (Hann et al. 2008):

- **Condition Class 1:** Fire regimes are within historical range.
- **Condition Class 2:** Fire regimes have been moderately altered from their historical range.
- **Condition Class 3:** Fire regimes have been significantly altered from their historical range.

Table 4: Percentage of Project Area by FRCC

FRCC 1	17%
FRCC 2	5%
FRCC 3	78%

Desired Conditions for Fire and Fuels

- Restore project area to a Fire Regime Condition Class 1.
- Reduce canopy in areas of pinion-juniper encroachment in order to reduce risk of uncharacteristic fire.

Existing Conditions for Soils, Hydrology & Water Resources

Existing soil conditions were assessed using the Terrestrial Ecosystem Survey of the Apache-Sitgreaves NFs (TES) (Laing et.al. 1987) in conjunction with interspersed field data collection from 2018, 2014 and 2008 in the individual pastures. Soil condition was determined using the three primary soil functions found in the R3 Soil Condition Rating Guidance (USDA-FS, 2013). 81 % of the map units within the Heber allotment exhibit satisfactory soil conditions while 17 % was rated as impaired. No map units were rated as unsatisfactory. Remaining acreage was given an “unsuited” soil condition classification on slopes exceeding 40 %.

Table 5: Average vegetative ground cover and desired ground cover values

TES Mapping Unit	Current Ground Cover	Tolerance Ground Cover	Desired Veg Ground Cover (%)	Current Soil Condition Rating	Desired Soil Condition Rating
41	35%	5%	30% – 45%	Satisfactory	Satisfactory
43	35%	5%	30% – 50%	Satisfactory	Satisfactory
51	50%	5%	30% – 50%	Satisfactory	Satisfactory
52	30%	10%	30% - 45%	Impaired	Satisfactory
53	50%	5%	30% - 50%	Satisfactory	Satisfactory
54	35%	5%	30% - 50%	Satisfactory	Satisfactory
55	60%	20%	20% - 40%	Unsuited	Unsuited
58	40%	5%	40% - 60%	Impaired	Satisfactory
178	45%	5%	40% - 70%	Satisfactory	Satisfactory
181	30%	5%	40% - 70%	Impaired	Satisfactory
182	40%	25%	40% - 70%	Satisfactory	Satisfactory
183	70%	5%	40% - 70%	Satisfactory	Satisfactory
186	70%	5%	40% - 70%	Satisfactory	Satisfactory
187	40%	35%	40% - 70%	Satisfactory	Satisfactory
189	55%	75%	75% - 80%	Unsuited	Unsuited
191	65%	5%	60% - 80%	Satisfactory	Satisfactory
192	70%	40%	60% - 80%	Satisfactory	Satisfactory
193	70%	5%	60% - 80%	Satisfactory	Satisfactory
197	50%	5%	50% - 70%	Impaired	Satisfactory
198	45%	5%	50% - 70%	Impaired	Satisfactory
202	65%	55%	65% - 80%	Satisfactory	Satisfactory

Existing Soil Trends

Trend determination for soil condition is based on the state of physical indicators that assess the three soil functions, ground cover, and vegetative cover and their relationship to the desired condition. Soil condition assessments indicate satisfactory soil conditions in areas of previous thinning treatments. These areas exhibit 0 – 10 % canopy cover from pinyon-juniper within grassland vegetation types, 10 – 20 % canopy cover in pinyon-juniper savanna, and between 20 – 30 % cover in persistent woodlands. Trends for these sites are stable across the most recent observations, with ground cover and soil functions remaining within desired ranges. There are locations within the allotment where soil impairment was observed where pinyon-juniper canopy cover exceeds 30 - 35 %. Persistent juniper encroachment tends to outcompete understory species, reducing groundcover making soils susceptible to accelerated erosion. Contiguous soil loss is occurring in locations of impaired soil conditions along stretches of FS road 95 through a portion of the Oil Well and Red Knoll pastures. Past disturbances coupled with juniper encroachment in these locations has exacerbated soil loss, creating the potential for a downward trend in soil conditions.

Existing Riparian Conditions

The linear length of streams with riparian vegetation in the project area totaled approximately 46 miles (USDA, 2011; Triepke et al. 2013). PFC assessments were performed on a total of 30.1 miles of intermittent and perennial stream within the project boundary in 2013 and 2014. See below:

Table 6: Proper Functioning Condition Assessment Results for Stream Systems

Stream System	Name	Miles	Recent PFC	Previous PFC	Trend
Black Canyon	BC1	1.5	FAR U	FAR U	Static
Black Canyon	BC2	1.7	FAR NA	FAR NA	Static
Black Canyon	BC4	4.7	FAR NA	FAR NA	Static
Black Canyon	BM	0.6	FAR NA	NF	Improvement
Buckskin Wash	BW1	2.9	FAR NA	NF	Improvement
Gentry	GEN	0.6	FAR U	FAR D	Improvement
Hangman's Draw	HANG	0.4	FAR U	FAR U	Static
Phoenix Park Wash	PP1	1.4	FAR U	FAR U	Static
Phoenix Park Wash	PP2	1.4	PFC	FAR U	Improvement
Phoenix Park Wash	PP3	1.1	FAR NA	FAR NA	Static
Phoenix Park Wash	PP4	2.6	FAR U	FAR NA	Improvement
Pierce Wash	PW1	3.6	FAR U	FAR NA	Improvement
Pierce Wash	PW2	1.3	FAR U	FAR U	Improvement
Pierce Wash	PW3	1.1	FAR NA	FAR NA	Static
Pierce Wash	PW4	1.8	FAR NA	FAR NA	Static
Pierce Wash	PW5	1.5	FAR NA	FAR U	Downgraded
Turkey Creek	TC	2.5	FAR NA	NF	Improvement

Existing Conditions - Watersheds

The Watershed Condition Framework is the state of the physical and biological characteristics and processes within a watershed that affect the hydrologic and soil functions supporting aquatic ecosystems. Watershed condition reflects a range of variability. Table 7 provides the proportional extent of the allotment within the applicable subwatersheds (6th Code HUC), and their ratings using methods from Pontyondy et al. (2011). Color key – green: class 1 PFC; blue: class 2: FAR; impaired: red. No impaired results are reported.

Table 7: Watershed Condition Classification Ratings of Watersheds within the Heber Allotment.

6th Code Watershed Name	HUC Acres	Allotment Portion of HUC	Rating for 6 th Level HUC
Bull Flat Canyon	14,374	35%	Class 2-Functional at Risk
Canyon Creek Headwaters	25,819	14%	Class 2-Functional at Risk
Lower Brookbank Canyon	20,989	92%	Class 2-Functional at Risk
Trap Tank-Chevelon Canyon	17,333	16%	Class 2-Functional at Risk
Buckskin Wash	18,626	79%	Class 2-Functional at Risk
Decker Wash	20,119	20%	Class 1-Proper Functioning Condition
Bear Canyon-Black Canyon	16,915	45%	Class 2-Functional at Risk
Squaw Wash-Black Canyon	15,879	29%	Class 1-Proper Functioning Condition
Lower Pierce Wash	12,489	7%	Class 2-Functional at Risk
Upper Phoenix Park Wash	19,279	56%	Class 2-Functional at Risk
Lower Wildcat Canyon	10,923	19%	Class 1-Proper Functioning Condition
Long Hollow Tank	24,176	80%	Class 2-Functional at Risk
Upper Pierce Wash	16,415	77%	Class 2-Functional at Risk
Upper Potato Wash	12,971	45%	Class 1-Proper Functioning Condition
Middle Wildcat Canyon	10,362	1%	Class 1-Proper Functioning Condition
Buckskin Canyon	23,931	16%	Class 2-Functional at Risk
Lower Potato Wash	24,200	43%	Class 1-Proper Functioning Condition
Long Draw	15,538	63%	Class 2-Functional at Risk
West Fork Black Canyon	8,670	70%	Class 2-Functional at Risk
Upper Day Wash	12,183	2%	Class 2-Functional at Risk
Upper Wildcat Canyon	25,488	27%	Class 1-Proper Functioning Condition
Upper Brookbank Canyon	16,593	35%	Class 2-Functional at Risk

Existing Water Quality

No streams within the allotment boundary are in an impaired status (ADEQ 2016). Black Canyon Lake, with a designated use for Aquatics and Wildlife, has been listed as being impaired with ammonia. Although the primary source of the ammonia has not been identified, changes to watershed runoff following forest fire has been identified a strong possibility. The 303d listing first occurred in 2004, shortly following the Rodeo-Chediski wildfire.

Desired Conditions for Soils, Hydrology & Water Resources

- Soil condition is satisfactory or impaired with an upward trend, within natural capability range.
- Vegetative ground cover and litter limit accelerated erosion and are distributed evenly across the soil surface to promote nutrient cycling, water infiltration.
- Soil productivity, soil biotic crust formation, and grass regeneration is promoted.
- Soil compaction is mitigated through the proper implementation of site-specific soil BMPs.
- Soil stability is kept intact, and soil erosion is mitigated by providing desirable ground cover.
- Ground cover, vegetative cover, and soil condition/disturbance monitoring is implemented.
- Residual coarse woody debris meets prescribed levels in pinyon-juniper woodland treatments.
- Satisfactory vegetation and soil conditions above the floodplain protect downstream water quality.
- Best management practices and soil and water conservation practices are implemented and monitored.

Resource Management Needs (cf. FSH2209.13, Chapter 90, Sec. 92.13)

Each of these represent an area in which current management of the project area can be updated to help move the project area towards desired conditions, and has a corresponding objective or objectives identified below. These are further illustrated by the summary presentations of existing conditions within the analysis area, found in chapter 3 of this document and cross-referenced below:

- **Maintain and Improve Understory Vegetation:** The current range management plan for the allotment dates to 1989 and needs to be updated. The RMP needs to be updated to reflect changed conditions over time in addition to modern management practices in order to maintain or improve observed trends in vegetation condition. See Objectives 1, 2, 3, & 6 for objectives derived from the need to maintain or improve rangeland vegetation.
- **Pinyon Juniper Woodland Canopy Cover:** Encroachment of these species into historic semi-desert grasslands has reduced herbaceous ground cover and results in negative impacts to soils as well as changing of fire regimes in the project area. See Objectives 1, 3, 4, & 5 for objectives derived from the need to address vegetation management on the allotment as it pertains to herbaceous productivity and riparian functioning.
- **Move Toward Forest Plan Conditions, Standards and Guidelines:** An updated RMP needs to be produced in order to provide management long-term direction for the allotment going forward under the updated 2015 Forest Plan. See Objectives 1, 2, & 6 for objectives derived from the need to update management to current plan standards and guidelines.
- **Provide Flexibility to Adapt Management:** An updated range management plan needs to incorporate modern adaptive management principles. As noted above, the last planning effort for the allotment occurred in 1989, and guidance for rangeland analysis and planning has been updated and reissued for the Southwestern Region of the USFS since that time. The analysis contained in this document follows this updated guidance. See Objective 2.
- **Legal and Administrative Compliance:** environmental analysis needs to be conducted in accordance with the National Environmental Policy Act in order to comply with the requirements of Rangeland Rescission Act of 1995 as well as other resource planning laws. Again, as noted above on page 3, the last planning effort for the allotment occurred in 1989 at which time the allotment covered a smaller area that has since been consolidated with neighboring allotments through administrative changes to the associated permit. See Objective 7.

Need for the Proposal

Ongoing opportunities for the management of livestock grazing on lands identified as suitable, such as the Heber Allotment, need to be considered in accordance with the Forest Plan, and in this case our proposal is shaped on the basis of the gaps identified above as well as USFS Range Management policies incorporated by reference. Analysis of authorization under an updated RMP is appropriate at this time 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, Forest and Rangeland Renewable Resources Planning Act of 1974, Federal Land Policy and Management Act of 1976, National Forest Management Act of 1976*).
- The Heber Allotment contains lands identified as suitable for domestic livestock grazing, and continued domestic livestock grazing is consistent with the updated Forest Plan, (cf. pgs. 23, 29, 34)
- It is Forest Service policy to make forage available to qualified livestock operators from lands suitable for grazing consistent with land management plans. (*Forest Service Manual [FSM] 2203.1; 36 Code of Federal Regulation [CFR] 222.2 (c)*).
- It is Forest Service policy to continue contributions to the economic and social wellbeing 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*).

Project Objectives that were identified to fulfill the need of this project and address the resource management needs above are as follows:

- *Objective 1:* Continue to manage vegetation to promote stable to upward trends within long-term transect locations.
- *Objective 2:* Incorporate flexibility into the management of the Heber Allotment in order to allow the Forest Service to adapt management to changing resource and environmental conditions.
- *Objective 3:* Reduce canopy cover of pinon-juniper in order to maintain and restore ground cover and herbaceous vegetation to move towards desired conditions in grassland and woodland areas
- *Objective 4:* Maintain watershed and riparian conditions at levels that are stable or on an upward trend.
- *Objective 5:* Maintain current satisfactory soil conditions and improve soil conditions rated as impaired or unsatisfactory.
- *Objective 6:* Develop a monitoring plan to verify that management actions are maintaining or moving resource conditions toward those desired.
- *Objective 7:* Move the Heber Allotment into legal compliance with the requirements of the Rangeland Rescission Act of 1995.

Apache-Sitgreaves Forest Plan Consistency

The proposed project is consistent with the management direction, goals and objective of the Land Management Plan for the ASNFs (2015). The updated 2015 plan identified the Heber Allotment as suitable for livestock grazing. The full scope of plan consistency is detailed in the project record.

Decision Framework

The Black Mesa District Ranger is the responsible official for this project who will review the alternatives of no action and the proposed action and the associated environmental effects to make a decision. The District Ranger will decide whether to implement the proposed action as described or with modification, develop an environmental impact statement, or implement the No Action Alternative. To reiterate, the purpose of this analysis is, in accordance with CEQ regulations at 40 CFR 1508.9, to provide a concise public document that briefly provide[s] sufficient evidence and analysis for determining whether to prepare an environmental impact statement or a finding of no significant impact, and thus to document a process by which the responsible official was provided the relevant information to make a reasoned decision.

Public Involvement

The proposal was listed in the ASNFs Schedule of Proposed Actions (SOPA) in January 2014. In July of 2014, the Black Mesa Ranger District provided a field trip allowing collaborators to visit various sites in the project area and review conditions. The purpose of the trip was to discuss the proposed action and treatments of invading pinon-juniper in grassland and savanna areas on the allotment. Four people attended.

On August 13, 2014, a scoping package was sent to approximately 59 individuals, groups, and federal and state agencies. Four public comment letters were received. Four letters from tribes were also received. An official 30-day comment period for collecting input on the Draft EA was conducted from May 15, 2015 to June 15, 2015. The agency received 6,684 responses within the comment period, of which 128 were unique letters. The remaining 6,556 responses were organized response form letters, some of which included editing and additions, and 549 of which were duplicate submissions. We coded this into 994 unique comments and 81 representative public concern statements across 10 resource categories. The agency prepared a separate comment analysis and response, which provides summaries of distinct public concerns derived from the analysis of these public comments.

Issues

For the purposes of the NEPA process, an issue is a point of discussion, debate, or dispute about the environmental effects of the proposed activities. Issues are cause-effect relationships directly or indirectly caused by implementing the proposed action. Following our initial scoping process, we reviewed all comments received to determine what issues were identified.

Concerns such as the ecological function of removing juniper trees from Great Basin grasslands, funding for rangeland improvements, and the relationship between livestock grazing, wildlife, and rangeland vegetation health are addressed in this assessment. Our comment response document details much of the interaction between these issues and our analyses. This document is available at the online project page: <https://www.fs.usda.gov/project/?project=43442>. Development of our comment responses is further detailed in the project record.

It is important to note here that the draft EA received the bulk of its comments on the management of the Heber Wild Horse Territory. The issues discussed in these comments lie outside the scope of the proposed action for the allotment. In the final EA, we have provided additional analysis of any potential impacts that the proposed action for the allotment can be expected to have on the Heber Wild Horse Territory. For the most part, however, the concerns of these individuals are better addressed in the forthcoming Heber Wild Horse Territory Environmental Assessment. Information available online at: <https://www.fs.usda.gov/detail/asnf/landmanagement/resourcemanagement/?cid=FSEPRD534229> and from the Black Mesa Ranger District. These actions do not meet the definition of a connected action under CEQ regulations specifically 40 CFR 1508.25(a)(1) because these actions are not for the same purpose or need, do not depend on one another, and do not trigger one another. Thus they are being analyzed separately.

Chapter 2: Proposed Action and Alternatives

This section provides a comparison of alternatives and defines the differences between each alternative for the public and to provide a clear basis for choice among options by the decision maker.

Alternatives Considered & Eliminated from Detailed Study

Current management was not analyzed in detail because it would not fully meet the need for the proposal detailed above. Current management livestock levels are incorporated into the proposed action as the initial and possibly continued levels of authorized livestock grazing, so an alternative with current management levels is not needed as a separate alternative.

Alternatives Considered in Detail

Alternative 1: No Action/No Grazing

The no action alternative or consideration of no grazing is required by Forest Service Handbook (FSH) 2209.13 Chapter 90. This both serves to set the bounds of a range of reasonable alternatives and serves to provide a baseline for all other comparisons of resource effects. Under alternative 1, grazing by domestic livestock on the allotment would not be authorized. The permittee would be given one year from the date of the decision for the allotment to remove livestock. Forest boundary fences would be maintained by the Black Mesa Ranger District. Existing allotment boundary fences would remain in place, and maintenance of the allotment boundary fences would be re-assigned to adjacent grazing permit holders. No vegetation treatments would be implemented. This alternative additionally provides an analysis baseline against which to compare the impacts of the action alternative.

Alternative 2: Proposed Action

The action proposed by the agency to meet the identified purpose and need consists of three components:

1. Re-authorization of livestock grazing under a new system through a new Allotment Management Plan (AMP) that includes a monitoring plan to ensure that desired conditions are being met and adaptive management strategies to provide flexibility to adjust management to fit changing resource conditions.
2. Structural improvements including maintenance of existing improvements and installation of new improvements.
3. Grassland and pinon-juniper woodland restoration treatments.

