Forest Service
U.S. DEPARTMENT OF AGRICULTURE

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Rain Tank Allotment Grazing Reauthorization

Final Environmental Assessment

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Chapter 1: Project Background and Purpose and Need for Action

This environmental assessment (EA) analyzes the anticipated effects of the Rain Tank Allotment Grazing Reauthorization Project. This project would authorize the Rain Tank Cattle Company, an entity of the Havasupai Tribe, to continue placing livestock within the allotment, to complete needed infrastructure improvements such as fence and water pipeline repairs and realignment, to install water catchments, and to implement a grazing strategy that would facilitate operations in a manner that would maintain or improve existing resource conditions across the Rain Tank allotment on the Tusayan Ranger District (TRD) of the Kaibab National Forest (Kaibab NF).

Project Background

Lifestyles associated with ranching and livestock grazing have long been a part of the landscape. These historic and contemporary uses contribute to a sense of place; many people living in local communities participate in or have connections to ranching and identify with the associated values.

The Rain Tank allotment is in the northwestern portion of the TRD, just west of Tusayan, Arizona. The allotment shares the northern border with the Grand Canyon National Park and is bounded by the Havasupai Reservation on the west and Highway 64 on the east. The Anita allotment shares the southern boundary. Rain Tank allotment is approximately 62,600 acres falling under National Forest System (NFS) lands. The project area is located within the Colorado River drainage system and has elevation ranges from 5,900 to 6,600 feet.

Livestock grazing began on the Rain Tank allotment in the late 1870s. The allotment had been historically used to support seasonal sheep operations, year-round cattle operations, and is currently a seasonal cattle operation. The allotment was vacant from permitted livestock from around March 1998 until July of 2019. In July of 2019 a new permit was issued to the current permittee, the Rain Tank Cattle Company.

The allotment has been managed using a stock and monitor approach. This method considers both implementation and effectiveness monitoring to determine if management is meeting or moving toward the standards in the Land and Resource Management Plan for the Kaibab National Forest (Forest Plan) (USDA Forest Service 2014). Current management on the allotment occurs using a deferred rotation grazing system. Generally, each pasture is grazed only once during the grazing season.

Range improvements on the allotment have been added over time as permitted by regulations. As improvements were constructed, maintenance responsibility was added to the term grazing permit. The Forest Service requires all improvements listed in the term grazing permit to be maintained to standards agreed upon by the permittee and the Forest Service through a permit modification or annual operating instructions (AOI). Due to the allotment being vacant for so long, many existing structural improvements have deteriorated and are no longer functional.

This project implements the Forest Plan and is not authorized under the Healthy Forests Restoration Act, so it is therefore subject to subparts A and B of the project-level pre-decisional administrative review process at 36 CFR 218.

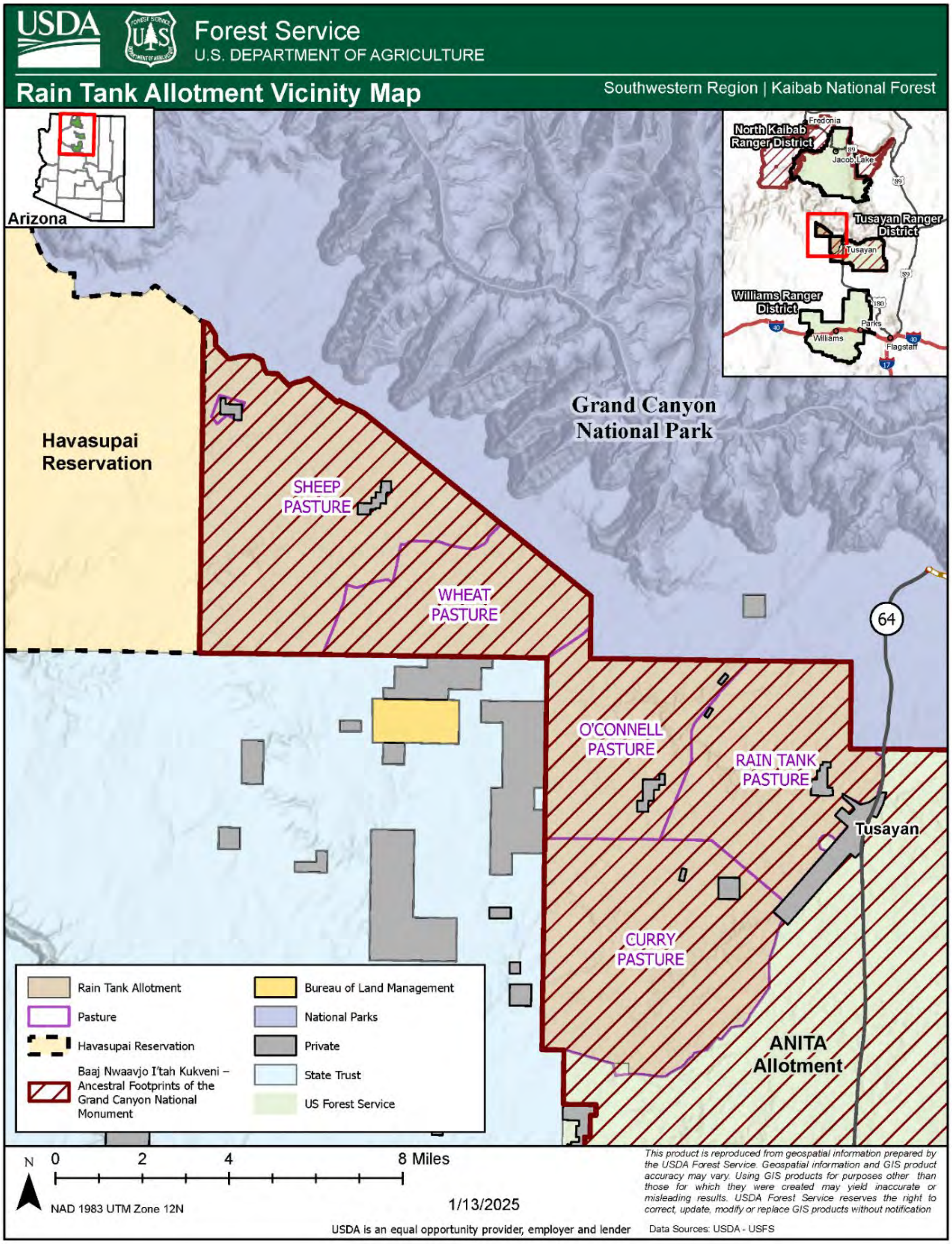

Figure 1. Vicinity map of the Rain Tank Allotment

Relationship to the Forest Plan

The Forest Plan (USDA Forest Service 2014) provides a framework to promote ecological integrity and guide management on the Kaibab NF so that it is environmentally sustainable. This includes management direction (i.e. management guidelines and best management practices) for livestock grazing and other resources, uses, goods, and services applicable to this project. Grazing is one of the many uses allowed on the Kaibab NF and the project area has been determined suitable for grazing. All projects and activities authorized by the Forest Service must be consistent with the Forest Plan, unless an amendment is proposed to allow for a deviation. Applicable desired conditions, standards, guidelines, and objectives from the Forest Plan (USDA Forest Service 2014) were used to inform development of the proposed action. This analysis assesses the degree to which all alternatives, in tandem with proposed design features and resource protection measures, would meet the project's purpose and need while complying with the Forest Plan.

Desired conditions in the forest plan are determined by known potential natural vegetation types (PNVT), which are the plant communities that would occur in the presence of natural disturbance processes such as lightning caused wildfires. The PNVTs within the project area primarily consist of pinyon-juniper woodland, ponderosa pine, and sagebrush shrubland. As appropriate, the relationship of the alternatives to the plan components for these PNVTs and other applicable plan components is analyzed in Chapter three of this analysis.

For livestock grazing, the Forest Plan (pp 68 - 69) provides the following desired conditions:

- There are opportunities to engage in ranching activities and graze livestock on NFS lands. These activities contribute to the stability of rural communities.
- Grasses and forbs provide adequate forage for permitted livestock.
- Livestock use is consistent with other desired conditions.
- Allotment fencing allows for passage of animals susceptible to movement restrictions such as pronghorn.

The Kaibab NF uses an adaptive management strategy to manage rangeland resources. Allotment management plans and associated grazing authorization decisions are reviewed about every ten years following an environmental analysis in conformance with the National Environmental Policy Act (NEPA). In general, the Kaibab NF manages grazing at conservative use levels (up to 40 percent) per the Forest Plan. This grazing intensity (based on percent use of forage by weight) should provide for plant integrity, density, ecological diversity, and regeneration over time (USDA Forest Service 2014). Grazing decisions involving new or modified fences, corrals, salt locations, and artificial water sources are designed to make progress towards the desired conditions in the Forest Plan and promote healthy soil and watershed conditions, wildlife interactions, and wildlife movement.

Within the scope of the NEPA grazing decisions, fine-tuned adjustments are made annually through the Annual Operating Instructions (AOI). Information from monitoring such as frequency plots, canopy cover, pace frequency transects, forage utilization, and allotment inspections inform appropriate adjustments. Grazing intensity (measured before the end of the growing season) in combination with other factors such as weather patterns, likelihood of plant regrowth, and previous years' utilization levels, is used in management determinations. Authorized numbers may go up and down, but do not exceed the number set in the grazing decision, implemented through the term grazing permit. The AOI may also change season of use, salt locations, and pasture rest periods. Deferred rotation grazing with deferment in the spring may be necessary to favor the development of native cool season grasses and to align with desired conditions (USDA Forest Service 2014).

Monitoring and adaptive management in Chapter 2 address how the Forest Service utilizes the AOI to balance ecological conditions in the allotment and allows the Responsible Official to adjust the AOI if necessary.

Special Area Designations

The Rain Tank Allotment is completely within the boundary of the southern portion of the Baaj Nwaavjo I'tah Kukveni-Ancestral Footprints of the Grand Canyon National Monument (Monument). The Monument was designated via Presidential Proclamation 10606 by President Biden on August 8, 2023 to protect and preserve the rich cultural, ecological, scientific, historic, and scenic values of the greater Grand Canyon landscape. The designation of the Monument was also for the purpose of protecting sacred places for cultural and spiritual uses, while respecting existing uses such as livestock grazing permits and preserving access for hunting and fishing (Proclamation 10606 of August 8, 2023).

The proclamation states explicitly: "Nothing in this proclamation shall be deemed to prohibit grazing pursuant to existing leases or permits within the monument, or the renewal or assignment of such leases or permits, which the BLM and Forest Service shall continue to manage pursuant to their respective laws, regulations, and policies." In discussing preparation of the Monument management plan, which the proclamation requires, it directs the Secretaries of the Interior and Agriculture Departments to "take into account, to the maximum extent practicable…. providing appropriate access for livestock grazing…" (Proclamation 10606 of August 8, 2023).

Additionally, the proclamation expressly does not preclude maintenance, modification, expansion, upgrades, or construction of new water infrastructure for various purposes if it is consistent with the proper care and management of the objects identified in the proclamation and all other applicable laws. The various components of the proposed action were designed to comply with the proclamation and the effects analyses conducted as part of this EA will ensure compliance with the requirements and direction in the proclamation.