Component 1: Re-authorization of Updated Livestock Grazing System

The Black Mesa Ranger District proposes to re-authorize livestock grazing on the Heber Allotment under a replacing the old RMP with a new AMP that would include strategies for adaptive management of livestock grazing to fit resource conditions as they change. The proposal would include authorization of a range of AUMs with a maximum of 7,600 AUMs and a six-month grazing season from May 1 to October 31 under a deferred, rest-rotation grazing system.

Initially the current grazing level would be re-authorized for up to six months annually, between May 1 and October 31. This is a level of 5,430 AUMs. Proposed management levels are based upon existing conditions and current historical data. Adjustments that modify numbers within the range represented by the current level of grazing, i.e. up to 5,430 AUMs in a 6-month season, could be made annually through the Annual Operating Instructions (AOI), based on factors like weather, such as above average rainfall amounts leading to good plant growth and vigor, or if data collected through implementation monitoring supports an increase. An increase above 5,430 AUMs may not occur until after three grazing seasons following the decision. For an increase taking the total above 5,973 AUMs (which is a 10% incremental increase from 5,430 AUMs), the following must occur: 1) effectiveness monitoring and a review of all monitoring to validate that existing conditions are still within or working toward the desired conditions and trends are stable to improving and 2) three additional full grazing seasons must pass before the next increase that goes above a 10% threshold.

Adjustments that decrease the numbers could be made annually through the Annual Operating Instructions, based on weather factors, such as drought, lack of water sources, etc. In addition, reductions would occur *at any time* if data collected through monitoring warrants a need for reduction, which could include excessive utilization or downward trends in species compositions, etc. Any changes to grazing management could include numbers, timing, intensity, or frequency of grazing. Under this system, every pasture would generally receive rest once every twelve to thirteen years with periodic growing season rest and the ability to adjust for rest based on pasture conditions. Total use at the end of the growing season would be maintained within conservative use levels of 25-35% utilization. See appendix A for more information on what goes into these management decisions.

Monitoring

Implementation Monitoring

Upland Vegetation: Monitoring would occur in the first year following implementation and would be conducted every year or every other year thereafter, as determined upon completion of the previous monitoring. Utilization monitoring would occur either during or at the end of the growing season. Monitoring data would be used to determine if any adjustments in management should be implemented to allow for plant development, regrowth, and recovery. Implementation monitoring methods may include, but are not limited to comparative yield, stubble height, paired plot clipping and weighing, height and weight, and Landscape Appearance Method. Implementation monitoring may also include review of livestock numbers and dates of use in each pasture, conditions of improvements, and terms of the AOI.

Effectiveness Monitoring

Upland vegetation: Monitoring would be used to assess the effectiveness of management in achieving desired objectives in relation to species composition, ground cover, and trends. This monitoring would occur in the sites described within the EA (e.g. NATT1, Phoenix Park C4). Effectiveness monitoring methods used by the district range program include, but are not limited to Parker 3-step, dry-weight rank, Common Non-Forested Vegetation Sampling Protocol (CNVSP), Daubenmire, and photography plots. Based on protocols tied to the methods, monitoring would occur at an interval of 5-10 years in established areas.

Riparian Monitoring

Riparian monitoring includes incremental design features developed through the analysis process (*cf.* 36 CFR 220.7(b)(2)(iii); 40 CFR 1502.21.), summarized in table 1.

Table 8: Riparian Monitoring (Adapted from Heber Wild Horse Territory Plan, USDA – FS 2020)

Indicator	Monitoring Methodology	Monitoring Frequency	Thresholds for Management Action	Possible Management Responses
<p>Short Term Indicators: Herbaceous species utilization, woody species browse.</p> <p>Long Term Indicators: Riparian woody species height class, streambank stability and cover</p>	Various protocols with preference given to methods that examine the indicators	<p>Short-term monitoring will occur at 1- to 3-year intervals and consist of herbaceous species utilization and woody species browse measured annually for the short-term and situationally as needed.,</p> <p>Long-term monitoring will occur at 5- to 10-year intervals and consist of woody species height class, streambank stability and cover.</p>	<p>Short term thresholds will be exceedance of 30% allowable use of herbaceous species and/or 50% use of terminal leaders on riparian woody species over 30% of the key monitoring sites 2 consecutive years or any 2 out of 5 years.</p> <p>Long-term thresholds will be a downward trend in riparian condition indicated by accepted methodology</p>	Use tools in appendix A to change patterns of use

Component 2: Structural Improvements

Existing range improvements should be maintained to further promote proper management and achievement of objectives. The following list of proposed improvements would aid in the achievement of desired conditions:

- Drill 1 new well
- Add approximately 9 ¼ miles of pipeline to existing wells and 1 new well
- Install 14 troughs and 2 storages on the new pipelines from the wells
- Install 2 new cattleguards and re-locate 1 existing cattleguard
- Construct 7 new waterlots and 8 new corrals
- Construct 16 new roadside stock tanks
- Create 2 new holding pastures
- Expand 1 trick tank and build 4 new trick tanks
- Install 14 new troughs and 7 ¾ miles of pipe on the new trick tanks

Figure 3: Proposed Structural Improvements, South Part of Allotment

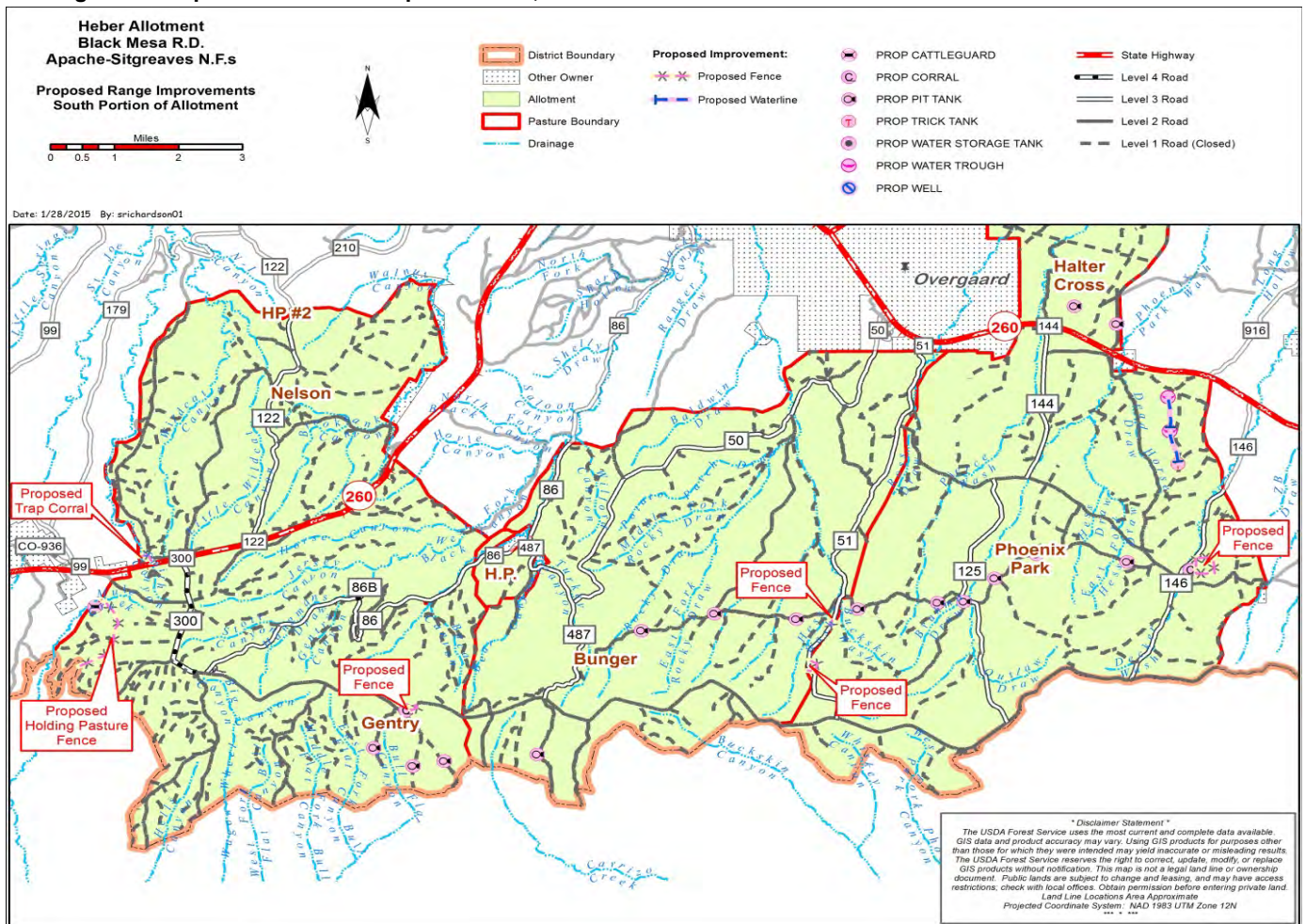
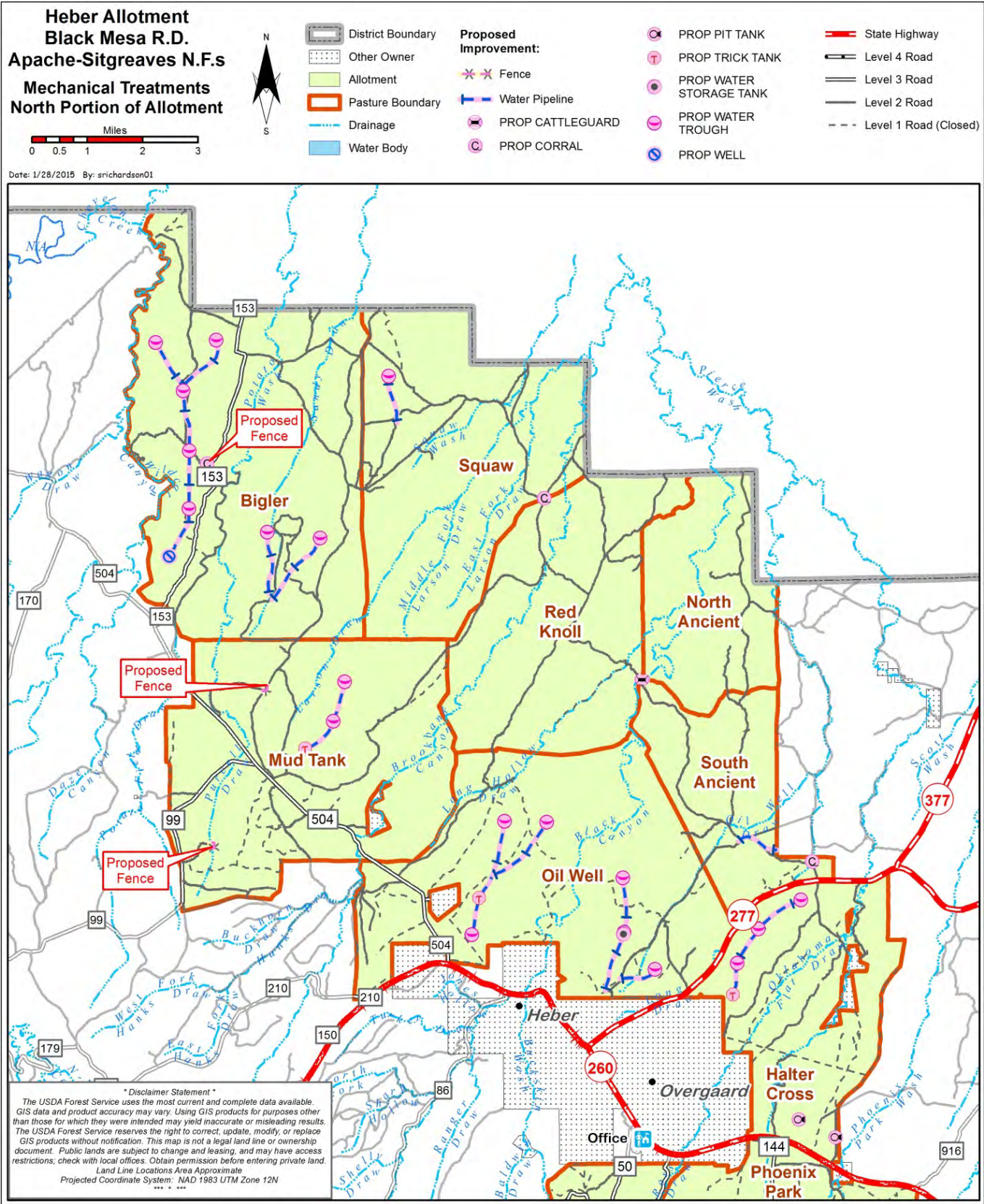


Figure 4: Proposed Structural Improvements, North Part of Heber Allotment



Component 3: Grassland and Pinon-Juniper Woodland Restoration Treatments

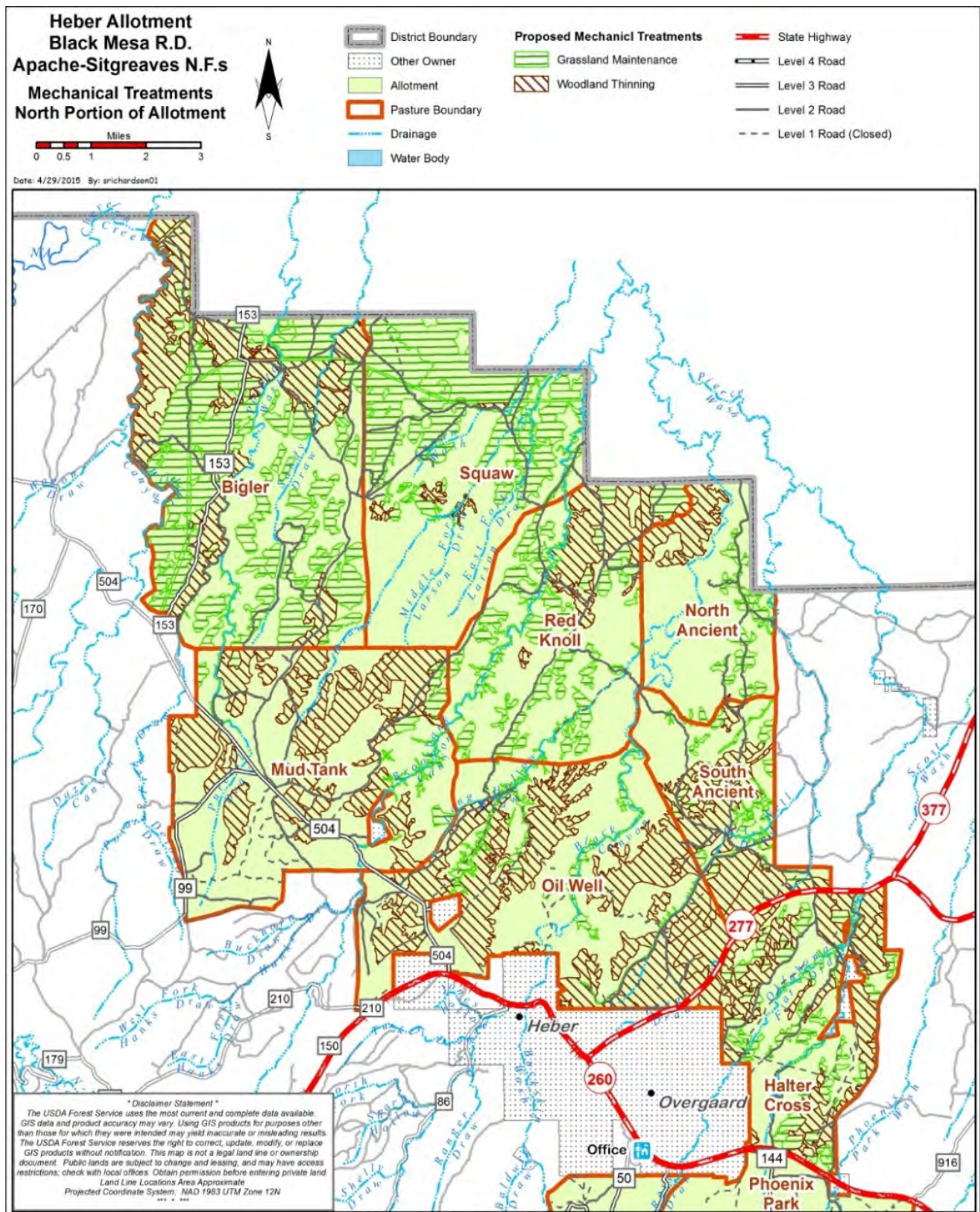
Mechanical treatments are proposed within the northern eight pastures north of Highway 260 totaling approximately 39,000 acres. Approximately 17,800 acres would be treated for restoration of grasslands and approximately 21,200 acres of woodland would be thinned to reduce canopy cover and restore understory vegetation. Methods for implementation of the treatments may include mastication, whole tree removal, personal and commercial fuelwood sales, tree shearing, and hand thinning. Prescribed burning may be used to restore and maintain grasslands and woodland treatment areas as identified in figure 5. No mechanical removal of ponderosa pine would occur.

Table 9: Treatment type by acres and percentage of total

Treatment Type	Desired Canopy Cover	Treatment Acres	% of Total Treatment Area
Grassland Restoration	<10%	17,758	22%
Woodland Thinning	10-20%	21,196	26%
No Treatment	20%+	42,379	52%
<i>Total</i>		<i>81,333</i>	<i>100%</i>

Grassland restoration areas have been identified generally as areas that were historically grasslands defined by a dominant herbaceous understory. The goal for this type of treatment is to reduce the canopy cover of pinon / juniper tree species to less than 10%. Woodland thinning areas have been identified as woodland stands that were historically more open. The majority of these stands are currently between 35 and 50% canopy cover. The goal for this type of treatment is to retain between 10% and 20% canopy cover.

Figure 5: Proposed Vegetation Treatments



Transportation for Vegetation Treatments

Table 10: Existing Road Usage by Maintenance Level and Miles

Maintenance Level	Miles
<i>Maintenance Level 1- closed roads, may be opened and closed</i>	54
<i>Maintenance Level 2 - roads only suitable for high clearance</i>	125
<i>Maintenance Level 3 - low speed, single lane roads</i>	17
Total Miles	196

Temporary roads may be needed for implementation of vegetation treatments in order to avoid cultural resources, comply with the Clean Water Act, or other circumstances. No new permanent road construction would occur. Temporary roads would be closed and rehabilitated following treatment activities.

Summary

Table 11: General Alternatives Comparison

	Alternative 1	Alternative 2
Animal Unit Months	0	up to 7,600
Season of Use	0	05/01 – 10/31
<i>Proposed Structural Improvements</i>		
Wells	0	1
Pipeline	0	17 miles
Water Troughs	0	28
Water Storages	0	2
Tanks	0	20
Waterlots	0	7
Corrals	0	8
Holding Pastures	0	2
Cattleguards	0	2 new, 1 moved
<i>Vegetation Treatments (acres)</i>		
Grassland Restoration	0	17,758
Savanna Thinning	0	21,196

Table 12: Alternatives Comparison: Forest Plan Compliance and Desired Conditions

Purpose and Need	Indicator/Measure	Alt 1	Alt 2
Maintain and Improve Understory Vegetation	Number of monitoring sites	0	16
	Number of sites with a stable trend or an upward trend	Unknown	16
	Develop and Implement monitoring Plan	No	Yes
Reduce Canopy Cover of Pinon-Juniper	Acres of grassland restoration	0	17,758
	Acres of savanna woodland restoration	0	21,196
Move Toward Forest Plan Standards and Guides	Meeting or moving towards standards	Some	Yes
	Meeting or moving towards guidelines	Yes	Yes
Provide Flexibility to Adapt Management	Develop adaptive management strategies	No	Yes

Chapter 3: Environmental Effects Analysis

Effects on Rangeland Vegetation and Grazing Systems

This section addresses the rangeland vegetation within the Heber Allotment, along with the effects associated with the management of livestock. This section contains the information necessary to understand the environmental effects associated with the alternatives considered.

The *Data Sources* section informs the reader of the source of information underlying the analysis. The *Affected Environment* section for each resource topic describes the existing or baseline condition against which environmental effects are evaluated and from which progress toward the desired condition can be measured. The Environmental Consequences section for each resource topic discusses direct, indirect, and cumulative effects. Effects can be neutral, beneficial, or adverse. The *Basis of Comparisons among Alternatives* delineates what general measures will be assessed in the *Effects* section. This pattern is followed for every resource analyzed in this chapter of the EA, and this descriptive key is not repeated in other sections in an effort to keep this document concise.

Data Sources

The local district files for the Heber Allotment contain time-series analyses with the detailed monitoring data. Utilization data on the allotment has been collected over decades using various methods, including both the Parker 3-step and the Common Non-Forested Vegetative Sampling Procedure (CNVSP). Files also contain detailed information on the history of the permit and the Annual Operating Instructions from year to year, in addition to the monitoring data.

Affected Environment

Environmental effects for rangeland resources and grazing within the project area are documented within the allotment boundary for the Heber Allotment, on the Apache-Sitgreaves National Forests. Earlier sections of this document detail the existing conditions of vegetation and range resources on the allotment.

Basis of Comparisons among Alternatives

For rangeland vegetation, multiple measures are used to analyze the direct and indirect effects of alternatives relative to existing conditions and desired conditions. Direct and indirect effects include the amount of vegetative ground cover, and composition of that groundcover in terms of species and quality of forage. Cumulative effects are considered in terms of projections of these effects alongside scientific literature from experimental ranges and rangeland management journals regarding the long-term impacts of various grazing and disturbance regimes.

For livestock grazing management, the alternatives are contrasted based on their direct effects to the existing livestock operation, including number of head and the administrative grazing system such as improvements and pasture rotations. Cumulative effects are considered in the same terms, incrementally over a longer time scale.

Effects to Rangeland Resources

Effects of Alternative 1 on Vegetation – No Action

Although there would be no livestock grazing authorized, utilization would take place by wildlife and horses associated with the neighboring Heber Wild Horse Territory. Studies have shown that forage production was up to 24% higher under light than moderate grazing (Holechek et al. 1994; 1999). Light use may show some increases in palatable forage species composition, however different stocking rates, which correlate to use levels, generally had more impact on forage production than plant composition (Holechek et al. 1994; 1999). This indicates that plant composition would likely remain highly variable while overall forage production would demonstrate at least a marginal increase. However, no vegetation monitoring would be conducted.

The northern pastures currently dominated by blue grama are not expected to see a change in species composition as a result of removing livestock. However, a slight increase in ground cover would be expected in the short term. In the long term, without vegetation treatments, these increases in production, ground cover, and trends would begin to diminish in the northern part of the allotment. This would result from increasing overstory canopy cover in parts of the northern pastures that include the Pinyon-Juniper Woodland vegetation type (Ross 2012; USDA-RMRS 2004; Coop 2017). For instance, displacement of understory plants by juniper resulted in a loss of 70 % of the perennial grasses, forbs, and half-shrubs in an ungrazed study plot (Arnold 1964). Based on the studies above, species composition changes would be more closely tied to the state of overstory increase than to any other factor.

For the southern pastures, which are dominated by understory species more closely related to the ponderosa pine ecosystem type, light use levels would still be expected. However, Ponderosa pine tends to increase with the removal of disturbance from livestock in these ponderosa pine dominated sites. In past studies, dense coverages of pine seedlings developed under similar circumstances (Potter and Krenetsky 1967). Under Alternative 1, ground cover may increase, resulting from short-term increases in production and vigor. However, in the long term, expanding ponderosa pine seedling establishment may decrease the production of understory vegetation. The amount of light reaching the forest floor is the most influential and manageable variable affecting understory forage production. Intercepted precipitation results in a reduced amount of water reaching plant roots (Kolb 1999; Roundy et al 2013). In these southern pastures, litter would be expected to increase, mainly provided by pine needles.

Effects on Structural Improvements under Alternative 1

Over the long-term, the effects of this alternative would be a lack of maintenance of structural range improvements. The effect of no maintenance on earthen stock tanks would result in them being filled in with sediment which would result in decreased water volume holding capability and eventually defunct water sources. Trick tanks, wells, and water systems would not be maintained under this alternative. The effects of this would result in these water sources becoming non-functional.

Effects of Alternative 2 on Vegetation – Proposed Action

Effects on vegetation resulting from this can be roughly delineated into two areas: vegetation effects from the grazing system (timing, rotation, use levels), and general effects from the structural improvements and the impacts these have on animal movements.

Vegetation effects of grazing system: The effects of livestock grazing at the proposed conservative levels would maintain or even improve the density, composition, vigor, and production of desirable forage plants within areas that have less than 20% canopy cover. Increases in these attributes would also have a positive effect on ground cover and trends, likely increasing both. For areas that have greater than 20% canopy, the ground cover, species composition, and trends are expected to demonstrate a flat trend. In these areas, the amount of understory vegetation is likely controlled by the woody overstory or climatic variables as much as by grazing effects (Arnold 1964; Holechek et al. 1994). A deferred, rest-rotation grazing system allows for different plants to be grazed at different growth stages within any given year and from year to year. In the long term, combined with other management factors, this grazing system would help promote a healthy understory of desirable forage species.

Conservative use levels have shown to provide benefits from both levels of utilization, with the greatest benefit of light or conservative stocking in terms of forage production occurring in dry years (Holechek 1994; 1999). Most of the studies available are in terms of light, moderate, or heavy grazing, so for this report, an assumption must be made that data presented for moderate grazing levels could have had up to 50% utilization, whereas Alternative 2 proposes levels that will trend towards *lighter* levels of grazing than analyzed in these studies. For the northern pastures, blue grama makes up the majority of the species composition, and with Alternative 2, it would continue to

dominate the northern pastures. In a study completed by Schuster in 1964, blue grama and other grasses had a higher percentage of ground cover and composition in moderately grazed areas than in exclosures which excluded livestock. High elevation grasslands near Flagstaff, AZ (Loeser et al 2007), showed similar results. In that study, cattle removal demonstrated no consistent differences in cover from the moderate grazing control in any plant functional category. Based on the results on this and similar studies, species composition should remain similar or increase. Trends on long term transects should remain stable or improve under the actions proposed in Alternative 2. For the southern pastures, effects from livestock grazing are similar to the northern pastures but vary in terms of species composition. Alternative 2 would maintain or improve production and vigor of desirable perennial grass species in the ponderosa pine type. Across summary of numerous studies, forage production was higher under rotation versus continuous grazing and more beneficial to desirable forage species, making this a well-supported type of conservative grazing system for a southwestern ecosystem (Holechek et al. 1994; 1999).

Effects on Improvements under Alternative 2

Livestock grazing at the proposed levels would not be contingent upon completion of any of the identified proposed range improvements. Proposed management levels are based upon existing conditions and current historical data. Structural range improvements would promote better livestock distribution and make handling livestock more efficient. Improvements phased in under Alternative 2 include:

- *Waters:* (1 well, 17 miles of pipeline, 28 water troughs, 2 water storages, 4 new trick tanks and 1 expansion, and 16 new stock tanks)

These waters would help in areas that are currently lacking water. This would spread out livestock distribution and make more efficient use of the available forage.

- *Livestock Handling:* (7 waterlots, 8 corrals, 2 holding pastures, 2 new cattleguards and re-locate 1)

Cattleguards would replace gates that are on roads that receive higher than normal public use.

- *Vegetation Treatments:* (17,758 acres of grassland restoration, 21,196 acres of savanna thinning)

A reduction in canopy cover would result in increased understory vegetation with greater production, cover, and species composition. Herbage production in open pinon-juniper stands may be as much as six times higher than dense pinon-juniper stands (Clary 1974; 1981; see also Coop 2017). Grassland restoration treatments would result in canopy cover less than 10%. In Arizona, an increase of tree canopy cover from 0 to 10% can reduce herbage production by as much as 50% (Clary 1986). In a study done of this type of treatment, the proportion of grasses by weight in the post-treatment composition increased to 73% from a pretreatment average of 46%. Savanna thinning treatments would result in total canopy cover of pinon-juniper between 10 and 20%. These savanna thinning areas would also show a relative increase in herbaceous understory vegetation in terms of production, species diversity, vigor, and litter accumulation relative to untreated areas (USDA 1964).

Table 13: Existing and proposed acres for vegetation types under Alternative 2

Pasture	Existing Grassland	Proposed Grassland	Existing Savanna	Proposed Savanna	Existing Persistent Woodland	Proposed Persistent Woodland
N&S Ancient	874	1,260	378	2,955	8,828	5,867
Oil Well	101	753	805	6,493	11,514	5,175
Red Knoll	2,117	2,449	404	1,297	6,917	5,691
Mud Tank	219	610	345	3,863	9,166	5,263
Squaw	3,318	4,709	234	298	7,703	6,248
Bigler	4,687	6,409	1,247	4,159	10,503	5,868
Halter Cross	1,160	1,568	501	2,131	4,563	2,571
Total	12,476	17,758	3,914	21,196	59,194	36,683
% of Total Area	17%	23%	5%	28%	78%	48%

1. Grassland = <10% Canopy Cover – 2. Savanna Woodland = 10-20% Canopy Cover – 3. Persistent Woodland = >20% Canopy

Table 14: Alternatives Effects Comparison by Pasture

Pasture	Proposed Improvements		Veg. Treatment Acres		Long Term Veg. Trend*	
	Alt. 1	Alt. 2	Alt. 1	Alt. 2	Alt. 1	Alt. 2
North and South Ancient	None	1 waterlot 1 corral	0	4,215 (41%)	→ or ↘	→ or ↗
Oil Well	None	5 ¾ miles of pipe 7 troughs 1 storage 1 trick tank	0	7,246 (53%)	→ or ↘	→ or ↗
Red Knoll	None	1 cattleguard Re-locate 1 cattleguard	0	3,746 (39%)	→ or ↘	→ or ↗
Mud Tank	None	2 corral expansions 2 waterlots 1 trick tank expansion 1 new trick tank 1 ½ miles of pipe 5 troughs	0	4,473 (34%)	→ or ↘	→ or ↗
Squaw	None	1 mile of pipe 1 trough	0	5,007 (45%)	→ or ↘	→ or ↗
Bigler	None	1 well 8 ½ miles of pipe 8 troughs 1 storage 1 waterlot 1 corral	0	10,568 (66%)	→ or ↘	→ or ↗
Halter Cross	None	2 stock tanks 1 trick tank 4 troughs 2 ¼ miles of pipe	0	3,699 (50%)	→ or ↘	→ or ↗
Nelson	None	1 holding pasture	0	0	→	→
Gentry	None	1 cattleguard 1 holding pasture 3 stock tanks 1 corral 1 waterlot	0	0	→	→
Bunger	None	4 stock tanks 2 waterlots	0	0	→ or ↗	→ or ↗
Phoenix Park	None	5 stock tanks 1 corral expansion 2 corrals 1 holding trap 1 trick tank 1 ¼ miles of pipe 3 troughs	0	0	→	→

|→ - stable with no apparent trend |↗ - upward trend |↘ - downward trend.

**Vegetative trend is defined here by the measures of the CNVSP protocol, primarily looking at plant basal area and species composition. Upward trend is indicative of moving towards desired conditions, which are in turn defined in terms of the composition and productivity of forest rangeland.*

Cumulative Effects

Cumulative effects for this project are considered as incremental impacts from past and reasonably foreseeable future actions. These are considered primarily in terms of additive effects occurring to vegetation in the allotment area.

Past agency actions: considered approx. 2000 - 2020

The past agency actions fit roughly into the following categories: Broadcast Burning, Pile Burning, Timber Cuts, Compacting/Crushing of Fuels, Fuel Break, Noxious Weed Treatments, Piling, Chipping, Rearrangement of Fuels, Tree Planting, Grazing, Range Forage Improvement, Tree Encroachment Control, Pinon-Juniper Removal, and Wildlife Habitat Improvement. The vegetation and landscape that is represented by current conditions present within the Heber Allotment is a result of these activities, along with several other factors. A standard list of past agency actions was generated by the Interdisciplinary Team at the outset of the analysis and is used for all analyses. This list can be found in the project record.

Present and Reasonably Foreseeable Agency Activities: approx. 2020 – 2025

Rodeo-Chediski Prescribed Burn Implementation – An environmental analysis was completed in 2012 that analyzed prescribed burning in the Rodeo-Chediski fire. This activity should reduce ponderosa pine regeneration and restore vigor in herbaceous understory vegetation. Prescribed burning, depending on the scale, could impact pasture rotations, livestock distribution, and overall plant productivity. Fire in tandem with properly timed livestock grazing and rest periods has demonstrated positive results on the condition of southwestern grasslands, particularly when addressing loss of herbaceous understory due to woody plant encroachment (USDA-RMRS 2004, pp. 145-146).

4FRI Rim Country Project – As above, the activities authorized under this project should reduce ponderosa pine regeneration and restore vigor in herbaceous understory vegetation.

Okty Flat Forest Health Project – This Healthy Forest Recreation Act CE covers the perimeter of the community of Heber-Overgaard, AZ. An incidental benefit of removing unhealthy, dead, or dying trees due to bark beetles is addressing loss of herbaceous understory due to woody plant encroachment. This project reduces the basal area of woody species in the pastures bordering Heber-Overgaard.

Mexican Gray Wolf Recovery Plan – A Record of Decision was signed January 2015 for a revision to the regulations regarding the gray wolf. This revision expanded the territory to include the Sitgreaves National Forest, which includes the Heber Allotment. It also allows for the release of wolves on the Sitgreaves. The presence of wolves on the Heber Allotment could impact pasture rotations, livestock, distribution, and livestock productivity, but primarily exists as an administrative issue calling for cooperation between the current permittee, USFS, and USFWS, as opposed to impacting the viability of livestock grazing. Wildlife-specific effects are analyzed later in chapter 3.

Heber Wild Horse Territory Management Plan – The Heber Wild Horse Territory (HWHT) is approximately 20,000 acres, entirely on the Black Mesa Ranger District. Approximately 9,349 acres of the HWHT overlaps the Heber Allotment, mainly within the Gentry Pasture (7,326 acres), with the remainder in the Bunker Pasture (1,892 acres), and the Holding Pasture (131 acres). The HWHT is currently undergoing analysis. See the later portion of chapter 3 for a fuller discussion of cumulative effects and the HWHT.

Travel Management Rule – In the project area, there are numerous informal OHV trails and routes. Unauthorized OHV use can decrease production and ground cover, leading to a loss of forage and deterioration of soil conditions. OHV use can also impact long term monitoring transects by reducing vegetation and potentially destroying the transect location itself. The effects of OHV use are minor in scale when compared to the total project area. The Forests' Travel Management Review process will result in a reduction in cross-country overland travel using motorized vehicles. Roads and OHV use being a prominent disturbance in Southwestern grasslands, this action in tandem with the proposed grazing plan has the potential to positively impact rangeland vegetation, particularly with the reduction of cross-country disturbances and soil displacement (USDA-RMRS 2004, pp. 151-153, 166).

Effects on Soils, Watersheds, and Riparian Conditions

Data Sources

Random sampling points were located within TES map units from Laing et al. (1987) that accounted for 20 % or more of any given pasture area across the Allotment. At least one soil condition field evaluation form was completed for each of these units in the vicinity of sampling points established by Forest soils and hydrology specialists. Each pasture received at least one field day of sampling and overall soil condition assessment.

Affected Environment

Environmental effects for soil resources within the project area are documented in terms of direct and indirect effects that occur within the allotment boundary for the Heber Allotment, within the Apache-Sitgreaves National Forests, and watershed-scale effects that are larger than the allotment boundary corresponding to 5th and 6th level Hydrologic Unit Codes (HUCs). Earlier sections of this document detail the existing conditions of soil and hydrological resources on the allotment.