Purpose and Need for the Proposal

The purpose of this project is to continue authorization of livestock grazing on the Rain Tank Allotment in a manner that ensures livestock management activities are consistent with other resources in alignment with the Kaibab National Forest Land and Resources Management Plan and the direction to move ecosystems toward their desired conditions. There is a need to adjust the range in Animal Unit Months (AUMs) of permitted livestock and rotation strategies to allow for increased flexibility for livestock management on the allotment in a manner that meets these conditions. There is also a need to construct additional range improvements to achieve better livestock distribution and to increase flexibility in addressing drought. This project would allow the Forest Service and the grazing permittee to use adaptive management to respond to changing resource conditions or management objectives while complying with Forest Service Policy (Forest Service Handbook (FSH) 2209.13 Chapter 90).

To address the purpose and need, a Forest Service interdisciplinary team developed the proposed action for the Rain Tank allotment based on a comparison of existing resource conditions in the project area with desired conditions identified in the Forest Plan and through site-specific evaluation of the project area resources. The proposed action is described in Chapter 2 of this EA.

Additionally, authorization is needed on this allotment because:

- There is Congressional intent to allow grazing on suitable lands where consistent with other multiple use goals and objectives, (Multiple Use Sustained Yield Act of 1960, Wilderness Act of

1964, Forest and Rangeland Renewable Resources Planning Act of 1974, Federal Land Policy and Management Act of 1976, National Forest Management Act of 1976).

- This allotment contains lands identified as suitable for domestic livestock grazing in the Forest Plan and continued domestic livestock grazing is consistent with its goals, objectives, standards, and guidelines (Forest Plan, pages 24, 91-118).
- It is Forest Service policy to make forage available to qualified livestock operators from lands suitable for grazing consistent with land management plans (Forest Service Manual 2203.1; 36 CFR 222.2 (c)).
- The Grand Canyon National Park Enlargement Act of 1975, established the lands now known as the Havasupai Reservation, and that those lands "…shall be administered under the laws and regulations applicable to other trust Indian Lands provided that … (2) the lands shall be available for use by the Havasupai Tribe for agricultural and grazing purposes, subject to the availability of such lands to sustain such use as determined by the Secretary." The act also included a provision that "…rights of use and occupancy of the lands will be transferred to the tribe," regarding lands designated as the Rain Tank allotment on the Kaibab National Forest after the existing permits or leases at the time of the law expired. (Public Law 93-620).

Public Involvement

Prior to the final development of the draft proposed action analyzed in this EA, the Forest met with the President of the Rain Tank Cattle Company (an authorized signatory for the Havasupai Tribe) other local parties to identify and evaluate management objectives and strategies. The Rain Tank Grazing Reauthorization project was listed on the Kaibab NF Schedule of Proposed Actions (SOPA) and posted to the Kaibab NF project website on January 18, 2024. The initial draft proposed action was made available for a public scoping period from February 1, 2024, to March 4, 2024. 13 comment letters were received during this scoping period. These letters helped identify issues for the analysis in this EA (see Issues section below) and provided other suggestions that have been incorporated in this EA and project record.

A draft version of this EA was made available for a 30-day public comment period, which ran from May 16– June 16, 2025. During this comment period, seven comment letters were received. A comment analysis can be found in Appendix C. Corresponding updates were made through this EA. This final EA and a draft decision notice and finding of no significant impact will be available for an objection period pursuant to 36 CFR 218. More information about public involvement can be found in Chapter 4.

Issues

Issues highlight effects or unintended consequences that may occur from the proposed action and alternatives, giving opportunities during the analysis to reduce adverse effects and compare trade-offs for the decision maker and public to understand. Issues help frame the alternatives and analysis. Table 1 lists issues that were raised internally and/or during external scoping and will be addressed in the effects analysis. Table 2 lists issues that will not be given detailed consideration.

Table 1. Issues for analysis

Resource Area	Issue	How Addressed
Climate	The effects of livestock grazing may exacerbate the effects of climate change.	Forest Service range management uses an adaptive management approach that is responsive to short-term, i.e., annual changes in vegetation and water availability, and incorporates predictive modeling of forage production based on weather outlooks. If monitoring would indicate deteriorating

Resource Area	Issue	How Addressed
		conditions, regardless of whether they were the result of stocking levels, grazing patterns, or climatic factors, adaptive management actions would be taken to ensure that desired conditions continue to be met.
Emissions	The proposed increase in AUM may result in increased methane and other greenhouse gases.	Emissions were analyzed and is in the project record. Average annual emissions under the proposed action, assuming the maximum number of cattle would be authorized to graze each year, would decrease by 4.5% compared to current management. Average annual emissions would be offset by the carbon uptake of 518 acres of average U.S. forest in one year.
Cultural Resources	The project may impact cultural resources, including through cattle grazing within pastures.	Issue analyzed in Cultural Resources section of the EA.
Cultural Resources	The proposed action may affect Tribal religious uses or sites.	Issue analyzed in the Cultural Resources section of chapter 3 in the EA, in addition, Tribal Consultation for the project is summarized in chapter 4.
Drought	Drought and timing of precipitation may impact the effectiveness of the proposed water catchments.	Drought preparedness is addressed in the proposed action (Chapter 2) and in the effects analysis in Chapter 3. Catchments are designed based on local precipitation and livestock wildlife watering requirements. Further, the purpose of the additional waters is to increase livestock distribution across a larger area and limit intensive use near current waters.
Economics	The proposed repair and construction of infrastructure on the allotment are expensive and taxpayers may end up with the burden.	Issue addressed in the effects analysis for the Range resource in Chapter 3.
Fire/Fuels	Livestock grazing on public lands may impact natural fire regimes.	Fuels, fire and vegetation effects are addressed in Chapter 3.
Infrastructure and motorized use	The project may result in the construction of infrastructure that cannot be serviced by currently inventoried roads, resulting in increased cross-country travel and subsequent damage to the land.	Potential new range infrastructure and access routes are addressed in the effects analysis in Chapter 3 of the EA. An offroad use permit issued by the authorizing official would be required prior to construction activities.
Invasive Species	Livestock grazing on public lands may spread invasive weeds.	Invasive weeds are considered in the effects analysis for the Range resource in Chapter 3.
Monument	The proposed action could affect the landscape and objects within the Monument boundaries.	Issue is addressed through the interdisciplinary effects analysis in Chapter 3.

Resource Area	Issue	How Addressed
Plants	The proposed action may affect rare plants, restricted/endemic plant species such as Tusayan rabbitbrush, Western mousetail, or Fickeisen plains cactus.	Issue is addressed in effects analysis for U.S. Fish and Wildlife Service Listed, Forest Service Sensitive, and Restricted and Narrow Endemic Plant Species in Chapter 3.
Range	The EA should include an adaptive management plan to ensure ecosystem functionality, including a monitoring plan, disclosure of monitoring results, thresholds for soil conditions and hard thresholds with a list of required corrective actions.	Adaptive management and monitoring is described in the proposed action (Chapter 2 of the EA). Monitoring results are disclosed in the current conditions in the effects analyses in Chapter 3. Lastly, Appendix A, “Project Design Features by Resource,” includes an if-then scenario for with examples of future adaptive management actions based on future conditions as indicated by monitoring.
Range	Permitted livestock may encroach onto sensitive habitats or leave the allotment and enter neighboring lands, such as the Grand Canyon National Park and private lands.	Issue addressed through the proposed action, discussed in Chapter 2.
Range / Botany / Wildlife / Monument	The proposed infrastructure may result in changed hydrology of the area due to the water catchments and water movement. The area around each of the troughs could become a sacrifice zone devoid of vegetation and wildlife because livestock will trample the area.	Effects of proposed infrastructure are analyzed in Chapter 3.
Recreation, Scenery and Wilderness	The proposed action may detract from the wilderness experience of camping, hiking, picnicking, wildlife viewing and other uses.	Issue analyzed in the Recreation and Scenery section of this draft EA. In addition, there is no designated wilderness in or near the project area.
Soils and Watershed	The proposal may impact soils and watersheds, including xeroriparian areas and soil biocrusts.	Issue analyzed in Soils and Watershed section of this draft EA. While there are no xeroriparian areas on the allotment, the closest to compare to is fluventic soils. Potential effects to fluventic soils are analyzed in the draft EA.
Watershed	The proposed action may impact water quality.	Water quality is addressed in the Soils and Watershed section of Chapter 3.
Wildlife	The project may impact wildlife, including native species, U.S. Fish and Wildlife Service Listed Threatened and Endangered Species, wild ungulates, and birds.	The effects of the proposed action and alternative to plant and wildlife species are analyzed in Chapter 3.
Wildlife	Livestock grazing may reduce the amount of forage available for native wildlife.	Livestock will be moved when a 40 percent utilization threshold is met, leaving 60 percent of biomass available for plant regeneration and use by wildlife. The effects of grazing on available forage are discussed in the Wildlife section of Chapter 3.

Resource Area	Issue	How Addressed
Wildlife	The proposed fence may negatively impact wildlife, including bird and ungulate species.	In accordance with the Forest Plan, all new fences would be constructed to wildlife friendly standards as defined by Arizona Game and Fish Department Guidelines.

Table 2. Issues or topics dismissed from detailed consideration

Resource Area	Issue	Rationale for Dismissal
Emissions	The calves are taken from the forest to crowded feed lots where they continue to contribute to greenhouse gases.	What happens to these livestock after they are removed from the allotment is outside the scope of this analysis and the authority of the Forest Service.
Cultural Resources	Temporary closures may be needed within the allotment to protect the privacy of cultural, religious and gathering activities of members of Tribal Nations.	This issue is already addressed in law. The existing Cultural & Heritage Cooperation Authority Chapter 32A §3054(b)(1) provides the USDA Forest Service with the authority to grant temporary closures of National Forest Service System land to protect the privacy of tribal activities for traditional and cultural purposes. This analysis or permitting action would not supersede this Authority.
Kaibab National Forest Staffing	Concern that that Kaibab N.F. Range program may experience changes in personnel and decrease in continuity of shared knowledge.	This issue is addressed through management and is outside the scope of the environmental analysis.
Monument	The proclamation language of the Monument does not protect a given use such as grazing.	The Monument proclamation allows existing livestock grazing to continue with a heightened sensitivity as to potential effects and mitigations for grazing. While recognizing that ongoing livestock grazing is part of the land use within designated Monument boundaries, management is conducted with respect to respective laws, regulations, and policies.
Monument	The area is now part of the Conservation Lands system, and these lands must be managed differently than other Forest Service managed lands that are managed for multiple use.	The portion of the Monument that is within NFS lands remain under the jurisdiction of the Kaibab NF and manage in accordance with the laws, regulations and policies of the Forest Service. The portion of the Monument that may be National Conservation Lands is outside of the project area and is managed by the Bureau of Land Management.
Monument	The Monument designation calls for a Federal Advisory Committee per the Federal Advisory Committee Act (FACA) and Tribal Advisory Committee, which are not yet in place.	The Proclamation does not require the FACA and Commission to be functioning prior to making any management decisions. Public involvement, Tribal Consultation and scoping efforts are described in chapters 1 and 4 of the Draft EA.

Resource Area	Issue	Rationale for Dismissal
Range	The gates associated with range fences are hard to open.	This comment can be addressed through management and is outside the scope of the environmental analysis.
Soils and Watershed	The proposed action may degrade riparian habitat or springs.	Riparian and wetland vegetation have not been found on the allotment. No riparian areas, springs, or wetlands have been documented within the Rain Tank allotment area. Therefore, this issue is outside the scope of the analysis.
Wildlife / Range	Unauthorized/trespass livestock may be present in the allotment and may have an impact on the range and protected landscape.	The presence of unauthorized livestock is a result of unpermitted placement or abandonment of property on the NFS lands. The agency cannot evaluate the effects of implementing a project under the assumption that an illegal or unpermitted activity exist or would continue. Actions with regard to illegal activity are managed through law enforcement regulations and therefore this issue is outside the scope of this analysis.
Wildlife / Range	If domestic sheep are permitted, they may spread disease to the bighorn sheep population inside of the Grand Canyon National Park.	Sheep are not included in the proposal for this analysis. The proposed livestock animals are cattle. While sheep were historically grazed on the Rain Tank Allotment, the 2014 revision of the Forest Plan includes a standard that specifically does not allow sheep to be permitted in areas near the Grand Canyon to prevent the spread of disease between domestic sheep and wild sheep populations.