Basis of Comparisons among Alternatives

The criteria used to evaluate alternatives will be based on the likelihood of moving toward or attaining desired conditions identified for this project and in the Forest Plan. The indices used to make these determinations provide the basis of existing conditions as disclosed in chapter 1 and reiterated here:

- **Soil Effects**: For soils, the potential effects to the USFS Soil Condition Framework are used to evaluate the environmental effects of the alternatives. These resource indicators are soil condition and trends relating to qualitative data collected as part of project analysis in 2014 supplemented by data collected on the Gentry and Bunker pastures during the Heber Wild Horse Territory analysis in 2008 and 2018.
- **Water Quality Effects**: For water quality, compliance with the Clean Water Act will provide the threshold for analysis, covering direct, indirect and cumulative effects. Potential for changing the listing of a given water body will be gauged.
- **Watershed/Riparian Effects**: The Watershed Condition Framework and PFC Assessments will be used to evaluate and compare watershed scale direct, indirect and cumulative effects in this report for watersheds and riparian areas. Specifically, will desired conditions be moved towards.

Effects on Soil Condition and Trends under Alternative 1- No Action

The existing condition of soils rated as satisfactory in grassland, pinyon-juniper savannah, and pinyon-juniper persistent woodland vegetation types will continue under the no action alternative. Grassland, savannah, and persistent woodland vegetation types with impaired soil conditions due to juniper encroachment will have the potential for a downward trend overtime if treatment is not implemented or maintained and current site conditions continue to persist. In short, grass biomass and cover decrease as woody species biomass and cover increase. If these site conditions persist, infiltration rates will gradually decrease as exposed, bare soil is consistently subjected to raindrop impactation and overland flow. Bare soil exposure and connectivity will increase erosion rates and loss of vegetative ground cover could have long-term, negative impacts on site stability and productivity.

In certain existing impaired soil types, with the absence of livestock grazing, vegetation and soil biotic crusts would be allowed to recover more quickly. Re-establishment of vegetative ground cover occurs in the absence of usage from cattle, desirable soil productivity and stability would return at a quicker rate, in these areas, compared to the proposed action.

Soils in locations of heavy fuel loading under a dense canopy are generally impaired and have increased potential for a downward trend under the no action alternative. Encroached, forest and woodland vegetation types across the allotment with heavy fuel loading on the ground are more susceptible to high soil burn severity in the event of a wildfire. The loss of canopy cover, ground cover, and organic debris on the soil surface in a higher-severity fire event, would likely lead to increases in soil erosion, loss of soil organic matter, and possible reduction in soil fertility and / or development of hydrophobic qualities.

Effects on Riparian Areas under Alternative 1- No Action

As livestock would not be present under this alternative, riparian areas would not be impacted by livestock related herbivory or hoof-related impacts. However, there would be no chance of benefits to riparian condition from improving upland watershed condition to desired conditions from vegetation treatments and prescribed fire. Coarse woody debris loading remains high, thus there is greater risk of high burn severity and subsequent flooding effects, which could negatively affect riparian condition.

Effects on Soil Condition and Trends under Alternative 2- Proposed Action

Overall, the proposed action should improve vegetative and soil conditions in currently impaired areas at a greater rate than Alternative 1, primarily through implementation of mastication treatments, which thus occupy the bulk of our analysis below. 81% of the soils in the project area currently indicate that desirable soil function is being sustained and the ability of the soil to maintain resource values and sustain outputs is high. Approximately 2 % of the soil conditions across the allotment are rated as inherently unstable or “unsuited”. Soils with this condition rating generally occur on very steep slope gradients (<40 %), are extremely rocky, and very shallow. Soils receiving impaired condition ratings indicate the ability of the soil to function properly and normally has been reduced and/or there exists an increased vulnerability to degradation. Impaired soils make up the remaining 17 % of the project area. Approximately 6 % of that total occurs within the southern portion of the allotment in forest vegetation types that exhibit impaired conditions primarily due to effects from the Rodeo-Chediski fire. Of the remaining 11 % impaired soils in pinyon-juniper woodlands, Great Basin grasslands, and ephemeral drainage bottoms, approximately 4% is being proposed for vegetation treatments that should improve soil conditions in the long-term.

The existing condition of soils rated as satisfactory in grassland vegetation types being maintained at 0 – 10 percent canopy cover, pinyon-juniper savannah types at 10 – 20% canopy cover, and pinyon-juniper persistent woodlands at 20 – 30 % canopy cover will be maintained or improved with proper implementation of soil Best Management Practices (BMPs) under the proposed action, detailed in Appendix B. Organic soil carbon will continue to accumulate at potential rates and soil fertility will slowly improve commensurate with the accumulation of organic matter at its existing or improved response rate to pinyon-juniper thinning and grassland restoration treatments. Positive results involving soil stability and productivity response to proposed pinyon-juniper thinning treatments comparable to this project are evident in a study conducted by Brockway et al. (2001) on the Mountainair Ranger District of the Cibola National Forest in central New Mexico. They reported a large increase in native grass cover and plant species richness/diversity and an increase in understory biomass for all harvest treatment plots compared to control (no treatment) plots. Treatment also increased litter cover, reduced bare soil exposure, and subsequently reduced soil loss rates (Brockway et al., 2001). Positive results on increases in soil moisture retention after mechanical tree removal have been documented regionally. Young et al. (2013) reported in their study in southern Utah that juniper mastication treatment areas experienced an increase of soil moisture holding capacity.

In total, 84 of the 98 % manageable land area across the allotment should achieve desirable soil conditions (according to the Soil Condition Framework) over time with the implementation of the proposed action in conjunction with the proper institution of soil and water conservation measures and accompanying explanatory notes in Appendix B.

Effects on Water Quality under Alternative 2- Proposed Action

There would be no changes with compliance of the Clean Water Act. Long-term water quality should benefit from treatment of upland areas currently not meeting desired conditions because of departures in vegetation and fuel composition. Although there may be isolated, short term disturbance of soils and vegetative cover from implementation of these treatments, project BMPs modeled off of similar projects on the Forests will be used to maintain compliance with federal and state water quality laws. These standard mitigations are used across a variety of projects on the Forests and have been validated in maintaining, for instance, Clean Water Act compliance, through their use on previous projects.

Effects on Riparian Areas under Alternative 2- Proposed Action

Although the current condition of most of the riparian areas was improving, they were not at desired conditions currently, being in a condition somewhat less than PFC. Because grazing is allowed in riparian areas and during the growing season, it is expected that riparian recovery will be slower than the no grazing alternative. Few of the riparian areas of concern are separately fenced off from the rest of the pasture. The proposed action will allow grazing on a deferred rotational pattern throughout the year, the bottomlands getting complete rest from livestock use during an entire growing season in pastures 1 to 2 out of every 13 years. Some studies have shown that extended heavy use by grazing animals can cause a decline in the amount or the disappearance of riparian woody species such as willow (Singer et al, 1994). In addition, continued heavy use of riparian woody species can limit the plant's ability to regenerate (Winward, 2000). Additional watering points proposed under this alternative would mitigate via improved livestock distribution and decrease pressure on riparian areas, thus improving the rate at which a particular reach will meet desired conditions or helping to maintain PFC. Regarding vegetation treatments, increased infiltration resulting from the vegetative treatments would result in a slower release of water, minimizing channel bank and bed instability (Fisher et al. 2008).

	Alternative 1: No Action			Alternative 2: Proposed		
<u>Resource Indicator</u>	<u>Grazing Permit Renewal</u>	<u>Veg. Treatment (Fire and Mech.)</u>	<u>Infrastructure</u>	<u>Grazing Permit Renewal</u>	<u>Veg. Treatment (Fire and Mech.)</u>	<u>Infrastructure</u>
Soils(Soil Condition)	Satisfactory soils will remain in existing state. Fastest potential to recovery for impaired soils	Coarse woody debris loading remains high, greater risk of high burn severity and loss of soil fertility	None because grazing would cease	No long-term negative effects to soil stability/ productivity with implementation of BMPs	Impaired soils due to juniper encroachment move towards an upward trend. Reduced soil burn severity.	Minimal effects with implementation of BMPs
Riparian	Allows fastest possible recovery to PFC	No benefit to riparian condition PFC	No benefit to riparian condition PFC	Slower recovery to desired conditions (PFC)	Benefit to riparian condition (PFC)	Benefit to riparian condition (PFC)
Water Quality	No changes in compliance with Clean Water Act, benefit to water quality.	No changes in compliance with Clean Water Act, no added benefit to water quality.	No changes in compliance with Clean Water Act.	No changes in compliance with Clean Water Act	No changes in compliance with Clean Water Act, added benefit to water quality	No changes in compliance with Clean Water Act, benefit to water quality
Water Quantity	Minimal effects, may promote more stable hydrology	Potentially less stable hydrologic regime long-term	Minimal Effects to stable hydrologic regime	Minimal effects, potentially less stable hydrologic regime	Potentially promotes more stable hydrologic regime	Minimal effects to hydrologic regime

Table 15: Summary of Soils and Watershed Effects

Cumulative Watershed Effects

Table 16: Watershed Cumulative Effects, Summary based on Watershed Condition Framework

Action	Effect on Watershed Condition Scores		
Past Activities	Watershed condition ratings originally developed in 2010, All watersheds rated as Properly Functioning Condition or Functional at Risk		
Present Activities	Maintenance or improvement of indicators: water quality, water quantity, soils, fire regime and wildfire, forest cover, rangeland vegetation, and forest health		
Reasonably Foreseeable	Maintenance or improvement of indicators: water quality, water quantity, soils, fire regime and wildfire, forest cover, rangeland vegetation, and forest health under 4FRI Rim Country		
Heber Allotment Actions		Alternative 1 No Action	Alternative 2 Proposed Action
	Grazing Permit Renewal	Water quality, riparian vegetation, soils and rangeland vegetation indicators improve	Water quality, riparian vegetation indicators, soil, and rangeland vegetation indicators maintained with effective adaptive management strategy
	Fuels and Vegetation Treatments	No benefit to water quality and quality, riparian/wetland vegetation, soils, rangeland vegetation, fire regime and wildfire indicators.	Maintenance or improvement of water quality and quality, riparian/wetland vegetation, soils, rangeland vegetation, fire regime and wildfire indicators. Roads and trails maintained with BMPs.

Cumulative effects analysis at the watershed scale was completed using the Watershed Condition Framework as a basis. As described earlier in the report, Watershed Condition scores are based on attributes related to watershed processes. See project lists in the section above. This analysis will qualitatively describe the potential changes of the relevant seven indicators in relation to: 1) the effects of past, present and reasonably foreseeable activities within the watershed and 2) the effects that are expected with implementation of the alternatives associated within the Heber Allotment. Examples of activities and events which are at a scale and magnitude large enough to effect watershed condition indicators include but are not limited to, livestock grazing, wildfire, prescribed fire, forest thinning, and grassland and woodland restoration.

These projects either include fuels reduction through prescribed fire or are mechanical vegetation treatments. Coupled with similar fuels reduction and vegetation treatments included in the proposed action for the Heber Allotment, watershed condition indicators including soils, fire regime or wildfire, water quantity and quantity indicators, and rangeland vegetation are expected to be maintained or improved over the long-term.

Prescribed fire activities as part of this project have the potential to benefit the WCF wildfire indicator with respect to attaining desirable vegetation structure and composition, fuel composition, and restoring natural fire regimes in the long-term. Upland satisfactory soil condition will remain stable and impaired soils have the potential for improvement. Recurring, low intensity prescribed fire is a key component in the maintenance of desirable ecological and soil condition. As long as it is maintained regularly at low to low-moderate intensities, it has the potential to increase the rate of soil organic matter decomposition and incorporation in the long term. This helps stimulate more vigorous herbaceous plant growth which improves site stability / productivity. Ultimately, this should increase infiltration rates, reduce overland flow, promote stable hydrologic / sediment regimes and ultimately improve the WCF water quality and quantity and riparian/wetland indicators overtime.

The management of neighboring allotments is expected to continue consistent with the past, therefore there are no expected changes to watershed condition indicators from those areas. With respect to grazing permit renewal portion of this proposed action, soil condition, rangeland vegetation, water quality, and water quality indicators are expected to remain unchanged with implementation of an effective adaptive management strategy as outlined in the proposed action.

Effects on Wildlife and Migratory Birds

A variety of species occur in the project area including game, non-game, and special status species. These are discussed by category in more detail below.

Data Sources

A species list was obtained on September 17, 2014 from the U.S. Fish and Wildlife Service (FWS) Arizona Ecological Services, Information, Planning, and Conservation System (iPAC) system. A Biological Assessment (May 11, 2015) was prepared for federally listed species, to meet Endangered Species Act requirements, 1973, as amended, for section 7 consultation. A letter of concurrence dated July 1, 2015 from the USFWS concurred with the effect calls in the submitted Biological Assessment. Concurrence on presence of species and critical habitat within the analysis area was obtained by various FWS species specialists. Species that are not present or do not have potential habitat in the allotment are dismissed from further analysis as the project will necessarily have no effect to these species. Follow-up and confirmation of species lists and consultation was sought in 2019 and 2020.

Affected Environment

The analysis area is the Heber Allotment. See Figure 1 above. For the purpose of including these species for effects analysis, species that are known or have potential to occur within the Heber Allotment are further analyzed, and species that are not present or do not have potential habitat in the allotment are dismissed from further analysis as the project will have no effect to these species.

Basis of Comparisons among Alternatives

Direct effects are considered in terms of impacts that can result in or effect the types of determinations delineated in appropriate recovery plans and biological assessments. Indirect and cumulative effects are typically considered in the same terms, only incrementally removed in either space or time. Details of the effect determinations documented below are available in the project record and are simply presented below in summary form. More detail will be found in the discussion of the proposed action as the no grazing alternative would present little opportunity for potential direct or indirect effects to the species.

Direct and Indirect Effects of the No Grazing Alternative

The No Grazing Alternative would result in “No Effect” determinations for any sensitive species present in the project area. More rapid recovery of riparian stretches (see riparian analysis above) would benefit riparian obligate or riparian dependent species. The primary benefit of this alternative is that recovery of soils, watershed, and riparian conditions would occur, and would be quicker than with the action alternative. Increases in ungrazed available herbaceous and browse forage would be expected to result in higher densities of insects, small mammals, passerine birds, game animals and other wildlife species that depend on grasses, forbs, and leaders on woody shrubs and mast for food.

However, excluding grazing alone without fire/fuels and Pinyon-Juniper woodland treatments would limit the extent that wildlife habitat quality could improve in northern portions of the allotment. Proposed vegetation treatments would not occur and stands of piñon-juniper woodlands would remain dense and overstocked, with continued degradation of the habitat, for those species dependent on woodland. Grassland maintenance would also not occur with encroachment of piñon-juniper into grasslands continuing to degrade habitat for those species dependent on grasslands.

Direct and Indirect Effects of the Proposed Action

In general, potential effects from livestock grazing on wildlife habitats and species include changes in structure and composition of habitat. Potential effects on wildlife species would be reduced by grazing within allowable utilization thresholds, which provide residual vegetation for wildlife cover and food. Resting and seasonally deferring pastures from grazing can provide higher quality habitat areas for wildlife breeding, feeding, and other functions. Effects can be anticipated to be limited to local effects on individuals of some species and short-term effects on habitat quality in some areas. Determinations made below in consultation with USFWS are based on these assumptions. See tables 17 -21 below.

ESA-Listed Species analyzed in Detail

Table 17: Listed Species Analyzed in Detail

Common Name	Scientific Name	Known to Occur?	Potential to Occur?	Federal Status	Critical Habitat	Effect Determination for Proposed Action
Mexican Gray Wolf	<i>Canis lupus baileyi</i>	Yes	Yes	Experimental Population, non-essential	No	Not likely to jeopardize the continued existence of the Mexican gray wolf
Mexican Spotted Owl	<i>Strix occidentalis lucida</i>	Yes	Yes	Threatened	Yes	May effect not likely adversely effect the Mexican spotted owl or its critical habitat
Narrow-headed Gartersnake	<i>Thamnophis rufipunctatus</i>	No	No	Threatened	Yes (proposed)	Not likely to adversely affect or modify proposed narrow-headed garter snake habitat

Listed Species Not Analyzed in Detail

Table 18: Listed Species Not Analyzed in Detail

Common Name	Scientific Name	Known to Occur?	Potential to Occur?	Federal Status	Rationale for No Detailed Analysis	Effect Determination for Proposed Action
Black-Footed Ferret	<i>Mustela nigripes</i>	No	No	Exper. Population, non-essential	Two experimental, non-essential population reintroduction sites occur in Arizona: Aubrey Valley (236 mi to the NW of Heber Allotment) and Espee Ranch (100 mi to the NW of Heber Allotment). No wild populations have been found despite intensive searches throughout the ferret's historic range. It is very unlikely any wild populations remain.	No effect
Southwestern Willow Flycatcher	<i>Empidonax traillii extimus</i>	No	No	Endangered	The project area contains minimal cottonwood and willow vegetation communities along creeks and streams; previous surveys in target areas on district had no detections. No Critical Habitat occurs within the Heber Allotment.	No effect
Yellow-billed Cuckoo	<i>Coccyzus americanus occidentalis</i>	No	No	Threatened	The project area contains minimal cottonwood and willow vegetation communities along creeks and streams; previous surveys in target areas on district had no detections.	No effect

Chiricahua Leopard Frog	<i>Lithobates chiricahuensis</i>	Yes	No	Threatened	Though several intermittent and ephemeral drainages in the project area as well as several perennial stock tanks may represent potentially suitable habitat for the species, declines in population levels since the 1980s have eliminated many nearby populations. This species has likely been extirpated from the Little Colorado River watershed. No recent (past ten years) or historic records for the species occur in the project vicinity. The nearest extant population occurs in the upper Cherry creek drainage approximately three miles south of the Allotment.	No effect
Northern Mexican Gartersnake	<i>Thamnophis eques megalops</i>	No	No	Threatened with Proposed Critical Habitat	No THEQME have been documented as occurring on the Black Mesa Ranger District. The nearest viable population occurs in Tonto Creek near Gisela, AZ approximately 32 miles from the project area. No proposed Critical Habitat occurs within or near the Heber Allotment.	No effect
Little Colorado Spinedace	<i>Lepidomeda vittata</i>	No	Yes	Threatened	The LCS occurs at two reintroduction sites on the Black Mesa Ranger District. The West Chevelon and Willow Creek sites are about 11 and 16 miles (respectively) west of the project area. West Chevelon Creek enters Chevelon Creek below Chevelon Lake dam.. From the project area all water flows north into Chevelon Creek. Critical habitat occurs in the lower Chevelon Creek drainage, about 35 miles north of the project area. The distance downstream yields a no effect determination for the LCS.	No effect

Forest Service Sensitive Species

The Black Mesa Ranger District utilized the Region 3 Regional Forester's Sensitive Species List to analyze species that may occur or have suitable habitat within the project area for effects analysis or are not analyzed in detail based upon species occurrence or habitat in the project area. The species analyzed in detail are listed in the relevant table below.

Table 19: Sensitive Species analyzed in detail

SPECIES	SPECIES STATUS ON DISTRICT*	SPECIES STATUS IN ACTION AREA	SPECIES HABITAT DESCRIPTION	Effect Determination for Proposed Action
<u>Mammals</u>	-	-		
<i>Corynorhinus townsendii pallescens</i>	U	Species not known to occur; habitat present in AMP area	Day roosts for these bats typically occur in caves and mines from desert-scrub up to woodlands and coniferous forests. Habitat features potentially benefiting prey species include pools, stock tanks, wet ground, herbaceous ground cover, and edge habitat.	The proposed action is not likely to result in a trend toward federal listing or loss of viability.
Pale Townsend's Big-eared Bat				
<i>Euderma maculatum</i>	P	Species known to occur; habitat present in AMP area	Has been found in riparian habitats in northwestern, and conifer forests in northern Arizona. Limited evidence suggests these bats prefer to roost singly in cracks or crevices in cliff faces.	The proposed action is not likely to result in a trend toward federal listing or loss of viability.
Spotted Bat				
<i>Idionycteris phyllotis</i>	B	Species known to occur; habitat present in AMP area	Plant communities associated with Allen's lappet-browed bat includes ponderosa pine, piñon-juniper, Mexican woodland, and riparian areas of sycamores, cottonwoods, and willows. Maternity roosts in northern Arizona have been located under loose exfoliating bark of ponderosa pine snags. Non-breeding roosts have been in sandstone cliffs and a cave.	The proposed action is not likely to result in a trend toward federal listing or loss of viability.
Allen's lappet-browed bat				
<i>Lasiusrus blossevillii</i>	P	Species known to occur; habitat present in AMP area	Western red bats prefer riparian areas dominated by walnuts, oaks, willows, cottonwoods. They primarily roost in cottonwood tree foliage	The proposed action is not likely to result in a trend toward federal listing or loss of viability.
Western red bat				
<i>Microtus mogollonensis navaho</i>	U	Species may occur; habitat present in AMP area	Inhabits dry, grassy habitats, usually in areas adjacent to ponderosa pine but sometimes also occurring as low as grassy areas in pinyon-juniper woodland or as high as spruce-fir forests. When inactive, the vole occupies a nest located either in a clump of vegetation, under a log, or in ground depressions.	The proposed action is not likely to result in a trend toward federal listing or loss of viability.
Navajo Mogollon Vole				
<i>Perognathus flavus goodpaster</i>	U	Species may occur; habitat present in AMP area	Occupies plains and desert grasslands and the sagebrush-cactus association, extending into juniper woodland.	The proposed action is not likely to result in a trend toward federal listing or loss of viability.
Springerville Silky Pocket Mouse				
<u>Birds</u>	-	-		
<i>Accipiter gentilis</i>	B	Species and habitat present in AMP area	Primarily occupies ponderosa pine, mixed-species, and spruce-fir habitats in the southwest and prefers mature conifer stands with dense canopies for nesting. There are 11 goshawk post-family fledging areas (PFAs) within the Heber Allotment.	The proposed action is not likely to result in a trend toward federal listing or loss of viability.
Northern Goshawk				
<i>Athene cucicularia hypugaea</i>	U			

Western burrowing owl		Species not known to occur; habitat present in AMP area	Western burrowing owl habitat is dry grasslands and pastures usually associated with prairie dogs or ground squirrels.	The proposed action is not likely to result in a trend toward federal listing or loss of viability.
<i>Falco peregrinus anatum</i>	B	Species and habitat present in AMP area	Breeds in Arizona wherever sufficient prey is available near cliffs	The proposed action is not likely to result in a trend toward federal listing or loss of viability.
American Peregrine Falcon				
<i>Haliaeetus leucocephalus</i>	B	Species and habitat present in AMP area	Nests near lakes on Black Mesa. Uses carrion of fish, birds, and mammals extensively wherever encountered at sites that provide disturbance-free access from the ground	The proposed action is not likely to result in a trend toward federal listing or loss of viability.
Bald Eagle				
<u>Amphibians</u>	-	-	-	-
<i>Lithobates pipiens</i>	B	Species may occur and habitat present in AMP area	Occupies a variety of aquatic habitats including slow-moving or still waters along streams and rivers, wetlands, permanent or temporary pools, and human-constructed habitats such as earthen stock tanks and borrow pits.	The proposed action is not likely to result in a trend toward federal listing or loss of viability.
Northern Leopard Frog				
<u>Fish</u>	-	-	-	-
<i>Catostomus sp. 3</i>	P	Species and habitat present in AMP area	Occupies creeks, small to medium rivers, and impoundments. It can be predominantly found in pools with abundant cover but also in riffles	The proposed action is not likely to result in a trend toward federal listing or loss of viability.
Little Colorado Sucker				
<i>Gila robusta</i>	P	Species and habitat present in AMP area	Occupies cool to warm water in mid-elevation streams and rivers where typical adult microhabitat consists of pools up to 6.6 feet deep adjacent to swifter riffles and runs. Cover is usually present and consists of large boulders, tree root wads, submerged large trees and branches, undercut cliff walls, or deep water.	The proposed action is not likely to result in a trend toward federal listing or loss of viability.
Roundtail Chub				
<u>Plants</u>	-	-	-	-
<i>Astragalus humistratus</i> var. <i>crispulus</i>	P	Species and habitat present in AMP area	Found in sandy soils of volcanic origin on slopes, benches, and ledges in xeric pine forest; (7,250-8,150 ft.)	The proposed action is not likely to result in a trend toward federal listing or loss of viability.
Villous groundcover milkvetch				
<i>Eriogonum ericifolium</i> var. <i>ericifolium</i>	H	Species may occur and habitat present in AMP area	Found in dry, gravelly to rocky slopes of lacustrine, in mixed grasslands, chaparral and oak woodlands, up to pinyon-juniper woodlands	The proposed action is not likely to result in a trend toward federal listing or loss of viability.
Heathleaf wild buckwheat				
<i>Helenium arizonicum</i>	P	Species and habitat present in AMP area	Occurs around wet places such as ponds, lakes, and roadside ditches	The proposed action is not likely to result in a trend toward federal listing or loss of viability.
Arizona Sneezeweed				
<i>Heuchera eastwoodiae</i>	H	Species not known to occur; habitat present in AMP area	Endemic to central Arizona where it grows on moist shaded slopes in ponderosa pine forests and canyons between 3,480 and 7,874 feet. The typical substrate is crevices in basalt soil or basalt soil. Many of the previous occurrences of this species have been reclassified and are no longer included is this taxon.	The proposed action is not likely to result in a trend toward federal listing or loss of viability.
Eastwood Alum Root				
<i>Huechera glomerulata</i>	U			

Arizona Alum Root		Species not known to occur; habitat present in AMP area,	Located on shaded igneous (gneiss and granite) outcrops and talus in montane oak-conifer wood at 4,000 to 9,000 ft. Found on shaded rocky slopes, in humus soil, near seeps, streams and riparian areas	The proposed action is not likely to result in a trend toward federal listing or loss of viability.
<i>Helianthus arizonensis</i>	U	Species not known to occur; habitat present in AMP area	Occurs in Coconino and Navajo Counties, Arizona in dry, sandy soils ranging in elevation from 4,000 to 7,000 feet	The proposed action is not likely to result in a trend toward federal listing or loss of viability.
Arizona sunflower				
<i>Phlox amabilis</i>	U	Species not known to occur; habitat present in AMP area	Found on open, exposed, limestone-rocky slopes within pinyon-juniper woodlands and pine-oak communities at elevations between 3,500 to 7,800 feet	The proposed action is not likely to result in a trend toward federal listing or loss of viability.
Arizona Phlox				
<i>Rumex orthoneurus</i>	P	Species not known to occur; habitat present in AMP area	Found in mid- to high-elevation (4,480 – 9,660 feet) wetlands with moist, organic soils generally adjacent to perennial springs or streams in canyons and meadow situations.	The proposed action is not likely to result in a trend toward federal listing or loss of viability.
Blumer's Dock				
<i>Salix bebbiana</i>	P	Species and habitat present in AMP area	Habitat includes borders of mountain streams, swamps, lakes, hillsides, open meadows, forest margins, and irrigation ditches.	The proposed action is not likely to result in a trend toward federal listing or loss of viability.
Bebb's Willow				
* Key to Status of Species on the District:				
P = Presence of species documented and likely still occurs				
B = Breeding of species documented				
H = Historic presence of species documented, but current status uncertain				
U = Presence of species not documented on District but may occur due to presence of suitable habitat				

Migratory Birds Analysis

Two of these, the Mexican spotted owl and southwest willow flycatcher are discussed in the Threatened, Endangered Biological Analysis will also not be analyzed further in this document. Black Mesa District is not in the current range of the California condor (IWJV) and is not known to occur in the project area. Species associated with alpine tundra, sagebrush, spruce-fir, madrean pine-oak, chaparral, desert scrub, desert grasslands, and low elevation riparian (0- 4,000 ft) were not discussed in this analysis because no habitat for these species occurs within the project or action area.

Important Bird Areas

There are no identified or potential IBAs within the project area. The Mogollon Rim Snowmelt Draw IBA occurs approximately twelve miles west of the project area. Therefore, no IBAs would be affected by the project.

Unintentional take (bird, eggs, nest) is unlikely to occur because the proposed action includes utilization guidelines which will ensure that upland and riparian herbaceous grasses, shrubs, and tree species will continue to reproduce, thereby providing habitat for nesting birds. Although livestock can inadvertently brush against or knock a nest out of a shrub or tree, this is expected to occur only occasionally. Consequently, this alternative will have no measurable negative effect on populations of migratory bird species of concern.

Table 20: Migratory Bird Species Analyzed

Species		
Northern Goshawk	Golden Eagle	MacGillivray's warbler
Mexican Spotted Owl	Ferruginous Hawk	Red-faced warbler
Olive-sided Flycatcher	Burrowing Owl	Phainopepla
Red-naped sapsucker	Black-throated Sparrow	Brewer's Blackbird
California Condor	Grasshopper Sparrow	Common Nighthawk
Northern Goshawk	Rufous -winged Sparrow	Piñon Jay
Mexican Spotted Owl	Chestnut-collared Longspur	Brewer's Sparrow
Flammulated Owl	Horned Lark	Juniper titmouse
Long-eared Owl	Rufous Hummingbird	Grace's Warbler
Olive-sided Flycatcher	Bald Eagle	Evening Grosbeak
Cordilleran Flycatcher	Common Black Hawk	Mexican Whip-poor-will
Purple Martin	Elegant Trogon	Pine Siskin
Lewis' Woodpecker	Southwestern Willow Flycatcher	Gray Vireo
Virginia's Warbler	Willow Flycatcher	Gray Flycatcher
Black-throated Gray Warbler		

Alternative 2 would have short term effects to all bird species that breed within the project area during prescribed burns or mechanical treatments. Vegetative recovery is not anticipated to occur until after the monsoon season in late July or August. Nest success for those species breeding within the project area would be greatly reduced. This is a short-term (one breeding season) impact, and vegetation would recover given average rainfall with the monsoon and winter moisture to allow for breeding of most species the next spring. Additionally, activities will treat approximately 2,000-3,000 acres annually; therefore, effects would be minimized due to activities being temporally and spatially separated. Vegetation treatments and removal do not constitute take, either intentional or unintentional, see *Seattle Audubon Society v. Evans* (952 F.2d 297).

Benefits from vegetative treatments and prescribed burning would include management towards desired conditions and increased herbaceous understory vegetation. No effects will occur to range-wide populations of migratory bird species dependent on mixed conifer, ponderosa pine, piñon-juniper woodland, and grasslands because the proposed action would not affect the suitability of migratory bird habitat.

Cumulative Effects

Cumulative effects include the direct and indirect effects of the proposed action and the no grazing alternative when added to all past, present, and reasonably foreseeable future actions. The past, present and future actions are based on the master list for the project, while the cumulative effects for wildlife resources related to the alternatives are summarized below.

Under the no grazing / no action alternative, a primary possible cumulative effect on wildlife would be the removal of or lack of maintenance of range water developments. Livestock permittees are responsible for developing and maintaining range water developments, which also provide water to some wildlife species when they are designed so wildlife have access to the water, and they have water in them. Under the No Grazing Alternative some of these improvements might fall into disrepair, while others would possibly continue to be maintained by natural resource partner groups, or the Forest Service, for wildlife and/or recreation purposes, though which ones is not reasonably foreseeable at this time.

Past agency actions: considered approx. 2000 – 2020

Actions from the project master list of past actions that have the possibility to have a cumulative effect when added to the proposed action are those that fit into the following categories: Broadcast Burning, Grazing, Range Forage Improvement, Tree Encroachment Control, Pinon-Juniper Removal, and Wildlife Habitat Improvement. In general, the existing conditions result from past agency actions and provide the context for the direct and indirect effects presented above.

Present and Reasonably Foreseeable Agency Activities: approx. 2020 – 2025

Actions from the project master list of present, and reasonably foreseeable actions that have the possibility to have a cumulative effect when added to the proposed action are the following: 4FRI Rim Country, Apache-Sitgreaves Travel Management, and Oky Flat Forest Health Project, Rodeo-Chediski Prescribed Burn Implementation, and the Mexican Gray Wolf Recovery Plan.

As noted above, 4FRI and Oky Flat should reduce ponderosa pine regeneration and restore vigor in herbaceous understory vegetation. An incidental benefit of removing unhealthy, dead, or dying trees due to bark beetles is addressing loss of herbaceous understory due to woody plant encroachment. These would benefit wildlife habitat.

The presence of wolves on the Heber Allotment could impact pasture rotations, livestock, distribution, and livestock productivity, but primarily exists as an administrative issue calling for cooperation between the current permittee, USFS, and USFWS, as opposed to impacting the viability of livestock grazing.

The Forests' Travel Management Review process will result in a reduction in cross-country overland travel using motorized vehicles. Roads and OHV use being a prominent disturbance in Southwestern grasslands, this action in tandem with the proposed grazing plan has the potential to positively impact rangeland vegetation, particularly with the reduction of cross-country disturbances and soil displacement (USDA-RMRS 2004, pp. 151-153, 166) and this will accordingly have benefits on wildlife habitat.

Effects on Fire, Fuels, Air Quality

Fire historically played a significant role in the ecology of the Southwest and the project area. Past fire suppression policies have resulted in a departure from the role of fire in natural ecological processes. Relations between this departure, the existing conditions in the project area, and the proposed action are detailed below.

Data Sources

Fire Regime Condition Class (FRCC) is a metric that quantifies how departed a system is from historical conditions in relation to fire and the role fire historically played in that system (Hann et al. 2004). Ecosystem attributes analyzed to determine FRCC include vegetation characteristics such as species composition, structural stage, stand age, canopy closure, as well as fuel composition characteristics, including fire frequency, severity, and patterns. In addition to providing description of existing conditions, FRCC model data also provides us the means of conducting comparisons among alternatives. For air quality, the Simple Approach Smoke Estimation Model (SASEM) was used to model potential impacts. SASEM calculates the consumption of fuel, emissions of particles, and dispersion of these pollutants produced by burning of forest and range vegetation types (Riebau 1988).

Affected Environment

Environmental effects for fire and fuel loading within the project area are documented in terms of direct and indirect effects that occur within the allotment boundary for the Heber Allotment, within the Apache-Sitgreaves National Forests. For air quality, effects are considered at the larger scale, that of the local ADEQ monitoring area. Earlier sections of this document detail the existing conditions of fire and fuels on the allotment.

Basis of Comparisons among Alternatives

Direct effects are considered in terms of FRCC by the % of the area in FRCC 1, 2, and 3 between the two alternatives based on modeling. Indirect effects are considered in terms of qualitative second-order effects from smoke generated by both wildland and prescribed fires, as are cumulative effects (see dimensions of impacts as discussed in Robinson 2010; Brinkert-Smith et.al 2015).

Air Quality Effects for All Alternatives

There would be minimal differences in regard to air quality between the alternatives across the implementation time period. Total smoke emissions from a wildfire would be expected to be greater than from a controlled prescribed burn, which must comply with Arizona Department of Environmental Quality (ADEQ) requirements for reporting and approval. Smoke emissions modeling would be completed as part of the permitting process for prescribed burns on a project-by-project basis as is currently the practice between the ASNFs and ADEQ. The Fire and Fuels Specialist report provides a detailed analysis of prescribed burning and air quality. Air quality impacts other than smoke are limited to the generation of dust generated by grazing/recreation activities. Grazing management use of the transportation system is limited, some fugitive dust may be generated from vehicles conducting livestock management. These impacts are expected to stay within the analysis area as dust from the very few roads settle out relatively quickly. There is no measurable difference expected between alternatives as related to dust generated from livestock grazing activities. The allotment is not within a State designated non-attainment area; therefore, no detailed assessment was necessary or completed.

FRCC Effects for Action Alternatives

With Alternative 1 approximately 17% of the acres would remain in FRCC class 1, five % in FRCC class 2, and 78% would remain in FRCC class 3. With Alternative 2 approximately 52% of the acres would be in FRCC class 1, with the remaining 48% in the FRCC class 3. Alternative 2 moves toward the desired conditions while Alternative 1 moves away from the desired conditions.