Chapter 2: Proposed Action and Alternatives

This chapter describes the alternatives analyzed in detail in this EA, including associated resource protection measures. Mitigation measures associated with all action alternatives are required and can be found in *Appendix A: Project Design Features by Resource* of this document. The no action (No Grazing) alternative and the proposed action (alternative A) were considered in detail during this analysis. The current management alternative does not meet the purpose and need for this project and therefore was not analyzed in further detail. An alternative was discussed during consultation with the Havasupai Tribe for a nine-month season of use and 700 AUM, which does not meet the purpose and need for this project and therefore was not analyzed in further detail.

Alternatives Analyzed in Detail

No Grazing

At the time that this project was initially scoped, direction from Chapter 90 of Forest Service Handbook 1909.15 was that a “No Grazing” alternative must be considered in any range environmental analysis, for this EA, the “No Grazing” alternative is also the “No Action” alternative. Under this alternative the term grazing permit on the Rain Tank allotment would be cancelled, reducing permitted AUMs to zero in the allotment for a period of no less than 10 years, following guidance in 36 CFR 222.4 and Forest Service

Manual 2231.62. Existing improvements no longer functional or needed for other purposes, including interior fences, cattle guards, and water developments would be evaluated for continued usefulness and removed as necessary. Exterior allotment boundary fences would be assigned to neighboring permittees for maintenance. Existing water developments may be adversely affected.

Proposed Action – Alternative A

The proposed action, referred to as Alternative A, consists of four components: authorization, improvements, management practices and conservation measures and monitoring. The proposed action follows 2023 guidance from Forest Service Handbook 2209.13, Chapter 90 (Grazing Permit Administration; Rangeland Management Decision Making).

Table 3. Proposed specifications for Livestock Authorization on Rain Tank Allotment in Relation to Current Management

Proposed Action	Details	Change from Current Management	Number of Acres Impacted by Construction of New Structural Improvements
Permitted Animal Unit Months (AUMs)	1,400 to 3,500 AUMs	Change from the currently permitted 1,970 AUMs to a range in permitted AUMs to add flexibility on an annual basis based on resource conditions, such as precipitation, vegetative growth, and other rangeland condition indicators determined by monitoring	N/A
Season of Use	April 1st – October 31st	None	N/A
Permitted number of head	200 - 500	Proposed range differs from the currently permitted 280 cow/calf pairs	N/A
Grazing System	Deferred rotational grazing	None	N/A
Forage Utilization Guideline	Conservative level of utilization (30-40%)	None	N/A
Seasonal Utilization Guideline	Conservative level of seasonal utilization (30-40%)	None	N/A
Pipeline extension and repair	Approximately 1.2 miles of newly constructed buried or surface pipeline	New Construction	Approximately 1.5 Acres
Water catchment installation	1 in Wheat Pasture, and 1 in Rain Tank Pasture	New Construction	Approximately 5 Acres
Water storage tanks and troughs along reconstructed pipeline	Up to 2 additional storage tanks and 4 troughs	New Construction	Approximately 6 Acres
Installation of boundary fence	Approximately 2.5 miles of new boundary fence construction near the Town of Tusayan	New Construction	Approximately 5.5 Acres

Authorization

The proposed action is to reauthorize livestock grazing on the Rain Tank allotment under the following terms and conditions. Proposed permitted numbers would be 200 to 500 cow/calf pairs for a seven-month period (totaling 1,400 to 3,500 AUMs) (Table 3). The proposed increase to the upper limit is based off a carrying capacity analysis that was completed in the year 2024, inspired by methods from Holecheck (2010), driven by data from the Rangeland Analysis Platform and the Rocky Mountain Research Station's Rangeland Production Monitoring Service (RPMS). To prepare the proposed action for this analysis, the Kaibab NF utilized remote sensing data from RPMS to collect biomass available for livestock grazing and model forage supply across the allotment. The model considered three climate-based scenarios (drought year, average year, and high precipitation year) and incorporated a 40 percent forage utilization threshold. Additionally, grazeable acres were identified through a grazing distribution analysis that accounted for allotment water supply, locations, and topography. The calculated forage supply was then compared to forage demand to determine the total available AUMs. The model indicated a capacity of 500 cow/calf pairs (equivalent to 3,500 AUMs) in an average year, which serves as the upper limit for the proposed action. The biomass data collected from RPMS was ground-truthed by field-collected production data.

The Forest Service defines a single Animal Unit Month (AUM) as the amount of forage needed to sustain one animal unit for one month. An animal unit is a mature cow that weighs about 1,000 pounds, either with or without a calf up to six months old, or its equivalent.

Based upon this analysis, annual authorized livestock numbers would vary within the proposed range based on existing resource conditions, including precipitation, available water, predicted forage production for the year and the previous annual or seasonal utilization levels. Adjustments to the annual authorized livestock numbers and AUMs (increase or decrease) may occur during the grazing year, based on conditions, or range inspections, or both. Adjustments are documented in the Annual Operating Instructions (AOI) and would be determined based on the monitoring and conditions from the previous year, with the goal of bringing the pastures towards the desired conditions described above. Forage use would be managed at a level corresponding to conservative use levels (30 to 40 percent) to provide for grazed plant recovery, increased plant vigor, and retention of herbaceous litter to protect soils and provide forage and herbaceous cover for wildlife.

A new 10-year term grazing permit would be issued for the allotment in accordance with Forest Service Manual (FSM) 2231.03 for the numbers and terms displayed in Table 2. The term grazing permit would identify the number, kind, and class of livestock authorized and the season of use as required by Forest Service policy (FSM 2231.11). A permit would also identify the total AUMs authorized for the Rain Tank allotment. The number and class of livestock and the season of use would be allowed to vary in response to resource conditions and management objectives. Annual use would not exceed the total AUMs authorized or the season of use identified in the permit. The new grazing permit would be issued within 90 days of final agency action following this decision (FSH 2209.13(94) and Forest Service Region 3 Supplement 2209.13-2016-1).

Consistent with Forest Service handbook (FSH) guidance 2209.13, 94, a new allotment management plan (AMP) will be developed for the allotment and would be incorporated into any term grazing permit issued. The AMP would specify the goals and objectives of management, management strategies, range improvements, and monitoring requirements and would incorporate an adaptive management strategy described below. The use of coordinated resource management plans will be encouraged where the coordinated use of intermingled private, state, and federal lands is conducive to more effective management.

On an annual basis, the Forest Service and permittee would continue to meet and jointly prepare written AOI prior to each grazing year (FSH 2209.13) to set forth:

- The maximum permissible grazing use authorized on the allotment for the current grazing season and the numbers, class, type of livestock, and timing and duration of use.
- The planned sequence of grazing on the allotment, and the management prescriptions and monitoring that will be used to make changes.
- Structural and non-structural improvements to be constructed, reconstructed, or maintained and who will be responsible for these activities.
- Allowable use or other standards that will be applied and followed by the permittee to properly manage livestock.
- Monitoring for the current season that could include, among other things, documentation demonstrating compliance with the terms and conditions in the grazing permit and AMP.

Improvements

Proposed structural range improvements to better support livestock distribution and pasture reliability include installation of two new water harvesting catchments and the reconstruction and extension of an existing water pipeline with associated storage tanks and troughs. This pipeline would be supplied from an existing water source outside of NFS lands and would be buried where possible. A new segment of the boundary fence of the Rain Tank pasture would also be installed near the town of Tusayan.

The maintenance of existing improvements would continue as needed. The responsibility for maintenance of range improvements is typically assigned to the permittee in the terms and conditions of each grazing permit (FSM 2244.03) and would be identified annually in the AOI. These improvements (Fig. 1) are proposed in the context of adaptive management, meaning they have been identified as possible practices to assist in the achievement of desired conditions:

- An existing but non-functioning polyethylene pipeline would be reconstructed and extended by 1.2 miles. This new pipeline will run from the existing Rain Tank stock tank (currently being used and is located off NFS lands) to existing livestock handling facilities located near Ranger Tank. Up to two water storage tanks and four troughs would be placed along the pipeline at appropriate locations. Portions of the non-functioning pipeline that are currently above-ground would be removed from NFS lands. The legal description of proposed water pipeline improvements is T. 30 N., R. 3 E., sec. 34; T. 29 N., R. 2 E., sections 4, 5, 7, 8, 18; and T. 29 N., R. 1 E., sec. 24.
- Two new water harvesting catchments would be installed. These catchments would consist of the localized construction of a catchment apron, wildlife-friendly exclosure fencing, water delivery pipeline, water storage, and trough. The legal description of proposed improvements is T. 30 N., R. 2 E., SE ¼ of sec. 4 and T. 31 N., R. 1 E., NW ¼ of sec. 28.
- Two and a half miles of new fence would be constructed on the boundary between the Rain Tank pasture and the Town of Tusayan. The legal description of proposed improvements is T. 30 N., R. 2 E., sec. 24. This is an allotment boundary fence that would provide additional ease of management, allow for use of that pasture, thereby increasing grazing capability on the allotment, and would be constructed with wildlife-friendly designs.

This is an evolving project, and additional structural improvements may be necessary to achieve management objectives in the future. Heritage, wildlife, and other appropriate resource clearances for both the improvements and the access to the improvement would be obtained before implementation of any future improvements. Improvements may be authorized as necessary to achieve desired conditions and management objectives. In the case that changing circumstances require structural improvements or management actions not disclosed or analyzed herein, further interdisciplinary review would occur.

Examples of future improvements may include, but are not limited to:

- Additional pasture division fencing

- Cattle guards on existing roadways
- Holding trap development
- Livestock handling facilities development
- Grazing enclosures
- Development of additional pipelines and troughs
- Development of additional water harvesting catchments
- Wildlife water development
- Base stations for virtual fencing

Management Practices and Conservation Measures

Under the proposed action, livestock grazing would continue under conservative grazing utilization guidelines in accordance with the Forest Plan, and regular growing season rest or deferment that would provide for grazed plant recovery. This management would allow for increased plant vigor and retention of sufficient herbaceous vegetation to protect soils and to provide herbaceous cover for wildlife.

Livestock grazing would follow a deferred use and rest rotation system, allowing pastures adequate rest or growing season deferment before being grazed again. Additionally, pastures would not be grazed at the same time each year, allowing for the phenological (natural lifecycle) development of grazed functional groups over time (i.e., cool-season plant species, warm-season species, forbs and browse species).

Adaptive Management

Adaptive management uses documented results of management actions (monitoring) to continually modify management to achieve specific objectives including but not limited to maintaining or moving towards desired conditions as stated in the Forest Plan (USDA Forest Service 2014). Adaptive management would be tied strongly to the drought management strategy, which is described in the following section. Management results would be assessed with both short and long-term monitoring (i.e. implementation and effectiveness monitoring) as defined in the monitoring section below. In addition, Forest Plan monitoring would be conducted across a larger landscape with random site selection, which may only assess a subset of allotments and may or may not include the Rain Tank allotment. Adaptive management provides flexibility to adjust livestock numbers and timing of grazing so that use is consistent with current productivity and is meeting management objectives. Under the adaptive management strategy, the specific number of livestock authorized, specific dates for grazing, class of animal and modifications in allotment use may be administratively modified as necessary and appropriate based on programmatic monitoring. Administrative changes would be documented and implemented in the AOI, which are made part of the term grazing permit. Adaptive management also includes monitoring and analysis to determine whether identified structural improvements are necessary or need to be modified.

If monitoring results indicate degraded conditions, a condition-based adaptive management strategy, such as the example actions found in Appendix A (Table 23) would be implemented. Additional soil condition monitoring and adaptive management actions as recommended by the Forest Watershed Program could be necessary if specific soil condition indicators are impacted. The need for those measures would be evaluated on an annual basis and incorporated into the Allotment Management Plan.

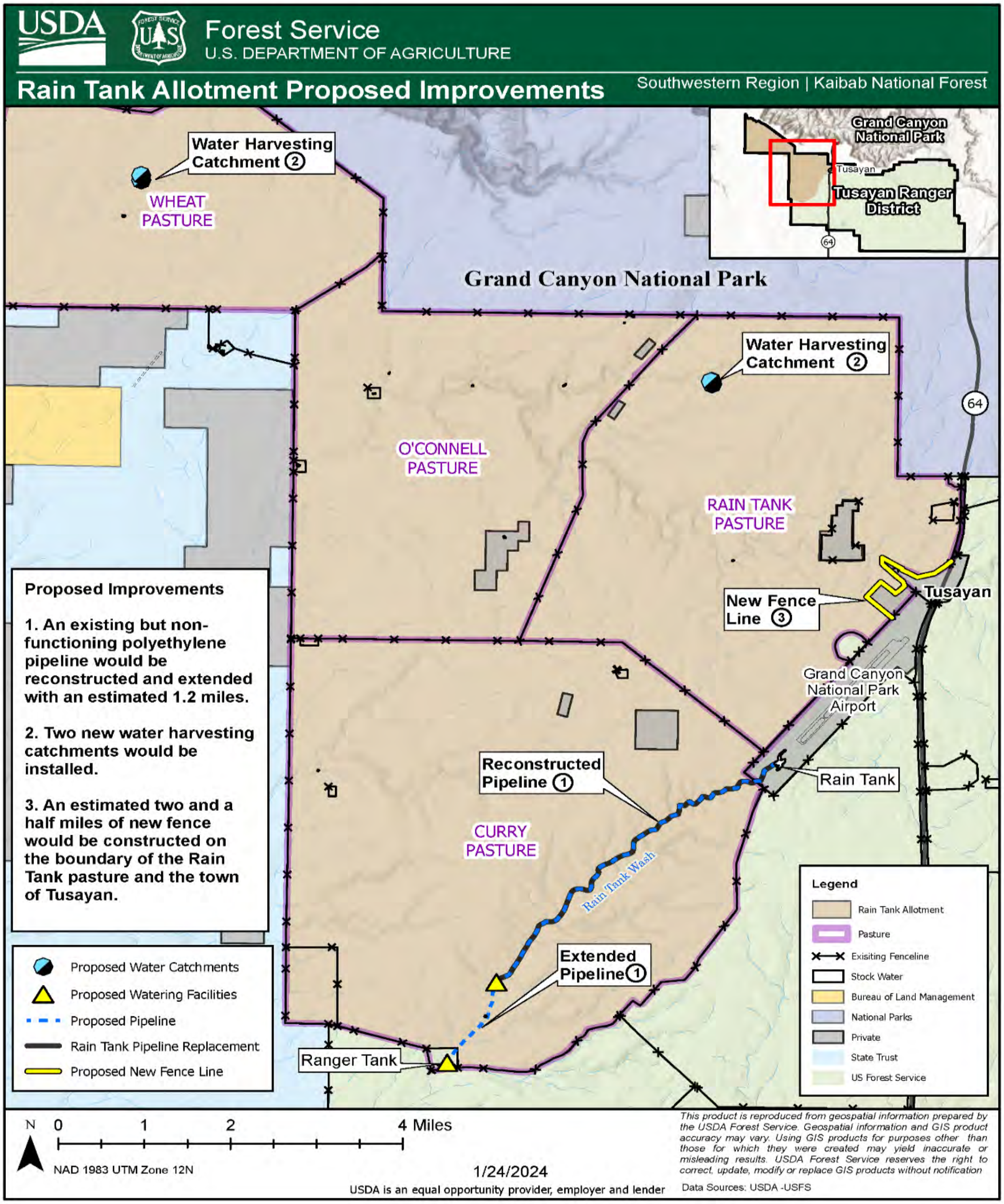

Figure 2. Proposed new range improvements

Drought Preparation

Drought is an inevitable occurrence in the southwestern United States. Land managers and grazing permittees must plan for drought as a normal part of management and business. The Standardized Precipitation Index (SPI) is a unit of measure that compares recent precipitation values for a period of interest with long-term historical values to assess moisture conditions in each area (NOAA.GOV). In the Southwestern Region (Region 3), any time the SPI reaches a value of minus 1.00 or less for the preceding 12-month period, grazing allotments should be evaluated for existing drought conditions. Many factors are considered when devising management actions on National Forests in Region 3 in response to drought. Such factors include the number of different plant species present, past grazing use, timing of grazing, intensity of management, and conditions of improvements to support grazing activities. These factors along with precipitation data provide flexibility to the Responsible Official to make decisions based on recommendations from District specialists. Rangeland management specialists use direction provided in the Region 3 Supplement to Forest Service Handbook 2209.13, the Grazing Permit Administration Handbook, and 12-Month SPI to assess soil and vegetation conditions. Using the SPI as a baseline and combining it with site-specific information from allotment inspections and monitoring data, range specialists can make a determination for necessary management actions and review adaptive management alternatives to determine the best course of action.

Region 3 and Kaibab NF drought management policies identify numerous adaptive management actions for mitigating grazing effects during drought. The District Range Program would conduct annual monitoring of the allotment to collect forage production and forage utilization data. Annual monitoring would help inform the management actions that could be used on Rain Tank allotment during periods of drought. The following are examples of management actions that could be used with appropriate monitoring:

1. Reduce authorized AUMs. Reductions may be necessary prior to the permitted season of use and/or during the permitted season of use.

2. Shorten season of use. Depending on the severity of potential drought or distribution of livestock water and authorized AUMs, a reduced grazing season may be necessary, and this may ultimately result in an early exit from the Rain Tank allotment.

3. Reduce forage utilization and/or seasonal utilization levels. Depending on the severity of the drought and the authorized AUMs, reduced forage utilization and/or seasonal utilization levels will likely result in shortened pasture use periods and may also result in an early exit from the Rain Tank allotment.

4. Graze pastures only once during the same grazing season, and this may ultimately result in an early exit from the Rain Tank allotment.

Pastures may need complete rest from livestock use. Pasture resting periods will depend on the severity of a given drought. Livestock use of planned rested pastures due to drought would not be authorized.

Monitoring

The objective of monitoring is to determine whether management is being properly implemented and whether the actions are effective at achieving or moving toward desired conditions. Rangeland monitoring is separated into two categories: effectiveness monitoring and implementation monitoring. These two types of monitoring are needed to interpret effects of management on rangelands. As effectiveness monitoring provides the long-term trend and data associated with various attributes related to upland vegetation, the implementation monitoring helps evaluate the uses, actions, and/or stressors that took place on the same benchmark sites and the surrounding areas. Assumptions can be made by using the data from these two data sets to help determine why certain attributes in long term monitoring are or are not changing over time and thus inform decision making in adaptive management.

Effectiveness monitoring includes measurements to track condition and trend of vegetation, soil, and watersheds. Monitoring will be done following procedures described in the Guide to Rangeland Monitoring and Assessment and the Region 3 Rangeland Analysis and Training Guide (USDA & DOI 2013). This data is interpreted to determine whether management is achieving desired resource conditions, whether changes in resource conditions are related to management, and to determine whether modifications in management are necessary. Effectiveness monitoring would occur at five-to-ten-year intervals, or more frequently if deemed necessary. Examples of effectiveness monitoring measurements include, but are not limited to plant frequencies by species, relative plant compositions by species, point ground cover, soil and watershed condition assessments, and repeat photography. Monitoring would occur at established permanent monitoring points.

Implementation monitoring would occur on an ongoing basis and will include, but not be limited to, forage utilization measurements, forage production, range readiness, plant phenology, livestock counts, and range improvement inspections. An allotment inspection would include all of the attributes along with field observations such as cattle behavior and distribution description, grazing permit compliance checks, invasive species populations, soil and watershed conditions, recreation uses, wildlife observations, and general resource conditions.

Utilization measurements are made following procedures found in the Interagency Technical Reference and with consideration of the Principles of Obtaining and Interpreting Utilization Data on Southwest Rangelands (Smith et al 2016). Utilization would be monitored on key forage species, which are perennial grasses that are palatable to livestock. At a minimum monitoring would include use in key areas but may include monitoring outside of key areas. Utilization on non-grass species (forbs, shrubs, and trees) may also be measured if appropriate for the site, in particular Tusayan rabbitbrush would be included as a key species in utilization monitoring where it is known to occur (currently within one site in the Curry pasture). Utilization may be monitored both during the grazing season (seasonal use) and at the end of the growing season (annual utilization). Forest Service rangeland management specialists would be responsible for monitoring livestock grazing utilization. Over time, changes in resource conditions or management may result in changes in livestock use patterns. As livestock patterns change, new key areas may be established, and existing key areas may be modified in cooperation with the permittee.

Records of livestock numbers, movement dates and shipping records would be tracked by the permittees and would be provided to the District Range Staff annually.

In addition to Rangeland and Forest Plan monitoring as described above, stream condition monitoring would focus on establishing key monitoring reaches based on inventory results from the project area. This would target reaches within named streams and selected tributaries within the allotment.

Soil condition monitoring may occur within 3-5 years of implementation of the Proposed Action. Repeat monitoring after that would occur when degradation in soil condition is detected or at least every 5-10 years thereafter. Detailed soil condition monitoring is recommended on one pasture on Terrestrial Ecosystem (TES) map unit 260, which comprises the largest aerial extent (16) of all soils in the allotment, to assure long-term soil condition and productivity is maintained. Additionally, regular monitoring of the TES map units that were determined to be in impaired condition during assessment is recommended.

Emerging Technologies

Remote sensing technologies such as the rangeland analysis platform and the Rocky Mountain Research Station's Rangeland Productivity Monitoring Service may be used as available to quantify trends in vegetation cover biomass production through time, vegetation response to climate, evaluate inter-annual variability, and quantify recovery from drought.

Virtual fencing may be implemented to meet resource management objectives. Virtual fencing technology is a system that enables livestock to be confined or moved without using fixed fences by relying on collars, sensors, GPS, and wireless technologies.