Smoke Effects for All Alternatives

Five Class 1 airsheds were identified within an 80-mile radius of the project area. Seven communities were identified as smoke sensitive areas near Heber Allotment project area. No current nonattainment areas exist within an 80-mile radius. Consideration for smoke duration and wind direction will be included in burn plans. Both prescribed fire and wildfire would create smoke, however the amount and timing of these smoke events can be mitigated with prescribed fire. Any prescribed burning would be conducted only with approved site-specific burn plans with standard smoke management mitigation. Burning would be conducted in favorable atmospheric conditions so as to minimize effects from smoke to nearby communities, class 1 airsheds and recreationists. All burning would be conducted according to the Arizona State Smoke Management rule to mitigate smoke impacts. These regulations ensure that effects from all burning within the area are mitigated and that Clean Air Act requirements are met. Prescribed fires would be conducted when conditions are such that overstory tree mortality would be low, which leaves much of the live-tree carbon pool intact. This results in less biomass being combusted than if the area were to burn under higher severity wildfire, therefore less carbon emissions are expected in controlled situations (Wiedinmyer and Hurteau 2010).

Smoke impacts from wildfires are less easily mitigated. Wildfires primarily occur during summer months when the Heber Allotment area is most used by recreationists and therefore would most likely have more of an impact on recreation values. The amount of biomass consumed during a wildfire is also not easily mitigated, the more biomass is consumed by fire the more smoke would be produced. Alternative 1 would leave biomass available for consumption in the event of a wildfire which would have direct and most likely uncontrollable impacts on recreation, the 5 class 1 airsheds within 80 miles of the project area and surrounding communities.

Cumulative Effects

Cumulative effects for this project are considered as incremental impacts from past and reasonably foreseeable future actions. These are considered primarily in terms of additive effects occurring to vegetation in the allotment area and in turn the impacts that this has had or may have on FRCC in the long run.

Past agency actions: considered approx. 2000 - 2020

Vegetation treatments around the communities of Heber/Overgaard have contributed to the current conditions. Over the past 25 years management near the Heber Allotment project area has included prescribed burning, wildfires, pile burning, mechanical thinning and various harvests as well as grazing and wildlife focused projects. See project lists in the section above.

Present and Reasonably Foreseeable Agency Activities: approx. 2020 – 2025

The primary cumulative influence on fuels in terms of present and reasonably foreseeable future actions is the Rodeo-Chediski Fire Prescribed Burn Project and 4FRI Rim Country project that overlap the Heber Allotment project area. These projects both utilize prescribed fire to move the project area towards a FRCC 1 condition and reduce the risk of uncharacteristically intense fire behavior. The combined effects of these two projects and many foreseeable projects around or near the communities of Heber/Overgaard, surrounding private infrastructure would provide restoration and fuels reduction and create mosaic stand conditions, allowing for wildlife habitat and vegetative diversity. This mosaic would allow for a diversity of fire effects thereby increasing opportunities for the maintenance of forest structure and ecological function using wildfire and prescribed fire in the long-term future.

Effects on Heritage and Cultural Resources

Heritage and Cultural Resources are a combination of archaeological, historic, and traditional cultural resources. 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*, (Programmatic Agreement). This agreement, specifically, *Appendix H, Standard Consultation Protocol for Rangeland Management* developed pursuant to Stipulation IV.A of the Programmatic Agreement, is the “standard operating procedure” for treating potential grazing impacts to heritage resources and provided the guidelines to this portion of the analysis.

Data Sources

The methodology used for data collection and for making recommendations resulted from a review of the various descriptions of the alternatives and an assessment of the potential impacts each could have to cultural resources within the project area. The current analysis used the ASNFs site and survey GIS layers, field data collection in 2018, 2019, and 2020, the Forest Service INFRA database, and reviews of existing site records stored at Forest offices. The most recent listings of the National Register of Historic Places were consulted. In addition to consulting interested Tribes, ethnographic documents and studies were reviewed to assist in identifying Traditional Cultural Properties in the project area. In accordance with Appendix H, cultural resource inventory surveys in the project area focus on 1) those areas in which standard range activities are most likely to have the potential to affect archaeological sites, and 2) those areas where new range improvements are planned and expected to be implemented within the next two years.

Affected Environment

The spatial boundary used to evaluate direct and indirect consequences of the project was the allotment boundary, since no cultural resources outside of this area will be affected by proposed project activities. Environmental effects for cultural resources within the project area are documented in terms of direct and indirect effects that occur within the allotment boundary for the Heber Allotment, within the Apache-Sitgreaves National Forests. Forest personnel determine a proposed project’s Area of Potential Effect (APE) based on the geographic area in which a project may alter the character or use of any existing Heritage Resource. Current conditions for heritage resources are summarized here for the reader, to provide a baseline against which effects are assessed. There is a total of 1,542 previously recorded sites within the allotment. Site affiliations include both prehistoric, historic, and multicomponent sites with a variety of site types from artifact scatters, fieldhouses, kivas, roomblocks, cabins, sweat lodges, and homesteads. More detail can be found in the project record.

Basis of Comparisons among Alternatives

Impacts to cultural resources, especially archeological sites, can generally be defined as anything that results in the removal, displacement of, or damage to artifacts, features, and or deposits of cultural material. In the case of cultural resources considered eligible for inclusion on the NRHP, this can also include alterations of a property’s setting or context. Heritage resources, depending on their nature and composition, are subject to several different types of impact from activities associated with grazing. Direct impacts from grazing are generally considered to be those resulting from concentrations of livestock or construction of range features. Indirect impacts can include erosion and changes in vegetative composition and density that alter the sites. The degree to which the various alternatives have the capacity to create these impacts provides the basis of our comparison which includes discussion of management options under the *First Amended Programmatic Agreement, Appendix H*.

Effects on Cultural Resources under Alternative 1- No Action

This alternative is a “No Action” alternative, wherein livestock are removed from the allotment within a one-year period and no range improvements would take place. Therefore, the potential for heritage resources to be either directly or indirectly affected by livestock grazing would be eliminated. Because of a lack of grazing, ground cover should increase, minimizing the impacts of erosion on cultural resource sites. Because no new range improvements would be constructed, no ground disturbing activity with the potential to affect heritage resources would take place.

Effects on Cultural Resources under Alternative 2- Proposed Action

Alternative 2 is the “Proposed Action” alternative. Under the proposed action alternative, livestock grazing would be permitted in such a manner that ground cover is expected to generally increase, reducing the threats of erosion upon cultural resources. Any ground-disturbing activity associated with the proposed improvements of the allotment will be surveyed prior to implementation and an archeologist will be consulted to ensure that the requirements of Section 106 of the National Historic Preservation Act are met. All historic properties will be avoided during the implementation of the proposed range improvements, thereby ensuring that there is no detrimental effect upon cultural resources. If maintenance of existing facilities are found to be in areas that have not been previously surveyed, archaeological survey will be completed prior to any maintenance or other project actions within that area. All eligible and unevaluated sites located during new survey will be flagged and avoided so that no damage is done to historic properties in the project area. All of the proposed improvements specified in the proposed action will have a heritage resource survey completed prior to implementation. Completion of such inventories will ensure a determination of either "no effect" or "no adverse effect" upon these resources.

The proposed action is detailed above in chapter 2 of this document. The increase of range improvements, specifically those that increase access of water for livestock can potentially reduce the risk for impacts to cultural resources from livestock as they will be more spread out across the landscape and less concentrated. New construction proposed under the EA will be phased to coincide with the completion of archaeology inventory. As long as archaeological sites are flagged and avoided by project actions and the boundaries/proposed treatments covered under the EA do not change, no additional archaeological inventory and/or consultation is needed. If unidentified sites are encountered during new construction, all work in that locale shall be halted and the District, Zone or Forest Archaeologist shall be notified immediately.

Fieldwork for the Heber Allotment project was completed in 2014, 2015, 2019, and 2020 by Forest Service archaeologists. Field work focused on providing clearances for basic maintenance of tanks, new range improvements, vegetation treatments, as well as assessing the impacts or not of grazing to sensitive sites. A total of 1,868 acres were surveyed, with 71 isolated occurrences documented, 41 sites rerecorded or inspected, and 18 new sites found. Table 21 below provides an overview of all the cleared activities by pasture.

Table 21: Structural Improvements with Current Clearance from Survey

Pasture	Stock Tanks Cleanings	New Stock Tanks	Troughs	Miles of Pipeline	Cattleguards	Waterlots	Vegetation Treatments
Bigler	5	-	-	-	-	1	-
Bunger	25	-	-	-	-	-	-
Gentry	28	-	-	-	1	-	-
Halter Cross	6	-	-	-	-	-	-
Mud Tank	11	-	-	-	-	-	-

Nelson	23	-	-	-	-	-	-
North Ancient	4	-	-	-	-	-	-
Oil Well	16	-	1	0.7	-	-	1,652 acres
Phoenix Park	25	3	2	1.22	-	-	-
Red Knoll	10	-	-	-	1	-	-
South Ancient	6	-	-	-	-	-	-
Squaw	5	-	-	-	-	-	-
TOTAL	164	3	3	1.92	2	1	1,652 acres

Cumulative Effects on Heritage Resources

Cumulative effects for this project are considered as incremental impacts from past and reasonably foreseeable future actions. These are considered primarily in terms of additive effects occurring to vegetation in the allotment area and in turn the impacts that this has had or may have on cultural resources incrementally into the future alongside the activities this EA has considered for cumulative effects.

Past agency actions: considered approx. 2000 - 2020

Current and previous Forest Service management activities, public resource procurement and recreational use and natural processes have impacted Heritage resources. Current conditions as disclosed above reflect the incremental impacts of past management activities. Some grazing related impacts to cultural resources, resulting from past actions, were observed within the Allotment. Continued monitoring and protection measures to those sites can mitigate those impacts, specifically exclusion fences around those kiva sites that are heavily impacted by wallowing.

Present and Reasonably Foreseeable Agency Activities: approx. 2020 – 2025

The primary cumulative influence on fuels in terms of present and reasonably foreseeable future actions is the Rodeo-Chediski Fire Prescribed Burn Project and 4FRI Rim Country project that overlap the Heber Allotment project area. The use of standard mitigation measures (all surface-altering actions will be surveyed prior to undertaking and all Heritage resources will be identified and flagged for avoidance before any actions take place) will ensure that impacts will be substantially diminished. The reduction or mitigation of direct and indirect effects in turn reduces cumulative effects to a negligible level. Provided that the requirements laid out herein and within regulations and policy in place regarding the protection of heritage resources are followed, continued grazing within the Heber Allotment should result in a determination of "no adverse effect" on a cumulative level as well as the direct and indirect level.

There are proposed improvements that have not been inventoried at this time and additional improvements that could be considered in the future. Therefore, prior to the implementation of any improvement that involves ground disturbance or has the potential to damage heritage resource sites, a heritage resource inventory must be completed to ensure that each project is managed in such a manner that there is no effect upon heritage resources.

Socioeconomic Effects

Data Sources

Using the Economic Profile System Analyst (EPS-HDT) tool developed by Headwaters Economics, a socioeconomic profile was produced for Navajo County. Additional data comes from relevant literature and IDT knowledge of the local area, as well as district range files. The primary non-market recreational values in this area, hunting and OHV use, are not expected to change in any meaningful sense under either alternative and are thus not analyzed in detail.

Affected Environment

Environmental effects for socioeconomic resources within the project area are documented in terms of direct and indirect effects that occur in the county immediately surrounding the boundary for the Heber Allotment, within the Apache-Sitgreaves National Forests. The majority of the Heber Allotment is located within Navajo County. This socioeconomic analysis discloses two primary implications of management actions- economics (*how actions effect money passing through institutions in and around the project area*), and social (*how actions effect the way people live in and around the project area*).

Existing socioeconomic conditions are best defined in terms of grazing fee receipts and employment associated with the ranching operation in the area. See effects summary below.

Basis of Comparisons among Alternatives

The direct and indirect effects of the Proposed Action and no grazing alternative are analyzed here at two levels. Direct Effects are impacts on the permittee and on the Federal Treasury / Forest Service (i.e. grazing fee receipts). Indirect effects are considered as county-wide impacts, specifically second-order social effects resulting from the direct effect. While some values used here appear very precise in measurement, they are based on certain assumptions, thus they serve best as an indicator and general magnitude of possible change, rather than a precise measurement.

Direct and Indirect Effects of Alternative 1- No Action

With this alternative, there would be no cattle grazing on the Allotment. The no action alternative would result in the loss of fees to the U.S. Treasury and the associated annual federal payments to Navajo County for livestock grazing (see above, pp. 3-5). This loss, by itself, is not substantial; however, the county would also not benefit from tax receipts from potential range improvements and the state would lose tax revenues based on the permittees' use of federal lands. This alternative would generate no economic contribution to the local economy from a livestock operation, would not directly or indirectly provide jobs associated with a livestock operation and would generate no grazing receipts for the federal treasury, in relationship to the to the Heber Allotment.

Although a definitive assessment is not possible, given the resources available for this analysis, it is recognized that adjustments to federal grazing can have consequences to individual ranch operations and ranch viability, as well as negative second-order implications to families, social structure, lifestyle, local economies, and land use. Because of the loss of grazing privileges on the allotment, alternative 1 would represent a negative impact to the permittee's ability to pursue the lifestyle and profession of their choosing. Researchers over the last 25 years have found that potential reductions in income and net ranch returns are greater in magnitude than just the direct economic loss from reductions in federal grazing (as summarized in Taylor 2005 and Rimbey 2015). Ranching operations have economic linkages with other sectors of the area's economy. These effects are summarized in the table below.

Alternative 1 Effects Summary

Table 22. Socioeconomic Indicators – Alternative 1

Resource Element	Resource Indicator	Measure(s)	Effects- Alternative 1
Economic opportunity	Employment	Number of jobs	Loss of jobs associated with current and future ranching operations.
Local Economic Sectors	Economic Sectors	Economic Sectors by percentage;	Reduction of agricultural component of local economy.
Land Use	Public and Private Land Distribution	Land Use Breakdown of Project Area	No change in %age of public land, reduction in land with agricultural production as a use.
Economic Contribution of Public Lands	Financial Contributions to and from Government	Value contribution to treasury; Revenue-sharing payments	Net loss of range of grazing fee receipts running from \$6,542 to \$10,260
Range Improvement Costs	Range Improvement Costs	Material and Labor Cost Calculations	None
Lifestyles, values, beliefs, and attitudes	Qualitative evaluation of literature related to the territory and its management	Qualitative evaluation of existing literature and local sources	Reduction in pursuit of traditional lifestyle / economic components of the area.
Environmental justice	Disproportionate and adverse effects to low-income and/or minority populations	Demographic Statistics; Qualitative evaluation	No impact

Direct and Indirect Effects of Alternative 2 – Proposed Action

With this alternative, cattle grazing would continue. Cost associated with the structural improvements that will assist with livestock management, such as corrals and holding pastures would be funded by the permittee with some assistance in the form of materials from the Forest Service, purchased with Range Betterment funds in part generated by returns on grazing fee receipts. For the purposes of analysis it could be expected that livestock numbers would as a baseline stay similar to what they have been, in turn indicating that grazing fees collected and number of jobs either directly related to the ranch operation or indirectly in the community would stay the same or increase. Portions of these fees would continue to be returned to the County and Forests. A local power plant uses forest products derived primarily from masticated juniper species to generate electricity, something that this alternative would support. These effects are summarized in the table below.

Alternative 2 Effects Summary

Table 23. Socioeconomic Indicators – Proposed Action

Resource Element	Resource Indicator	Measure(s)	Effects- Alternative 2
Economic opportunity	Employment	Number of jobs	Continuation of jobs associated with current and future ranching operations.
Local Economic Sectors	Economic Sectors	Economic Sectors by percentage;	Continuation of agricultural elements in local economy.
Land Use	Public and Private Land Distribution	Land Use Breakdown of Project Area	No change to existing land usage distribution.
Economic Contribution of Public Lands	Financial Contributions to and from Government	Value contribution to treasury; Revenue-sharing payments	\$6,542 to \$10,260
Lifestyles, values, beliefs, and attitudes	Qualitative evaluation of literature	Qualitative evaluation of existing literature	Continuation of traditional uses, something largely supported by local residents and businesses.

Environmental justice	Disproportionate and adverse effects to minority populations	Demographic Statistics; Qualitative evaluation	No impact
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Environmental Justice

Under Executive Order No. 12898, Environmental Justice strives to ensure that, to the greatest extent practicable and permitted by law, certain populations are not affected in a disproportionately adverse manner by, government activities affecting the environment. The closest unit of analysis for demographics is the “Heber-Overgaard Census-Designated Place.” The same EPS-HDT toolkit as well as the EPA’s *EJSCREEN* Environmental Justice Screening and Mapping Tool were used for this analysis.

Table 24. Environmental Justice Indicators

Geographic Area	2016 Total population	Percent of 2016 total population								
		White	Black or African American	American Indian and Alaska Native	Asian	Pacific Islander	Some other race	Two or more races	Hispanic or Latino (of any race)	% in poverty status
Arizona	6,728,577	69.5	4.0	4.0	3.0	0.2	0.1	2.1	30.5	12.9
Heber-Overgaard CDP	2,736	83.0	0.4	0.1	0.7	0.0	11.1	4.7	28.8	19.7

Minority and Low-Income Populations

About 6.7% of the local CDP’s population is *non-white minority* and about 29% of the population is Hispanic or Latino of any racial identification. These figures each fall below the Council on Environmental Quality (CEQ) suggested threshold for highlighting potential environmental justice concerns. The demographic measurements are not largely different from Arizona as a whole. Thus it is concluded to be unlikely that a project completed in the project area would have disproportionately negative impacts on any low-income or minority populations.

Effects on Heber Wild Horse Territory (HWHT)

Data Sources

Data for this analysis is derived from the recent work done by the Forests on a management plan for the territory (USDA – FS 2020) which represents the best available systematic information for the territory and associated horse population.