Comparison of Alternatives

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

Table 4. Comparison of Alternatives

Selected Issues	Alternative A – Proposed Action - Continue to authorize livestock grazing on Rain Tank under updated terms and conditions.	Alternative B – No Livestock Grazing/ No Improvement Projects
Livestock Grazing	Up to 500 cow/calf pairs depending on current resource conditions.	No grazing authorized.
Soils and Vegetation Conditions	Potentially stable or improved condition and upward trend in plant communities. Stock and monitor approach allows for proper stocking rates and grazing intensity. Condition and trend would be measured via effectiveness monitoring.	Conditions may remain static, potential upward trend in plant communities.
Monitoring	Effectiveness would occur every 5-10 years and implementation monitoring would continue on an annual basis.	No monitoring would occur.
Management	Adaptive management options are implemented to resolve problems.	No management implemented to change conditions.
Wildlife	The analysis broadly revealed livestock grazing can have both positive and negative effects to wildlife and their habitat. Proposed project design features would mitigate negative effects to prevent any level of significance. Conservative utilization of 40% will mitigate and prevent any permanent degradation of wildlife habitat. For some species the overall availability of suitable habitat will increase. Fences would be constructed and maintained at standards that are wildlife friendly to support habitat continuity. Additional waters may reduce competition for terrestrial species, improve livestock distribution and create foraging habitat for some species.	The No Action Alternative would limit the Forest Services' ability to apply adaptive management to authorized livestock on the landscape. Existing fences would degrade, resulting in increased habitat fragmentation. Lack of maintained fence lines would lead to trespass (unauthorized) livestock as a management concern where the potential for permanent degradation of wildlife habitat is not outside the range of possibilities. Water developments would slowly become unserviceable, decreasing the available water for wildlife on the landscape.

Chapter 3: Environmental Impacts

This chapter describes the current condition of the various environments, resource conditions, and uses in the Rain Tank allotment project area and discusses the anticipated direct, indirect, and cumulative effects of implementing the project on these factors. The effects analysis is focused on the issues identified in Chapter 1.

Rangelands

Existing Conditions - Range

The physiographic province within the allotment contains uplands within the Colorado Plateau, characterized by a sequence of flat to gently dipping sedimentary rocks eroded into plateaus, valleys and deep canyons. The lower elevations to of the allotment are comprised of a conifer woodland vegetative community characterized by juniper (*Juniperous spp*.) and pinyon (*Pinus edulis*) tree species. These species are generally openly spaced with perennial grasses intermixed. Other species include snake weed (*Gutierrezia sp.*), sage (*Artemeisa sp.*), and rabbitbrush (*Chrysothamnus viscidiflorus*). As elevation increases, the landscape changes to primarily conifer forest, dominated by ponderosa pine (*Pinus ponderosa*) and perennial grass understory consisting primarily of prairie junegrass (*Koeleria macanthra*), squirreltail (*Elymus elymoides*), western wheatgrass (*Pascopyrum smithi*i), and blue grama.

The Terrestrial Condition Assessment (TCA) is a mid-scale assessment that interprets and synthesizes data for 12 key indicators of ecological conditions and stressors, including drought and grassland productivity, to evaluate the overall ecological integrity of landscapes. Areas are classified into one of five categories for each of the 12 indicators: very good, good, moderate, poor, or very poor (USDA Forest Service 2023a). To describe the existing conditions across the allotment, we focused on two key indicators from the TCA: drought conditions and grassland productivity.

Drought conditions, calculated as moisture deficits over the last three years for which data were available (2021-2023) compared to a historical baseline dating back to 1900, are rated as moderate for the entire allotment (USDA Forest Service 2023b).

The grassland productivity data used in the TCA are based on mean relative difference of current biomass production in pounds per acre and the reference period. The grassland productivity dataset used for analysis covers 81 percent of the allotment area and shows that productivity is considered very good. The dataset does not contain productivity data for the remaining 19 percent of the allotment (USDA, Forest Service 2023b).

The Multidecadal Repeat-Dryness Exposure Index indicates that 94 percent of the allotment area received less precipitation than the long-term average from 1948-2021 for 40 to 50 percent of the years from 2000-2022. This means that for 50 to 60 percent of the years from 2000-2022, this area received average or above-average amounts of precipitation. The remaining 6 percent of the allotment area, roughly 4000 acres, received less precipitation than the long-term average from 1948-2021 for 50 to 60 percent of the years from 2000-2022. This means that for 40 to 50 percent of the years from 2000-2022, this area received average or above-average amounts of precipitation (Egan et al. 2024).

While the TCA classified the allotment as experiencing moderate drought conditions, and despite the fact that precipitation across the allotment has been below average roughly 50 percent of the years from 2000-

2022, grassland productivity remains high in the area where productivity data are available (81 percent of the allotment). See discussion of monitoring data from the allotment below for more information.

Monitoring

Eight long-term vegetation monitoring transects (monitoring clusters) exist in the Rain Tank Allotment (Table 5). The most recent data was collected from the Rain Tank monitoring clusters in 2021. The Pace Quadrat Frequency protocol was followed, which entails documentation of ground cover, canopy cover, species occurrence, species frequency and relative species composition at each pace interval. The purpose of the long-term monitoring is to assess vegetation and soil condition and trend. A recent change in monitoring methods now captures ground cover and vegetation data that correlated with data presented in the Terrestrial Ecosystem Survey (TES) (Ruyle and Dyess 2009). Pace Quadrat Frequency Data is available for 2012, 2018, and 2021. Historical data prior to this exists for years 1956, 1957, 1963, 1964, 1973, 1978, and 1993. Repeat photography dating back the transect establishment date was also conducted at all sites. When compared, monitoring sites showed an upward or stable trend towards desired conditions over time based on the attributes listed above (e.g.,plant species diversity, ground cover, etc.).

Table 5. Rangeland Trend by Cluster

Monitoring cluster	Pasture	Vegetation Life Zone	Rangeland Trend
2	Wheat	Great Basin Grasslands and Woodlands	Stable
3	Curry	Great Basin Grasslands and Woodlands	Stable
4	Curry	Great Basin Grasslands and Woodlands	Stable
6	Sheep	Great Basin Grasslands and Woodlands	Stable
9	Sheep	Great Basin Grasslands and Woodlands	Stable
10	Wheat	Great Basin Grasslands and Woodlands	Stable
12	Curry	Great Basin Grasslands and Woodlands	Upward
13	Curry	Great Basin Grasslands and Woodlands	Upward

Rangelands are in satisfactory condition when the existing vegetation community is in a stable trend maintaining desired condition, improving vegetation in an upward trend toward desired condition, and/or short-term objectives are being achieved to move the rangeland toward the desired condition.

Annual variation in climatic conditions is one of the major contributing factors, if not the primary factor, affecting range condition and trend in the southwestern United States. In most cases, the condition of water-limited ecosystems, such as those on the Kaibab NF, are more sensitive to the high variability in precipitation and soil moisture than to livestock management, given that appropriate management is being implemented (Holechek et al. 1999, Holechek et al. 2010, Loeser et al. 2001, Curtin 2005).

Invasive Plants

Records of invasive plants from within and near the project area were investigated in the Forest Service Natural Resource Manager database as well as in locally stored geospatial data. A 94-acre cheatgrass infestation (*Bromus tectorum*) was recorded by Range personnel in 2012 in O'Connell Pasture after the Griffen Fire. Cheatgrass was almost certainly a presence across most of the allotment long before that time, and this record likely indicates an increase in dominance following that fire. Diffuse knapweed was recorded in 2020 to have spread from developed areas of Tusayan onto the edge of Rain Tank pasture. Several invasive species were recorded as spotty infestations in an area of Rain Tank pasture as part of a timber management survey in 2016, including cheatgrass, bull thistle (*Cirsium vulgare*), and dalmatian toadflax (*Linaria dalmatica*). It is likely that this survey reflects distribution of these species in ponderosa pine areas throughout Tusayan that receive moderate to high rates of motor vehicle recreation.

Outside of the project area, there are recorded infestations of diffuse knapweed (*Centaura diffusa*) along Hwy 64 within the town of Tusayan. These infestations have been treated manually or with herbicides several times from 2020 to 2023 and appear to be contained. Hwy 64 also harbors infestations of yellow bluestem (*Bothriochloa ischaemum*) and scotch thistle (*Onopordum acanthium)* on the Tusayan Ranger District and within Grand Canyon National Park.

A valuable tool for estimating infestations of cheatgrass and other early spring annual invasives such as mustards is the Rangeland Analysis Platform, which uses remotely sensed satellite imagery to estimate annual growth and cover by lifeform categories across the continental United States. Few early-season native plants in the project area match the pattern of herbaceous annual plant cover shown by dense growth of cheatgrass in this tool. Visual investigation of this imagery classification from 2002 to 2023 suggests that cheatgrass density has fluctuated in parts of the project area (U of M & USDA ARS 2024) but no consistent 'problem spots' emerged either from this analysis or from range personnel or permittee observations.

Desired Conditions - Range

Desired conditions for the analysis area are based on Forest Plan guidance, site-specific knowledge of the allotment, and current scientific information related to the project area. In general, the desired condition for the allotment (Table 6) based on the actions associated with grazing management are to maintain or improve soil and water quality, when possible, augment water supplies when compatible with other resources through management actions based on the best available science and monitoring data.

Specific Desired Conditions for the Rain Tank Allotment

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

Table 6. Specific Desired Conditions for the Rain Tank Allotment

Forest Direction for Domestic Livestock Grazing	Specific Desired Condition	How to Measure Desired Condition
Balance livestock numbers with forage capacity on allotment.	Ensure grasses and forbs provide adequate forage for permitted livestock. Livestock use is consistent with other desired conditions.	Utilize short- and long-term monitoring protocol to capture native plant ground cover, vigor, litter, and herbaceous perennial grass utilization. Monitoring should yield a stable to upward trend.

Forest Direction for Domestic Livestock Grazing	Specific Desired Condition	How to Measure Desired Condition
Maintain the relative composition and cover of grasslands.	Depending on soil type and vegetation potential, bare soil varies between 10 and 60 percent. Basal vegetation varies between 5 and 50 percent ground cover. Organic litter varies between 30 and 50 percent of the ground cover. The relative proportion of vegetation canopy cover averages 40 to 60 percent grass, 10 to 30 percent forbs, and 5 to 20 percent shrub. Understory vegetation reflects the site potential.	Utilize short- and long-term monitoring protocol to capture native plant ground cover, vigor, litter, and herbaceous perennial grass utilization. Monitoring should yield a stable to upward trend.
Monitor percent of effective ground cover along with proportion of live and dead vegetation, litter, rock, and bare ground.	Vegetative ground cover is well distributed across the soil surface to promote nutrient cycling and water infiltration.	Utilize short- and long-term monitoring protocol to capture native plant ground cover, vigor, litter, and herbaceous perennial grass utilization. Monitoring should yield a stable to upward trend.
Monitor percent of the grassland areas, potential natural vegetation (PNVT) has less than 10 percent canopy cover.	Tree and shrub canopy are each less than 10 percent.	Utilize Geographic Information Systems (GIS) resources to evaluate PNVT on the Rain Tank Allotment.
Monitor frequency of area occupied by noxious weeds by species.	Invasive species are contained and/or controlled so that they do not disrupt the structure of function of ecosystems or impact native wildlife.	New populations should be detected early, monitored, and treated as soon as possible. Adopt techniques as they become available to remotely monitor cheatgrass or other invasives and improve management.

Desired Conditions for Invasive Species

Forest Service Manual 2900, Invasive Species Management: 2903, lays out the following relevant policies for invasive species management:

- Determine the risk of introducing, establishing, or spreading invasive species associated with any proposed action, as an integral component of project planning and analysis, and where necessary provide for alternatives or mitigation measures to reduce or eliminate that risk prior to project approval.
- Ensure that all Forest Service management activities are designed to minimize or eliminate the possibility of establishment or spread of invasive species on the National Forest System, or to adjacent areas.
- Use contract and permit clauses to require that the activities of contractors and permittees are conducted to prevent and control the introduction, establishment, and spread of aquatic and terrestrial invasive species. For example, where determined to be appropriate, use agreement clauses to require contractors or permittees to meet Forest Service-approved vehicle and equipment cleaning requirements/standards prior to using the vehicle or equipment in the National Forest System.

Effects of the Proposed Action - Range

The proposed action aims to enhance flexibility in allotment grazing management. Under this proposal, annual authorized livestock numbers would fluctuate within a specified range based on existing conditions, water availability, and forage predictions. This flexibility would be applied under the adaptive management framework, in which annual stocking rates would be adjusted to maintain conservative livestock utilization levels based on annual vegetation conditions (including forage production, water availability, and annual climatic trends). Livestock grazing would follow a deferred use and rest rotation system, allowing pastures adequate rest or growing season deferment before being grazed again. Additionally, pastures would not be grazed at the same time each year, allowing for the phenological (natural lifecycle) development of grazed functional groups over time (i.e., cool-season plant species, warm-season species, forbs and browse species). By managing grazing intensity based on the weight percentage of forage consumed, plant integrity, density, plant species diversity, and regeneration can be promoted over time.

Vegetative Composition

The proposed action would lead to short-term effects on vegetation height, canopy cover, plant species diversity, density, production, and quality. By implementing mitigation measures and adaptive management, along with favorable climatic conditions, these effects would remain localized and temporary. The cumulative impact of these actions is expected to result in minimal effects on vegetation. Under proper stocking rates, utilization levels, and favorable climatic conditions, grazed vegetation is anticipated to recover within one to two growing seasons after pasture use, resulting in minimal overall impacts.

Based on historical trend monitoring data, as well as long-term cover and production data, plant communities have either remained stable or shown a slight upward trend. Specifically, when analyzed on a per-pasture basis, plant cover by functional group has remained relatively stable across the allotment. Production (annual biomass) values correlate more closely with changes in annual precipitation than with historical stocking levels of authorized livestock. Herbaceous responses fall well within the natural variability associated with vegetation types found on the allotment.

Additionally, the eight long-term monitoring sites have shown little to no change in ground cover, canopy cover, species occurrence, species frequency, and relative species composition between readings completed in 2018 and 2021. These trends align with the reissuance of a term grazing permit in 2019. Considering these data trends, along with the flexibility in stocking rates up to the proposed permitted numbers, no adverse direct or indirect effects on vegetation are anticipated.

Invasive Plants

The proposed action may directly facilitate invasive plant abundance by introducing outside seed sources when cattle, vehicles, or equipment are brought onto the allotment, or by translocating seeds within the allotment when these vectors move. The most likely pathways for seed movement are cattle fur and hooves, excretion of seeds that pass through the digestive system of cattle, and tires and treads of equipment used for operations.

Cattle are effective seed dispersers of many native and nonnative plants, potentially acting as stronger dispersers of nonnative plants than deer and elk (Bartuszevige and Endress 2008, Chuong et al. 2015). The magnitude of this effect is hard to predict. Cattle would likely move seeds of cheatgrass and other widespread invasive plants into new portions of the project area, particularly those already abundant near water sources where cattle would concentrate. They could also introduce new invasive species or spread isolated ones to new areas of the allotment. Risk of adverse effects (i.e. introduction of new invasive species that disrupt the structure or function of ecosystems, especially in a warming climate) would depend in part on the presence of invasive plants on other lands used by the permittees' cattle, diligence of invasive plant survey and treatment by permittees and U.S. Forest Service personnel, and implementation of cleaning requirements for vehicles and equipment used for construction and operations.

The proposed action may indirectly affect invasive plant dynamics by altering ecosystem elements such as soil processes, pollinator and seed disperser animal communities, fire regimes, and vegetative communities. Any changes could increase or decrease the resilience of the project area to invasive plant introduction, composition and spread.

Lands with a history of domestic livestock grazing in the intermountain west exhibit an overall pattern of higher density of invasive annual grasses, tied generally to decreases in cover of biological soil crust (which deters seed germination) and perennial grasses, compared to ungrazed areas (Reisner et al. 2013, Condon & Pyke 2018, Chambers et al. 2016). In general, biological soil crusts are highly sensitive to crushing and trampling disturbance, with slow recovery. Concentration of cattle in degraded areas of the allotment would reduce recovery of soils and vegetation that provide resilience to annual invasive plants. Conversely, distribution of cattle would mitigate this effect, and the proposed action would allow for a period of early-season targeted grazing of invasives using virtual fencing or other means, which could result in lasting decreases in the invasive plant seed bank in some areas. Monitoring and management under the proposed action would be tiered in part to frequency of area occupied by invasive plants, and other measures of rangeland condition would also likely tie to downward trends in invasive plant abundance, even without the direct inclusion of measures of soil structure, such as soil crust cover. The potential effects of the proposed action and no grazing alternatives on biological soil crusts are addressed further in the soils and hydrology section of this document.

Under the proposed action, stocking rates and livestock distribution could result in an increase, decrease, or stable trend in invasive plant abundance and frequency, dependent on the level of management effort by permittees and Forest Service personnel to achieve stable or upward trends in measures of rangeland condition and to survey and treat invasive plant populations.

<u>Existing Structural Range Improvements</u>
The maintenance of existing structural range improvements was generally neglected during the timeframe that the allotment was vacant of permitted livestock. As a result, much of the existing infrastructure is now nonfunctional and dilapidated. Under the proposed action, existing structural range improvements would be required to be maintained to operational standards under the newly issued term grazing permit.

Maintaining existing structural improvements would facilitate the implementation of improved managed livestock grazing by providing the necessary infrastructure to control grazing periods, frequency, grazing intensity, and forage utilization. Additionally, maintaining existing fences would reduce the chance of entanglement for wildlife (AZGFD 2011). These existing fences may be modified or upgraded to meet current wildlife specifications. When existing fences reach the end of their functional lifespan, they would be reconstructed to comply with current wildlife standards. The operation and maintenance of these improvements would have short-term direct effects on isolated areas of vegetation. Plant height and canopy cover would be temporarily reduced in the immediate area due to maintenance activities; however, they would recover with favorable climate conditions after maintenance is complete.

If a virtual fencing system is implemented in the future to achieve management goals identified in the proposed action, some fence lines may be removed from the landscape on an as-needed basis, eliminating the need for maintenance and reducing barriers for wildlife. Furthermore, existing earthen stock ponds would be maintained, and water developments (such as water storage tanks and troughs) would remain operational. These functional livestock water developments are essential for managed livestock grazing and serve as critical water sources for wildlife. When currently non-functional stock tanks are returned to a functional status, the localized areas surrounding them may experience high levels of use, but distribution opportunities for livestock and total grazable acreage would likely be improved, decreasing overall utilization across the allotment. No adverse indirect effects are expected from the maintenance of existing improvements.

<u>New Structural Range improvements</u>
Under the proposed action, the construction of new structural range improvements would have short-term direct effects on vegetation. Specifically, plant height and canopy cover would be reduced in the immediate area due to fence construction (approximately 5.5 acres for a 2.5-mile-long, 10-foot-wide swath), pipeline construction near an existing roadway, and the installation of two water harvesting catchments with watering facilities (footprints totaling approximately 5 acres). However, vegetation is expected to recover under favorable climate conditions after construction is complete. Cross-country travel would be used to access improvement sites during construction, and incidental tree and shrub removal would occur within the footprint of the water harvesting catchment, fence line, and pipeline.

The newly installed watering facilities (troughs fed by pipeline and water harvesting catchments) would create an area where livestock and wildlife congregate, resulting in heavy utilization levels within an approximately 100-meter (300 feet) radius, totaling approximately 6 acres near each site. Vegetation in these areas is not expected to recover during the life of these improvements when used by livestock and wildlife. Additionally, there would be an increase in bare ground, compaction, and an accelerated potential for soil erosion within these high-use areas. Effects to soils are further discussed in the Soils and Watershed section of this draft EA.

Despite the anticipated impacts to soils immediately near the water catchments, the effects of the proposed infrastructure improvements would be beneficial overall. The proposed catchments are a way of conserving water, which is a management strategy in the Forest Plan to address key concerns about long-term climatic trends (USDA Forest Service 2014 p. 212). Proposed water developments will increase distribution opportunities for livestock, ultimately decreasing overall utilization across the allotment. If additional waters are installed in a given pasture, the livestock would utilize forage in areas near those other waters within that pasture, rather than concentrating around a single water source. The proposed fence line would directly benefit grazing management by allowing functional use of the Rain Tank pasture and indirectly affect Tusayan by preventing livestock from entering the town from the forest.

Cumulative effects of the proposed action - Range

The past, present, and reasonably foreseeable future activities considered in the cumulative effects analysis for upland vegetation include managed livestock grazing in combination with fuels reduction (prescribed fire), forest restoration (thinning treatments), South Zone Grassland Restoration Project (vegetation treatments), treatment of invasive species, recreation, off highway vehicle (OHV) use, and wildlife use would result in cumulative effects to plant height and canopy cover, vegetation density and species diversity, and vegetation production and quality. These cumulative effects, with mitigations are discussed in Table 7.

Table 7. Cumulative Effects of the Proposed Action to the Range Resource

Activity	Background	Effects	Mitigation
Fire and Fuels	Prescribed fire operations associated with the South Zone Grassland Restoration Project	Short term reduction in fine fuel availability from livestock grazing would limit fire's ability to carry in a low to moderate severity burn. In the long term, prescribed fire projects would reduce the	Grazing schedule can be changed to defer and rest pastures where prescribed fire is planned to allow for fine fuel build up.

Activity	Background	Effects	Mitigation
	are expected to continue intermittently within the allotment.	overstory canopy which would result in an increase in understory vegetation in burn areas. Short-term increases in abundance of invasive plants post burning; long-term decreased risk of high severity fire scars susceptible to invasive plant establishment.	
South Zone Grassland Restoration Project	Mechanical and hand thinning (including fuelwood gathering) of pinyon and juniper trees is planned through the South Zone Grassland Restoration Project within the analysis area.	Short term reductions in plant height, canopy cover and vegetation production and increases in common invasive plants, due to the crushing of understory vegetation and soil disturbance from mechanical removal of trees. In the long term, thinning projects would reduce the overstory canopy resulting in an increase in understory vegetation density, species diversity, plant height, understory canopy cover and vegetation production within the thinning treatment areas.	Grazing schedule can be changed to defer and rest pastures where treatments are planned and allow for herbaceous recovery prior to grazing.
Off Highway Vehicle Use (OHV)	OHV use and Tours are present in the project area	OHV use off the outside of designated road system results in reductions in plant height, canopy cover, and production. Vehicles are invasive plant vectors; disturbance of road network margins results in moderate to high risk of introducing new or isolated invasive plant species, potentially high risk of adverse ecosystem or wildlife effects especially under warming climate	OHV travel on Forest system roads under the Travel Management Plan lessens impact on rangeland resources. Invasive plant program efforts to detect and treat problematic invasive species and educate recreational motorists about invasives and cleaning practices
Wildlife Use	Allotment is located entirely within AZGFD Game Unit 9.	Reduction of forage and browse by livestock would limit forage available to wildlife. Livestock use would be limited to a 40 percent maximum use. Wild ungulates act as vectors for invasive plant spread but at a lesser degree than cattle.	Livestock will be moved when a 40 percent utilization threshold has been reached in a given pasture. In general, permanent water improvements would remain available for wildlife. Monitor spread of invasive plants to inform noxious weeds management.