Affected Environment

Environmental effects are considered relative to the overlap between the Heber Allotment and the horse territory, which occupies portions of two pastures. Within the HWHT, livestock grazing has been ongoing within the Heber Allotment on 7,326 acres in the Gentry Pasture, 1,892 acres in the Bunker Pasture and 131 acres in the Holding Pasture since prior to the establishment of the territory. This represents approximately 6% of the Heber Allotment overlapping with the HWHT. Fences within the Gentry, Bunker or the Holding Pastures within the Heber Allotment do not exclude livestock from grazing the HWHT. Grazing authorization is the only part of the proposed action here that potentially impacts the territory. All proposed fuels treatments and structural improvements are to take place outside of the territory.

Current conditions for the territory are taken from the most recent data used for proposing the management plan for the territory, see below for a summary. The two components of the current conditions considered for our analysis here are current population and the currently proposed management level population for the territory.

Population: Forest personnel commissioned flights in 2014, 2015, and 2017 specifically to estimate the horse populations. They included a larger area across the Sitgreaves National Forest, extending the survey area east from Linden to Show Low. These latest surveys were conducted using the same protocols and the data subjected to the same statistical analysis, making the results directly comparable. The flights for the May 2014 survey were conducted on a grid that covered the territory and included areas across the Sitgreaves National Forest where horses had recently been observed. Six flights occurred over two days. The protocols, statistical analysis, and flight pattern were replicated in February 2015 and April 2017.

Table 25. Horse-specific survey within the Heber Wild Horse Territory, May 2014, February 2015, and April 2017

Date of survey	Horses observed	Estimated Population
5/12 to 14/2014	18	16 to 21
2/17 to 19/2015	16	9 to 32
4/18 to 19/2017	27	22 to 51

Table 26. Horse-specific survey outside the Heber Wild Horse Territory, May 2014, February 2015, and April 2017

Date of survey	Horses observed	Estimated Population ¹
5/12 to 14/2014	184	177 to 258
2/17 to 19/2015	201	204 to 294
4/18 to 19/2017	272	270 to 420

Appropriate Management Level (AML) is expressed as a range with an upper and lower limit. The AML proposed in the HWHT Management Plan provides the basis for our analysis here. In that action, which is separate from this one and does not meet the CEQ criteria for a connected action, Forest Service personnel are proposing an appropriate management level for the Heber Wild Horse Territory of 50 to 104 horses that provides for maintaining a thriving natural ecological balance based on several factors (USDA-FS 2020, 8).

Basis of Comparisons among Alternatives

In terms of direct, indirect, and cumulative effects, the resource measures of our analysis are twofold:

1. Impacts on the legal status of the horse territory, meaning the boundary, extent, and designation under the Wild Horse and Burro Act of 1971, and;
2. Impacts on forage availability within the horse territory.

We developed these specific measures corresponding to concerns raised in review of the draft EA released in 2015. Using the proposed management actions for the Heber Wild Horse Territory (USDA-FS 2020) we qualitatively evaluated potential impacts on the territory resulting from grazing authorization. considered alongside the information from the Territory's proposed action (currently under NEPA review)

Direct, Indirect, and Cumulative Effects

Alternative 1 – No Action

Resource Measure 1 – HWHT Legal Status / Designation: With no grazing authorized in Heber Allotment, portions of the HWHT that overlap with the Heber Allotment would also see no livestock grazing. This would not change the legal status or designation of the HWHT.

Resource Measure 2 – Forage: In the event that no grazing is authorized on the Heber Allotment, there would be no direct or indirect effects, and in turn no cumulative effects, on forage available to horses.

Alternative 2 – Proposed Action

Resource Measure 1 – HWHT Legal Status / Designation: There would be a specified number of livestock authorized per year based on resource conditions. This would not change the legal status or designation of the HWHT.

Resource Measure 2 – Forage: In the event that grazing as proposed is authorized on the Heber Allotment, there would not be a significant effect on the Heber Wild Horse Territory, though there could be limited competition for forage in the relatively small segment of overlap with the Heber Allotment, although Forest Service range specialists have not noted this occurring in any significant way in the past, due in large part to differing behavioral and movement patterns as well as the management from the permittee. The general conclusion regarding forage availability is reached through the consideration of four interrelating considerations and mitigations in the management of the allotment alongside the proposed action for the territory as released for scoping in January of 2020.

- Current Coexistence of Allotments and Territories: The territory was established in 1974, with seven horses recorded (USDA-FS 2020, 5). Though horse numbers have grown considerably in the intervening time due to several inconclusive factors (see proposed territory management plan) grazing by authorized livestock on the Heber Allotment has continued throughout the lifespan of the Heber Wild Horse Territory. In that time, utilization measurements on key areas in the Heber Allotment have not resulted in degraded range conditions. This indicates, among other considerations that grazing has not had a significant effect on the territory in the 46 years since its establishment.
- Adaptive Management Provisions in Allotment Plan: The proposed management for the allotment (see appendix A) includes provisions for unforeseeable conditions if natural resource management require changes. The implementation tool or “action-forcing” element for these adaptive management practices would be through the issuance of Annual Operating Instructions (AOI). These are developed annually, in coordination with the permittee, and include the numbers to be grazed, what pasture(s) will be grazed, how long each pasture will be grazed, and other factors. Adaptive management practices issued through the AOI include adjustments to: numbers, timing, intensity, and frequency of grazing. Each of these practices are available to mitigate authorized grazing if the utilization limit is approached.

- Small Relative Portion of Allotment Overlap: As disclosed above, the effects of the proposed action are considered relative to the overlap with the horse territory, which occupies portions of two pastures. Within the HWHT, livestock grazing has been ongoing within the Heber Allotment on 7,326 acres in the Gentry Pasture, 1,892 acres in the Bunker Pasture and 131 acres in the Holding Pasture. This represents approximately 6% of the Heber Allotment overlapping with the HWHT. Because the portion of overlap is a relatively small portion of the Heber Allotment, the interaction between the horse territory and allotment does not represent a significant portion of the forage base considered in the proposed action. Further supporting this is the past utilization data for the allotment, as disclosed in table 5 above. This data indicated that the Gentry and Bunker Pastures received 15 and 11 percent average utilization, respectively. Further, these pastures received 6 and 4 years of rest from cattle grazing respectively within the 2001-14 timeframe. This information indicates that current livestock management is providing for maintenance and improvement in ecological conditions moving toward forest plan desired conditions further supporting our quantitative judgement that the overlap between the territory and allotment does not represent a major proportion of the livestock forage base and is thus unlikely to result in adverse ecological impacts under the proposed action.

- Adaptive Management Provisions in Territory Plan: The proposed management plan for the territory provided much of our context for evaluating the potential impacts to the territory were we to proceed with authorizing grazing on the Heber Allotment. The territory management plan sets an AML based on balancing wild horse management with other multiple uses that assures significant progress is made toward meeting desired conditions, standards, and guidelines identified in the 2015 land management plan for the Apache-Sitgreaves National Forests. In doing so, adaptive management provisions identified in the proposed management plan would provide options for maintaining AML and adjusting to forage an population fluctuations (this is akin to Consideration 2, above, noting options for managing livestock in a similar fashion).

- **Conclusions**: Taken together, these considerations support the following judgements and a determination that there will not be significant direct, indirect, or cumulative effects on the territory due to authorizing grazing. These conclusions are primarily qualitative in nature:
 - Historically, major conflict over forage availability has not emerged in the 46 years of the territory and allotment coexisting. Detailed time series studies on utilization and production support this.
 - Both the proposed livestock grazing management and horse territory management contain provisions providing significant flexibility that would enable conflicts over forage to be mitigated.
 - Overlap between the territory and allotment does not represent a major proportion of the forage base and is thus unlikely to receive heavy grazing pressure should grazing be authorized.

Effects on Recreation Resources

Affected Environment

Environmental effects for recreation resources within the project area are documented in terms of direct and indirect effects that occur within the allotment boundary.

Current conditions for recreation are summarized here for the reader, to provide a baseline against which effects are assessed. Further details are in the project record. Currently recreation on the Heber Allotment is limited. The analysis area consists primarily of general forest areas used for dispersed recreation. This consists of horseback riding, wildlife viewing, dispersed camping, fishing, hunting, and OHV use. The Heber Allotment is composed primarily of 2 recreation opportunity spectrum categories; Semi-Primitive Motorized and Roaded Natural, with smaller tracts of Rural and Semi-Primitive Non-motorized, and two scenic integrity classifications; High and Moderate, with most of the allotment classed as Moderate.

Basis of Comparisons among Alternatives

This analysis compares alternatives using the following measures and data sources detailed in the table below.

Table 27. Recreation Resource Indicators

Resource Element	Resource Indicator	Measure	Source
Recreation Opportunities	Recreation Opportunity Spectrum	See specialist report for explanation of ROS.	ASNFs Forest Plan, ; 2015 ASNFs Forest Plan, FEIS Maps
Scenery	Scenic Integrity Spectrum	See specialist report for explanation of scenic integrity.	ASNFs Forest Plan, ; 2015 ASNFs Forest Plan, FEIS Maps
Hiking / Trail Access	Trails on the Allotment	Trail Mileage	ASNFs GIS Database
Motorized Rec. / Road Access	Roads on the Allotment	Trail Mileage	ASNFs GIS Database
Unique Recreational Opportunities	National Recreation Trails & Wild and Scenic Rivers	Presence of these trails and rivers or eligible segments.	2015 ASNFs Forest Plan, FEIS Maps

Direct and Indirect Effects

Alternative 1 – No Action

Table 28. Recreation Resource Indicators – Alternative 1

Resource Element	Resource Indicator	Measure	(Alternative 1)
Recreation Opportunities	Recreation Opportunity Spectrum	See appendix A for explanation of ROS.	No impact.
Scenery	Scenic Integrity Spectrum	See appendix B for explanation of scenic integrity.	No impact.
Hiking / Trail Access	Trails on the Allotment	Trail Mileage	No impact.
Motorized Rec. / Road Access	Roads on the Allotment	Trail Mileage	No impact.
Unique Recreational Opportunities	National Recreation Trails & Wild and Scenic Rivers	Presence of these trails and rivers or eligible segments.	No impact.

Existing recreation opportunities would continue to be available to the public at large. Public perceptions of cattle grazing may affect an individual's recreational experience within the project area if cattle are removed from the project area, but any further and specific impact of this on recreational use of the area is not practicable to assess due to the often divergent range of public opinions on grazing on public lands.

Alternative 2 – Proposed Action

Table 29. Recreation Resource Indicators – Proposed Action

Resource Element	Resource Indicator	Measure	Alternative 2 Effects
Recreation Opportunities	Recreation Opportunity Spectrum	ROS classification	No impact. Trail and road mileage and access un-impacted.
Scenery	Scenic Integrity Spectrum	Scenic Integrity Rating	No long term impact. Short term disruption from woody biomass removal, long-term benefits from ecosystem restoration. Improvements will “remain subordinate to the characteristic landscape”, in keeping with the Forest Plan
Hiking / Trail Access	Trails on the Allotment	Trail Mileage	No impact. Trail and road mileage and access un-impacted.
Motorized Rec. / Road Access	Roads on the Allotment	Trail Mileage	No impact. Trail and road mileage and access un-impacted.
Unique Recreational Opportunities	National Recreation Trails & Wild and Scenic Rivers	Presence of these trails and rivers or eligible segments.	No changes from the current status of and access to George Crook NRT.

Resource Indicator and Measure 1: Recreation Opportunities

The Recreation Opportunity Spectrum (ROS) measures this first resource indicator, modeling what types of recreation opportunities exist in areas of the forest. There would ultimately be no changes to the current ROS resulting from the direct or indirect effects of the proposed action.

Resource Indicator and Measure 2: Scenic Integrity

While some forest users resent the presence of authorized livestock, others perceive the presence of authorized livestock positively. The variability of these human dimensions in resource management and a lack of regionally-specific data (i.e. in and around the project area) that pertains to specific user experiences on livestock make the impact of this presence on scenic integrity difficult to measure.

The proposed action also includes vegetative management treatments designed to restore grasslands on the northern half of the allotment back towards historic vegetative conditions. This includes the removal of juniper woodlands encroaching into historic Great Basin grasslands. The treatments will impact scenic resources in the short term, but in the long term, increased forest and grassland health will result in long-term maintenance of high scenic integrity. These treatments are also spatially removed from the higher-use recreation areas on the southern side of the allotment within the Ponderosa Pine PNV.

Resource Indicator and Measure 3: Hiking / Trail Access

No element of the proposed action has management implications for existing nonmotorized recreation and the miles of trail or number of trailheads that provide access for this type of recreation.

Resource Indicator and Measure 4: Motorized Recreation / Road Access

No element of the proposed action has management implications for existing miles of trail, road or number of trailheads and parking areas that provide access for this type of recreation.

Resource Indicator and Measure 5: Unique Recreational Opportunities

The section of the General Crook Trail on the allotment is located in areas that will not be affected by the proposed new improvements. Recreationists and hunters may encounter cattle, but the presence of cattle and livestock grazing does not preclude or prevent recreational opportunities within the project area. Continuation of livestock grazing within the project area will have minimal effect on the recreational experience of Forest users.

Cumulative Effects

The impacts in the table below provide our cumulative effects analysis for recreation. Cumulative impacts for recreation are not analyzed for the no-action alternative because no direct or indirect effects on recreation would result from that alternative.

Table 30: Resource indicators and measures for alternative 2 cumulative effects

Resource Element	Resource Indicator (Quantify if possible)	Measure (Quantify if possible)	Alternative 2 Cumulative Effects
Recreation Opportunities	Recreation Opportunity Spectrum	ROS Rating	No impact.
Scenery	Scenic Integrity Spectrum	Scenic Integrity Rating	Vegetation treatments with an emphasis on pinyon-juniper treatments and grassland restoration would occur in conjunction with 4FRI. Long term benefits would result from maintaining composition of forests and grasslands.
Hiking / Trail Access	Trails on the Allotment	Trail Mileage	No impact.
Motorized Rec. / Road Access	Roads on the Allotment	Road Mileage	A potential reduction of road mileage could occur in conjunction with TMR process. However, this reduction would be only come from the TMR process, as opposed to the proposed action for the allotment.
Unique Recreational Opportunities	National Recreation Trails & Wild and Scenic Rivers	Presence of these trails and rivers or eligible segments.	No changes from the current status of and access to George Crook NRT.

Chapter 4 Consultation and Coordination

The following Forest Service employees served on the interdisciplinary team to complete the analysis.

Name	Title
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Steven Richardson	Geographic Information Systems

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:

Federal and State Officials and Agencies

1. Natural Resources Conservation Service
2. US Fish and Wildlife Service
3. US House of Representatives – Office of Ann Kirkpatrick
4. US Senate – Office of Jeff Flake
5. US Senate – Office of John McCain
6. Arizona House of Representatives - Office of Bob Thorpe
7. Arizona House of Representatives – Office of Brenda Barton
8. Arizona Senate – Office of Chester Crandell (past)
9. Arizona Department of Environmental Quality
10. Arizona Department of Transportation
11. Arizona Game and Fish Department
12. Arizona State Land Department
13. Arizona State Historical Preservation Office
14. Coconino County
15. Navajo County

Tribes

White Mountain Apache Tribe
San Carlos Apache Tribe
Tonto Apache Tribe
Yavapai-Apache Nation
Yavapai-Prescott Tribe

Ft. McDowell Yavapai Indian Nation
Hopi Tribe
Navajo Nation
Pueblo of Zuni

Others

Scoping and mailing lists available upon request.

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Appendix A- Applicable Adaptive Management Framework

Within the proposed action and monitoring plan, it is described that adaptive management strategies would be implemented if the described resource conditions were not being met. This is further detailed here in this appendix. Adaptive management is about learning through monitoring and having more successful outcomes by adapting actions. Often unforeseeable conditions in natural resource management require changes in that management. Monitoring is used to determine if the results of actions match the desired outcomes and adapt to ensure outcomes are met or re-evaluated (Allen et. al. 2011; USDA – FS 2019). The implementation tool for these adaptive management practices would generally but not exclusively be through the issuance of Annual Operating Instructions (AOI). These are developed annually, in coordination with the permittee, and include the numbers to be grazed, what pasture(s) will be grazed, how long each pasture will be grazed, and a desired grazing utilization level. Adaptive management practices issued through the AOI include: numbers, timing, intensity, and frequency. The following provides definitions for each of these terms and gives examples of how they could be implemented. These four terms could be implemented by themselves or used in combination to meet desired resource conditions. It is important to note that guidelines such as utilization levels and stocking rates are not rigid limits or “bright line” standards to be met every year, but an inherently flexible tool to identify stocking rate or distribution problems over several years, to guide annual management, and to explain long-term trends (SRM 2018).

Key Variables

- ♦ Numbers - How many animals are grazing at any given time? This is often referred to as head, Animal Units (AU) or Animal Unit Months (AUM). Numbers would be adjusted up or down to meet desired resource conditions. Numbers in turn influence frequency and intensity.
- ♦ Timing - The time of season grazing occurs relative to the phenological stage of plant development, such as early growth period, reproductive period, or dormant period of a forage plant. Disturbance, such as that from grazing, may provide differing responses within the plant depending upon the stage of development. Timing could be adjusted through the season of use set forth in the AOI. Timing influences intensity and frequency.
- ♦ Intensity - Grazing intensity may be described as herbage removed during the grazing and/or growing period or as a utilization level at the end of the growing period. This is often measured as part of the implementation monitoring. Intensity can be adjusted through the desired utilization level. Intensity is influenced by numbers, timing, and/or frequency.
- ♦ Frequency - Frequency, when used as a grazing management tool, refers to the number of times forage plants are defoliated during the grazing period. Frequency can be looked at as how many times a forage plant is defoliated while animals are in pasture for a given amount of time. It can also be used as how many times a forage plant is defoliated in a grazing season. Frequency can be looked at in the long term as how many times a plant is defoliated over a longer period of time i.e. how many times a pasture is used/rested out of ten years. Frequency is sometimes referenced as grazing occurrence. Frequency can be controlled by adjustments in timing and/or numbers.