Effects of the No Grazing alternative

Under this alternative, authorized livestock grazing would not occur and as a result, there would be no direct or indirect effects from cattle grazing on vegetation within the project area. Livestock removal would result in reduced upland utilization. However, utilization by deer, elk, pronghorn, small mammals, and birds would continue. Vegetative composition and species diversity (including an increase in perennial graminoids), and vegetative ground cover (plant basal area and litter) would improve at a faster rate than under the proposed action alternative. An exception to this would be where canopy cover of woody vegetation such as sagebrush, piñon, and juniper can impede development of an herbaceous understory.

Under the no-grazing alternative, the drought conditions, precipitation trends, and productivity of grasslands on the allotment discussed in the “Existing Conditions - Range” section are likely to remain on the same trajectory they have been on. A decision not to authorize grazing and not make the proposed improvements would not change temperatures, precipitation, or seasonal changes experienced by the allotment over the next decade.

Vegetative Composition

As Ruyle and Dyess (2010) summarize, vegetation changes occur as a result of many factors other than grazing, and disturbance is a natural feature of plant communities. Grazing is not necessarily a primary driver of vegetation change and even when grazing has been the cause of vegetation change, completely removing grazing will not always result in a return to historical conditions.

Existing Structural Range Improvements

Operation and maintenance of existing structural range improvements is the responsibility of the grazing permittee. Under this alternative there would be no grazing permittee; as a result, operation and maintenance of existing structural range improvements would not occur. Due to the allotment being vacant in the past much of the existing infrastructure was neglected until the new permit was issued in 2019, wherein maintenance and reconstruction of existing improvements resumed. Outside of designated wildlife water catchments this would result in loss of available water for wildlife due to lack of maintenance, as existing tanks would no longer be cleaned. Indirect effects due to the lack of improvement maintenance would be realized through a long-term loss of water available for wildlife as stock tanks fill with sediment. Additionally, as fences degrade due to lack of maintenance, they would likely become an entanglement/impalement hazard for wildlife (AZGFD 2011).

New Structural Range Improvements

New structural range improvements would not be constructed; as a result, there would be no direct or indirect effects related to that activity.

Invasive Plants

Under the no-grazing alternative, invasive plants would not be dispersed by cattle moving into and out of the project area, removing a moderate risk of introducing new or isolated invasive species. Vegetation and soil structure would be disturbed by wild ungulates and small mammals, likely resulting in a stable to decreasing trend in abundance of common invasive plants as native plants and soil processes provide greater resilience year to year. If fine fuels were to increase, fire would be more likely to spread across the landscape. This would likely lead to increases in low and moderate severity fire effects, likely to cause minimal change in invasive plant abundance, and could also lead to increases in high-severity fire effects, making areas of the landscape more susceptible to invasive plant spread for periods of time. Over 10 years, these trends in fire regime are unlikely to significantly change distributions or impacts of common invasive plant species. Overall, the no-grazing alternative could result in a stable to decreased level of invasive plant introductions and abundance in the project area, dependent largely on climate and wildfire effects.

Cumulative effects

The past, present, and reasonably foreseeable future activities considered in the cumulative effects analysis for vegetation include: fuels reduction (prescribed fire), forest restoration (thinning treatments), South Zone Grassland Restoration Project (vegetation treatments), treatment of invasive species, recreation, off highway vehicle use, and wildlife use. Under the No Grazing alternative, there would be no direct or indirect effects from cattle grazing on vegetation density, vegetation species diversity, production, and canopy cover and as a result, there would be no cumulative effects related to cattle grazing.

Botany- At-Risk Plant Species

The Kaibab Land and Resource Management Plan and Forest Service policy require that projects account for effects to U.S. Fish and Wildlife Service (USFWS) Threatened and Endangered species, Forest Service Sensitive species, and Restricted and Narrow Endemic species, and their habitats, in the design of projects. This section summarizes the Botany specialist report that provides an analysis of effects to these species, which will be collectively referred to as at-risk plant species.

Existing Conditions – At-Risk Plant Species

This section presents an inventory of those at-risk plant species that are known to occur or that have potential habitat in the Project Area, and background information on those species. The following primary information sources were consulted:

- USFWS Environmental Conservation Online System
- Regional Network of North American Herbaria (via SEINet Portal network)
- Forest Service geospatial and paper data for rare plant occurrences and surveys, in the Natural Resource Manager database of record and in local storage ("T:" drive)
- Kaibab National Forest Restricted & Narrow Endemic Species Guidebook, Volume 2: Flora, Version 1.0.1 (working document)

Per the Forest Plan, the current list of restricted and narrow endemic species is maintained in the Kaibab endemic species guidebooks, which are living documents compiling information and management guidance for each species as it become available. The complete list of Kaibab restricted and narrow endemic plant species is presented in the Botany Specialist Report, Appendix A.

This analysis also considered any at-risk plant species with potential to occur in an "affected area" outside of the project area, defined as either the zone within 1 mile of the project boundary, where impacts to terrestrial ecosystem characteristics, such as soil hydrology and pollinator communities, could reasonably be inferred, or those low-lying areas of downstream corridors (flats, washes) where watershed impacts might be inferred. No additional species came into analysis through this framework.

Existing conditions presented in this section are considered to reflect current management practices, including past grazing management detailed in the Project Background section.

Species with Known Occurrences in the Project Area

Table 8 presents information on species with documented occurrences in the project area. In the Forest Service Natural Resource Manager geospatial database, an "occurrence" of an at-risk plant species is defined as one or more individuals occupying a certain area (a point or discrete area within a geospatial polygon) at some point in time, correctly identified with or without a recorded voucher specimen. "Occurrence" will be used interchangeably with "population" for at-risk plant species in this document, although this is not necessarily accurate biologically. Occurrences were compared from among all consulted information sources and any likely duplicate records omitted.

Table 8. At-risk plant species with documented occurrences in the project area

Common Name	Scientific Name	Status	# occurrences in Project Area	Pastures w/ occurrence(s)
Arizona phlox	Phlox amabilis	FS Sensitive	14	O'Connell, Rain Tank, Curry
Mat penstemon	Penstemon caespitosus var. desertipicti	Restricted/Endemic	4	Curry, Rain Tank
Mt. Dellenbaugh sandwort	Eremogone aberrans	FS Sensitive	6	Rain Tank, Curry
Tusayan flameflower	Phemeranthus validulus	Restricted/Endemic	19	Sheep, Wheat, O'Connell, Rain Tank
Tusayan rabbitbrush	Chrysothamnus molestus	FS Sensitive	1	Curry

Additional information on these species and documentation efforts is provided in the Botany Specialist Report.

Species with Potential Habitat in the Project Area

All plant species in the Kaibab National Forest Restricted & Narrow Endemic Species Guidebook were evaluated in terms of their habitat requirements and known range and distribution. Table 9 presents those species with potential habitat in the project area that have no known occurrences there.

Table 9. Species with potential habitat in the project area

Common Name	Scientific Name	Status	Habitat Description
Fickeisen plains cactus	*Pediocactus peeblesianus* subsp. *fickeiseniae*	Listed Endangered	Northern Arizona endemic. Occurs on shallow soils derived from exposed layers of Kaibab limestone. Most populations occur on the margins of canyon rims, on flat terraces or benches, or on the toe of well-drained hills with less than 20 percent slope. Within the Plains and Great Basin grasslands and the Great Basin desert scrub vegetation communities. Populations are known from the Cataract Canyon watershed immediately west of the Tusayan Ranger District. (USFWS ECOS)
Hairy clematis	*Clematis hirsutissima* var. *hirsutissima*	FS-Sensitive	Widespread species in the intermountain west, uncommon in Arizona. Meadows, ponderosa pine forests, montane habitats, open woods, thickets; 6500-8500 feet (Springer et. al). Known from two populations on the Tusayan Ranger District.
Mearns' deerweed	*Acmispon mearnsii* var. *mearnsii*	Restricted/ Endemic	Dry mesas, slopes, and grasslands from 3,000-7,000 feet (Kearney & Peebles 1969). Documented range is primarily in woodland and scrub areas in the periphery of the Arizona and New Mexico Mountains ecoregion. Known from 2 historic occurrences on the Tusayan Ranger District representing the northern extent of the species' range.
Western mousetail	*Myosurus nitidus*	Restricted/ Endemic	Poorly understood, but described as "Under sagebrush; 1800-2100 m; Ariz., Colo., N.Mex" in Flora of North America. Appears distributed in various woodland communities in central Arizona from herbarium records. One documented occurrence on Tusayan Ranger District (1991).

Formerly, range maps for Fickeisen plains cactus found on the USFWS Environmental Conservation Online System overlapped with the western boundary of the project area. (These range maps were updated in August 2024 based on a new model that restricted them to areas entirely outside of the

Tusayan Ranger District and the project area.) Forest Service botanists conducted limited surveys for this species in the project area in 2018 and 2024 during the flowering period (as ascertained by witnessing bud formation and flowering in nearby populations). To identify the most likely potential habitat in the project area that overlapped the former range maps, botanists used aerial imagery and Terrestrial Ecosystem Unit maps to identify limited areas most closely matching the species' known habitat (although these generally were higher elevation than occupied sites off-Forest, with sagebrush, pinyon, and juniper components lacking in those sites). Botanists then surveyed approximately 16.5 acres (5 acres in 2018 and 11.5 acres in 2024) within the identified potential habitat, focusing on shallow-soiled gravelly microsites (Fig. 2). No Fickeisen plains cactus was found. All photos from areas that were intensively surveyed are available in the project record.

Figure 3. Example of microsite surveyed for Fickeisen plains cactus, Sheep Pasture, May 1, 2024

Additional information on these species with potential habitat in the project area and any past survey efforts is provided in the Botany Specialist Report.

Desired Conditions - At-Risk Plant Species

Desired conditions and guidelines for at-risk plant species are discussed in the Botany Specialist report. They derive from the Endangered Species Act (including the Final Listing Rule for Fickeisen plains cactus,) from Forest Service Manual 2600, Chapter 2670: Threatened, Endangered and Sensitive Plants and Animals, and from the Forest Plan.

Endangered Species Act

Objectives and guidelines for threatened and endangered species management under federal law derive from Recovery Plans prepared by the USFWS. No recovery plan for the Fickeisen plains cactus has been prepared by the USFWS at this time. The Final Listing rule for this species from 2013, under "Available Conservation Measures," points to the importance of the now-revised Forest Plan and the FS-Sensitive status of the species as interim measures for management and protection on NFS lands. The "5-Year

Review: Summary and Evaluation" for this species published in 2020 was consulted; it offers no additional management recommendations, focusing instead on research and monitoring recommendations.

Communications with the USFWS for this project are described in Chapter 4 of the Draft Environmental Analysis. The Final Listing rule for Fickeisen plains cactus, in describing Section 7(a) responsibilities for federal agencies, includes the following statement: "Federal agency actions within [this] species' habitat that may require conference or consultation, or both, as described in the preceding paragraph include any management actions that could result in impacts to soil characteristics or seedbank viability, pollinators or their habitat, and associated native vegetation community, and any other landscape-altering activities on Federal lands administered by Federal agencies, such as … reauthorization of grazing permits by the Bureau of Land Management and the U.S. Forest Service."

Effects of the Proposed Action- At-Risk Plant Species

Direct effects from the proposed action are possible only to those at-risk species with currently existing populations within the project area. Based on existing conditions and surveys, the likelihood of Fickeisen plains cactus occurring in the project area is considered negligible, and direct effects to this species will not be analyzed.

Direct effects to most current and future populations of at-risk plants in the planning area are likely under the proposed action. These effects would primarily consist of direct herbivory of plants, trampling and soil disturbance in their immediate habitats by cows, and subsequent mortality, loss of vigor or interruptions to their growth and reproductive patterns, i.e. flowering and seed set. Effects are also possible through plant and soil disturbance by equipment during construction of improvements and during authorized off-road travel by permittees. The magnitude of these effects is analyzed in the Botany Specialist Report.