References: FSH 2209.13; SRM 2018; Allen et. al. 2011; USDA – FS 2019

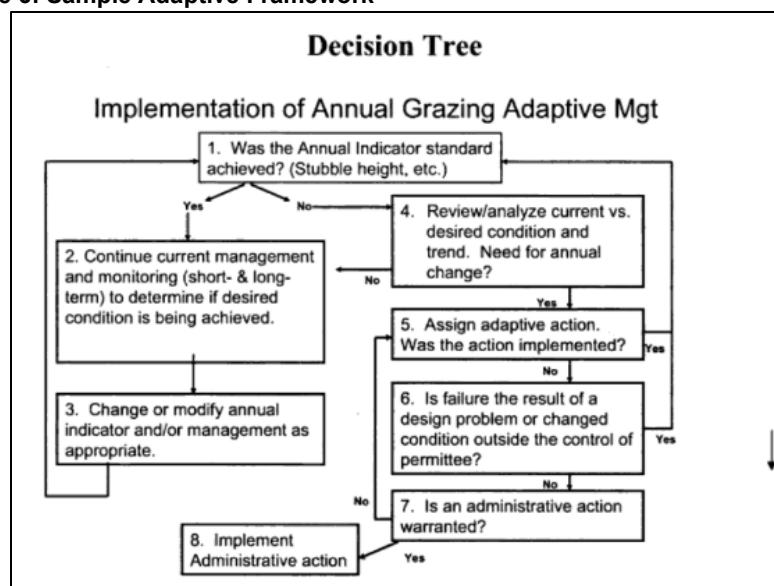
Examples of Tools for Implementing Adaptive Management

- Conduct implementation and effectiveness monitoring as specified in the AMP.
- Use monitoring results as an adaptive management feedback loop to revise, if necessary, annual grazing requirements in the AOI to account for current allotment conditions and trends.
- Use results of annual compliance monitoring and periodic trend monitoring, as well as forage utilization by wildlife and recreational livestock, to determine allowable annual amount of livestock use to meet rangeland and AMZ desired conditions.
- Adjust livestock numbers, season of use, and distribution when monitoring and periodic assessments indicate consistent noncompliance with permit provisions.
- Use suitable range management tools to alter livestock distribution.
- Consider resting (placing an area in nonuse status for a period of time) a pasture or an allotment to allow for natural recovery of resource conditions.
- Document adaptive management actions such as allowable use, the planned sequence of grazing on the allotment, and any other operational changes in the AOI.
- or mitigate adverse effects to soil, water quality, and riparian resources when special circumstances (e.g., drought) occur.

Monitoring Direction BMPs

- Data collection procedures and interpretation would consider guidance contained in the Principles of Obtaining and Interpreting Utilization Data on Southwest Rangelands (Smith et al. 2005), Interagency Technical Reference 1734-3 “Utilization Studies and Residual Measurements” and “Sampling Vegetation Attributes” (1996) (Technical Guide) and the Forest Service Region 3 Rangeland Analysis and Management Training Guide (June 1997) (Training Guide), “Guide to Rangeland Monitoring and Assessment (Smith et al 2012).
- Guidance in monitoring techniques will follow accepted Forest Service protocols set by the monitoring handbook.
- Both qualitative and quantitative monitoring methods would be used in accordance with the Technical Guide and Training Guide.
- Utilization measurements are made following procedures found in the Technical Guide.
- Key areas are described in “sampling vegetation attributes” (1996) as indicator areas that are able to reflect what is happening on a larger area.

Figure 6: Sample Adaptive Framework



Appendix B- Applicable Best Management Practices (BMP)

The following are site-specific BMPs required for this project which are incorporated into the analysis, specifically of soils and watersheds. The list is divided into categories, some BMPs listed in one category may functionally overlap another.

Streams, Springs, and Seeps

- **Practices:**

- Stream management zones (SMZs), referred to in the National Core BMP Technical Guide as Aquatic Management Zones, will be designated along stream courses for pinyon-juniper treatments. Unless otherwise designated, SMZ widths for the various stream types (as defined in the Forest's stream geodatabase) will be the following: 150 feet for perennial, 75 feet for intermittent, and 50 feet for ephemeral.
- SMZs will be delineated on the project area and contract maps.
- Preferred method for harvesting and extraction by mechanical equipment within a SMZ is to approach the material with the contour of the slope, cut or grapple the material, then back out following the same entry path. This BMP allows for a reduction in ground disturbance by limiting turning of equipment near the drainage and aims to retain as much of a filtering effect of the undisturbed ground cover as possible. Additionally, slash can be placed on travel courses to be driven over which will reduce soil disturbance and lessen rutting impacts.
- SMZs shall be crossed at designated crossings only and shall be approved by the authorized FS Officer or a watershed resource specialist.
- Travel courses used for removal of material will not be longitudinally within the SMZs.
- There shall be no decking of material within SMZs.
- The number of travel courses and crossings within SMZs should be minimized.
- Temporary road construction is prohibited within the SMZ.
- Adequate size and spacing of drainage control features (including but not limited to water-bars, lead-out ditches, etc.) shall be constructed to remove water from primary travel courses and roads.
- Drainage control features shall not be constructed in such a manner as to divert run-off into stream channels.
- Debris generated from treatment activities will be removed from stream channels unless instructed otherwise by a resource specialist or authorized FS Officer.
- Trees in or on banks of stream courses that are providing bank and stream channel stability shall not be removed. The authorized FS Officer will identify exceptions where restoration or additional thinning is needed for resource concerns.
- The authorized FS Officer will use their authority for travel courses, temporary roads, and landing locations to protect stream courses that were not designated on the project contract map.
- Roads and travel courses should be outslowed when closer than 50 feet to the channel to minimize concentration of water/sediment.

- Water control features shall be constructed so there is adequate filter distance between structure outlets and the drainage (minimum 50 feet and width can increase as slope steepness increases).
 - An undisturbed filter strip of vegetation and litter shall be maintained between primary travel courses, decks, and roads. The strip should be wide enough to adequately prevent sediment from entering the drainage.
 - Springs and seeps will be protected from heavy equipment treatment activities and will include a 50-foot limited access buffer that excludes mechanized equipment use.
- **BMP Explanation:** These practices include protection key features such as riparian vegetation and landforms as well as critical floodplain components necessary to sustain waterbody integrity and protect beneficial uses. In doing so, these practices are designed to protect these features from common disturbances generated from grazing and treatments.

Operating Season Limitations

- **Practices:**
 - Ground disturbance activities shall be limited to completely dry, solidly frozen soil conditions, or follows the forest's guidelines for excessive rutting (available in project record).
- **BMP Explanation:** Skidding or hauling on roads when the roadbed or the soil is not sufficiently frozen or dry can cause soil compaction and rutting.

Mechanized Equipment Travel / Ground Disturbance

- **Practices:**
 - Mechanized equipment usage for harvesting or extracting biomass shall be restricted to slope gradients of less than 40 percent.
 - Preferred method for harvesting or extracting biomass using mechanized equipment in upland areas will be to approach the material longitudinally at a 45 degree angle to the slope direction, cut or grapple the material, and then back the equipment out. Turning should be performed when moving in the upslope direction. Maintaining this 45 degree angle travel pattern (herringbone pattern) when moving across the slope is most desirable. This BMP allows for a reduction in ground disturbance by limiting turning of equipment and aims to retain as much of a filtering effect of the undisturbed ground cover as possible.
 - Slash can be placed on travel courses to be driven over which will reduce soil disturbance, lessen rutting impacts, and add ground cover.
 - Single passes consisting of travel to cut and to grapple material and backing out are encouraged. Single passes will lessen soil disturbance and rutting impacts.
 - Excessive ground disturbance that displaces topsoil and inverts subsoil to the surface should be minimized. The heavy clay content at the subsurface present in soil types within the project area, if brought to the surface, may hinder revegetation efforts.
- **BMP Explanation:** The potential for accelerated erosion or other soil damage during or following mechanical treatments depends on climate, soil type, site conditions, and type of equipment and techniques used at the site. Erosion control measures are grouped into two general categories: structural measures to control and treat runoff and increase infiltration and

nonstructural measures to increase ground cover. The above components have been used across the Apache-Sitgreaves on similar projects as successful measures for structurally and nonstructural addressing of erosion.

Travel Courses for Product Removal

- **Practices:**
 - Use existing travel courses where properly located.
 - Travel courses should follow the contour of the slope as much as possible.
 - Primary travel courses are to be water-barred, scarified, and seeded with primarily native species as needed.
 - All berms or depressions created along travel courses, such as ruts, will be filled in or removed, restoring the travel courses to the natural grade of the slope as much as possible.
 - Excess slash generated from the project should be spread in addition to water-barring where conditions allow.
 - Where material is being decked, minimize disturbance to existing ground cover, surface soil and rock material, and any existing surface organic material (i.e. surface litter and duff or old semi-decomposed branches/logs).
- **BMP Explanation:** Roads can be designed and maintained to avoid or minimize adverse effects to soil, water quality, and riparian resources. The above practices minimize the level of impact from both existing and temporary roads in terms of erosion and sedimentation potential.

Servicing and Refueling Equipment

- **Practices:**
 - During servicing and refueling of equipment, pollutants shall not be allowed to enter any waterway, riparian area, or stream course.
 - Select service and refueling areas well away from wet areas and surface water.
 - Construct berms around such sites to contain spills.
 - Spill prevention, containment, and counter measure plans are required if the fuel exceeds 660 gallons in a single container or if total storage at a site exceeds 1,320 gallons.
 - Project contract administrator shall designate the locations, size, and allowable uses of service and fuel areas. The authorized FS Officer shall be aware of actions to be taken in case of a hazardous substance spill.
 - Equipment operators shall maximize the recovery and proper disposal of all fuels, fluids, lubricants, empty containers, and replacement parts.
- **BMP Explanation:** petroleum and chemical products may pose a risk to contaminating soils, surface water, and groundwaters during refueling and servicing the equipment. The above are common-sense measures based on national and local BMPs that have successfully been implemented to protect groundwater and vegetation on the Apache-Sitgreaves National Forests.

Prescribed Burning

- **Practices:**

- For the retention of long-term soil productivity, to maintain the sediment filtering capacity of uplands and streamside management zones, and to reduce erosion, prescribed burning should be managed at low to moderate burn intensities.
- Machine constructed control lines shall not be constructed on slopes greater than 40 percent in all areas or within SMZ's. Exceptions will be identified by the authorized FS Officer in consultation with a FS watershed specialist and specific mitigations will be determined at that time.
- No new prescribed fire containment line construction paralleling wash/stream courses built with mechanized equipment. Containment lines, new or old, shall receive watershed work (drainage, waterbars, seeding, etc), if needed.
- Limit burning so that less than 5% of total acres within a 6th code watershed, receive treatments resulting in high soil burn severity. Site specific determinations will be used for seeding of high soil burn severity areas. Seed mix will include an annual cover crop and a native perennial mix of grasses.
- Limit burning so that less than 15% of the total acres within a 6th code watershed, receive moderate soil burn severity.
- Limit burning so that less than 50% of the total acres within a 6th code watershed, receive any level of burning. (Applicable to 6th watersheds that contain acreages over 150 acres within the analysis area)
- The burn plan developed by the FMO will include mitigation measures and BMPs addressing water and air quality.
- Riparian areas previously burned in Rodeo-Chediski Wildfire will be excluded from prescribed fire.
- Ignition shall be above slope breaks of active floodplain. Fire will be managed such that burning into streamside management zones where riparian vegetation is present is limited to 15% or less of the area of the SMZ when adjacent upland zones have not recovered hydrologically from project entries.
- Prescribed burning should be coordinated with livestock grazing. Livestock use may be deferred, if necessary in order to establish grasses in sufficient quantity to carry fire, prior to burning, or to protect new growth after burning.
- Maintenance burning is the application of fire after initial fire reintroduction into an ecosystem. This should be conducted when opportunities arise, including the use of wildfire when appropriate, in order to fully implement the forest plan goals around reintroducing fire to ecosystems.
- All burning should be coordinated through the Arizona Department of Environmental Quality (ADEQ) regulations for full compliance with the Clean Air Act.

- **BMP Explanation:** These locally-validated BMPs have been and currently are in use in the ASNFs fuels program for similar purposes elsewhere on the forests. ADEQ coordination on an ongoing basis (i.e. for every implementation unit at the time of the specific action) ensures compliance with the Clean Air Act.

Roads

- **Practices:**
 - Existing and temporary roads are maintained throughout the life of the project to ensure that drainage structures are functioning properly and that concentrated run-off does not occur.
 - Drainage control structures will receive maintenance prior to winter shutdown of project operations.
 - Once no longer needed closed roads (ML 1) and temporary roads will be decommissioned in a timely manner with closure structures, drainage control, and erosion protection.
 - Remove berms that may impede surface drainage on closed roads.
- **BMP Explanation:** Roads can be designed and maintained to avoid or minimize adverse effects to soil, water quality, and riparian resources. The above practices minimize the level of impact from both existing and temporary roads in terms of erosion and sedimentation potential.

Infrastructure

- **Practices:**
 - Obtain surface water and groundwater under appropriate Federal and State legal and regulatory authorities to avoid, minimize, or mitigate adverse effects to stream processes, aquatic and riparian habitats and communities, groundwater-dependent ecosystems, and recreation and aesthetic values.
 - Construct and complete wells consistent with applicable Federal and State regulations, use licensed well drilling contractors, use suitable measures to avoid or minimize well contamination, inter-aquifer exchange of water, floodwaters from contaminating the aquifer, and infiltration of surface water.
 - Operate wells only for purposes of livestock use.
 - Locate, operate, and maintain water conveyance structures in such a manner as to avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources.
- **BMP Explanation:** Infrastructure installation involves ground disturbance with potential changes to sedimentation, water levels and flow regimes. These locally-validated BMPs have been and currently are in use in the ASNFs range program for similar purposes elsewhere.

Coarse Woody Debris / Vegetative Ground Cover

- **Practices:**
 - To maintain or improve soil productivity as well provide soil protection, manage towards providing or retaining the following amounts of coarse woody debris (3 inches plus diameter size class) by vegetation type as follows:
 - ◆ 2 – 5 tons/acre in pinyon-juniper woodland types
 - ◆ Vegetative ground cover, in addition to residual coarse woody debris left after treatment should aim to produce amounts that are within a reasonable range of variability aligned with the natural productivity of the site.

- ♦ **BMP Explanation:** All management activities of other resources are to be designed to minimize short-term impacts on the soil and water resources and to maintain or enhance long-term productivity, water quantity, and water quality (FSM 2503).

Soils Site Specific Determinations

- **Practices:**
 - Site specific determinations for proper BMP implementation may be required for but not limited to the following site conditions:
 - Treatment areas that include locations of existing highly impaired soil conditions where soil loss tolerance rates are near or at their threshold value.
 - Broadcast seeding of native species may be used as a restoration treatment to foster regeneration of more desirable vegetation diversity and composition.
- **BMP Explanation:** During implementation, areas subject to excessive erosion, detrimental soil damage etc. can be identified and avoided.

Heritage / Cultural Resource Mitigations

- **Practices:**
 - Before any range facilities are constructed, a District, Zone, or Forest Archeologist will be contacted to determine if archeological survey is needed. All proposed range facilities will be surveyed by qualified personnel for heritage resources prior to any ground disturbing activities (and consulted on). Facilities will be located avoid impacts to heritage resources.
 - If unrecorded sites are discovered during the course of project implementation, activities will cease and a District, Zone, or Forest Archeologist will be notified.
 - Fencing or exclosure of livestock will be considered for individual sensitive heritage resources or areas containing multiple sensitive heritage resources being impacted by grazing.
 - Relocation of existing range improvements and salting locations sufficient to ensure the protection of historic properties being impacted by concentrated grazing use, if identified.
 - Periodic monitoring to assess site condition and to ensure that protection measures are effective. Effects to the site from cattle should be noted on a monitor form (and/or site forms).
 - Other mitigation measures involving data recovery, for example, will be developed and implemented in consultation with the SHPO. The appropriate tribes will be consulted if the mitigation is invasive or if it affects a TCP or other property of concern for them.
 - Use low to moderate intensity fire; no direct ignitions within site boundary, avoid with heavy equipment and ground disturbing activities; hand thin and remove dead and downed from features
 - Flag and avoid sites with heavy equipment and any other ground disturbing activities; hand thin in sites.

- **BMP Explanation:** During implementation, sites can be identified and avoided. Further, where sites overlap with proposed activities, some activities such as prescribed fire and fuels treatments can be carried out in a way beneficial to the long-term preservation of the resource through reducing intensity of fire or promoting more stable soils.

Wildlife Conservation Measures

- **Practices:**
 - Work with the Mexican gray wolf Interagency Field Team (IFT) to adjust patterns of pasture use by livestock in response to wolf denning where there is allotment management flexibility.
 - In the action area, livestock grazing or livestock management activities will occur within Mexican spotted owl PACs, but no human disturbance or construction actions associated with livestock grazing will occur in PACs during the breeding season (March 1 to Sept 30).
 - Stock tanks requiring maintenance would be surveyed for leopard frogs if they support suitable habitat prior to maintenance activities. Dry or nearly dry stock tanks should also be surveyed as they may harbor frogs in cracks, holes, or under rocks and logs.
 - Consider partial fencing of occupied stock tanks, complete fencing of occupied stock tanks with a drinker, or the gradual replacement of occupied single tanks with trick-tanks if the situation warrants to enhance vegetation.
 - Restrict human activities within approximately ½ mile of occupied nesting site March 1 through August 15 in the American Peregrine Falcon Conservation Guidelines (AZGFD 2016). The ½ mile protection distance may vary depending on local topography, potential for disturbance, and location of important habitat components. Prescribed fire will be restricted within 1 mile of cliffs with occupied eyries and within 2 miles from the base of cliffs with occupied eyries
 - Active raptor nests should be protected from treatments and disturbance during the nesting season to provide for successful reproduction. Specifically, for northern goshawk nest areas, human presence should be minimized during nesting season of March 1 through September 30.
- **BMP Explanations:** Implementing any combination of these actions would enhance coordination with US Fish and Wildlife Service and permittees, enhance or maintain vegetation, mitigate negative impacts on vegetation, and decrease water degradation, among other benefits, based on experience with similar actions elsewhere on the Forests, and consultation with the US Fish and Wildlife Service. These are to be implemented alongside the full list of management recommendations in the Biological Assessment.