Indirect effects may occur inside or within 1 mile of the project area or in low-lying areas of downstream corridors (flats, washes) where watershed impacts would have significance. The proposed action may have indirect effects on the ongoing availability of suitable habitat for at-risk plant species in this area by altering ecosystem elements such as soil processes, pollinator and seed disperser animal communities, fire regimes, and vegetative communities (e.g. woody plant encroachment and invasive species distributions). The magnitude of these effects is analyzed in the Botany Specialist Report.

Overall, direct and indirect effects of the proposed action may result in a stable to decreasing trend in population viability over 10 years for Arizona phlox, Mat penstemon, Mt. Dellenbaugh sandwort, Tusayan flameflower, Tusayan rabbitbrush, Mearns' deerweed (if present), Western mousetail (if present), or any other at-risk plant species that occur in the project area. In general, a stable or increasing trend in rangeland condition (as this project is intended to achieve) should allow for stable populations of these species to persist on the landscape. Effects to any actual at-risk plant populations would depend on their distributions and species-specific responses to grazing; on stocking rates, seasonality and distribution of cattle over time; on the level of management effort by permittees and Forest Service personnel to achieve desired rangeland conditions; and on the level of effort to document and monitor at-risk plant populations in the project area to inform grazing management.

Indirect effects to any populations of Fickeisen plains cactus on lands outside the project area would consist primarily of slight changes in seed rain and pollinator communities. These effects are considered low in magnitude and unlikely to cause an adverse effect.

Cumulative Effects of the Proposed Action - At-Risk Plant Species

Cumulative effects to at-risk plant species are likely over 10 years from projected activities in the project area. Mechanical thinning of trees and shrubs, prescribed fire projects, motorized recreation, and grazing by managed wild ungulates are likely to have complex effects that are discussed further in the Botany Specialist Report.

Cumulative effects to at-risk plant species may result in a positive, stable, or negative trend in habitat quality and population viability, depending primarily on the level of management effort by permittees and Forest Service personnel to achieve stable or upward trends in measures of rangeland condition; on survey and monitoring effort for at-risk species and successful adaptive management for these species in grazing and fuels management project areas; and on level of effort to manage motorized vehicles under the Travel Management Plan. Cumulative effects to any populations of Fickeisen plains cactus on lands outside the project area would consist primarily of slight changes in seed rain and pollinator communities. These effects are considered low in magnitude and unlikely to cause an adverse or beneficial effect.

Effects of the No Grazing Alternative – At-Risk Plant Species

Effects from the no-grazing alternative would consist largely of direct herbivory or trampling by wild ungulates, unmonitored feral livestock grazing small mammals, birds, and invertebrates. These effects are further discussed in the Botany Specialist Report.

Overall, direct and indirect effects of the no-grazing alternative may result in a stable or increasing trend in habitat quality and population viability over 10 years for Arizona phlox, Mat penstemon, Mt. Dellenbaugh sandwort, Tusayan flameflower, Tusayan rabbitbrush, Mearns' deerweed (if present), Western mousetail (if present), or any other at-risk plant species that occur in the project area. Effects would depend primarily on year-to-year weather and fire patterns, risks from unmonitored unauthorized livestock grazing or nonnative plant invasions, and on the level of effort to document and monitor at-risk plant populations in the project area to inform other management actions (such as wildlife and unauthorized livestock management.)

Indirect effects to any populations of Fickeisen plains cactus on lands outside the project area would consist primarily of slight changes in seed rain and pollinator communities. These effects are considered low in magnitude and unlikely to cause a measurable effect.

Soils and Watershed

This section discusses potential effects of the project on soil quality and watershed condition.

Existing Condition-Watersheds and Natural Waters

The Rain Tank Allotment comprises parts of eight sixth-code subwatersheds, all located within the Colorado River basin. Prominent drainages in the project area include Coconino Wash, Rain Tank Wash, Heather Wash, and Prairie Wash, all of which eventually drain into the Colorado River via Havasu Creek.

The climate is semi-arid with precipitation ranging from 13-18 inches per year, and an estimated mean of 16 inches. The precipitation pattern is bimodal with roughly 60 percent of precipitation falling between January and March and the remaining 40 percent falling during the summer monsoon season, between July and September. Arizona has experienced three severe and sustained droughts during the 20th Century: one that started in the early 1900s, another one during the 1950s and the current drought, which began during the mid to late 1990s and is still prevailing today. Drought preparation is essential to long-term management planning and has implications for watershed condition with respect to upland and stream health.

Watershed Condition Framework

In 2011, the Forest Service completed a national effort to assess the condition of all 6th-code watersheds on National Forest System land (Potyondy and Geier, 2011). Sixth-code watersheds are typically 10,000 to 40,000 acres in size (Figure 2). Forest interdisciplinary teams assessed 12 indicators to determine overall watershed condition class: water quality, water quantity, aquatic habitat, aquatic biota, riparian vegetation, road and trail network, soil, fire effects or fire regime, rangeland vegetation, terrestrial invasive species, forest cover, and forest health. Each indicator was ranked as good, fair, or poor based on the rubric set in the Watershed Condition Framework. The individual indicator rankings are aggregated to arrive at an overall ranking of Functioning, Functioning at risk, or Impaired for each 6th-code watershed. A functioning watershed exhibits high geomorphic, hydrologic, and biotitic integrity relative to its natural potential condition; a functioning at risk watershed has moderate integrity of these elements relative to potential; and an impaired watershed has a low integrity of these elements relative to potential.

Parts of eight 6th-code watersheds occur within the Rain Tank Allotment boundary; none occur entirely within the boundary (Figure 2). Of those watersheds, six (accounting for 54,486 acres, or 86 percent of the allotment area) are rated as functioning properly; only two (8,642 acres, or 14 percent of the allotment area) are rated as functioning at risk; none are rated as impaired; one (accounting for 389 acres, or 0.6 percent of the allotment area) was not rated due to the small percentage of its area occurring on National Forest System lands (Pasture Wash). Across the allotment, several indicators are consistently rated as having fair or poor condition: aquatic biota, roads and trails, fire effects/fire regime, terrestrial invasive species, and rangeland vegetation condition.

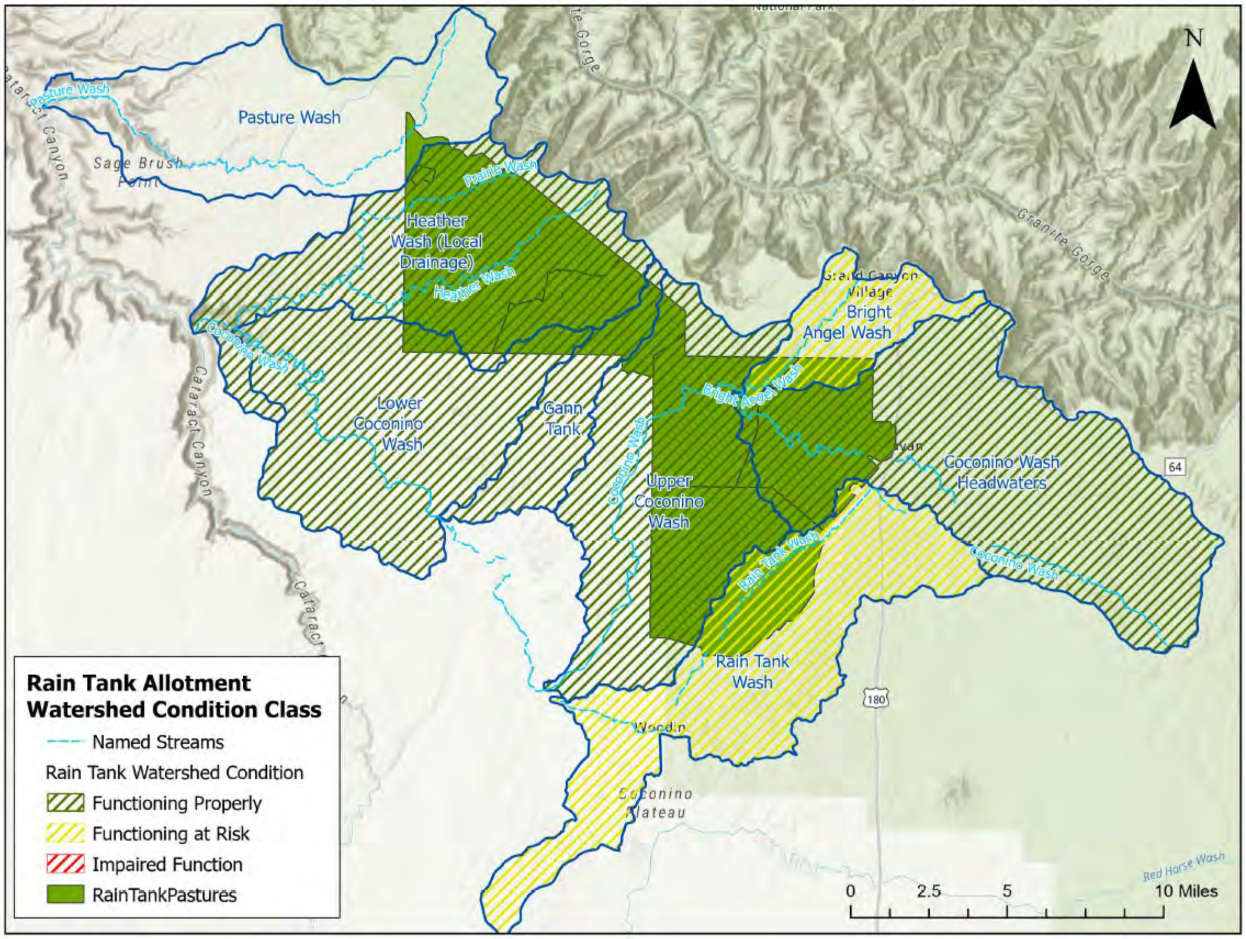

Figure 4. Location and condition of sixth-code watersheds and major streams within the project area; note that only portions of each watershed fall within the allotment.

Table 10. Watershed Condition Class for Subwatersheds Within the Rain Tank Allotment

Sixth-Code Watershed Name and Number	Acres in Allotment	Percentage (%) of the Water-shed within Allotment	Indicator Ratings of Fair or Poor (all others Good)*	Watershed Condition Class
Heather Wash 150100040808	21,420	57%	Aquatic Biota – Fair Water Quantity – Fair Road and Trail – Poor Fire Effects/Fire Regime – Fair Forest Cover – Fair Terrestrial Invasive Species – Fair Rangeland Vegetation – Fair	Functioning Properly
Upper Coconino Wash 150100040804	19,021	50%	Aquatic Biota – Fair Road and Trail – Fair Soil – Fair Fire Effects/Fire Regime – Fair Terrestrial Invasive Species – Fair Rangeland Vegetation – Fair	Functioning Properly

Sixth-Code Watershed Name and Number	Acres in Allotment	Percentage (%) of the Water-shed within Allotment	Indicator Ratings of Fair or Poor (all others Good)*	Watershed Condition Class
Coconino Wash Headwaters 1501000802	10,317	20%	Aquatic Biota – Fair Water Quality – Fair Water Quantity – Fair Road and Trail – Fair Terrestrial Invasive Species – Fair Rangeland Vegetation – Fair	Functioning Properly**
Rain Tank Wash 150100040803	6,337	16%	Aquatic Biota – Fair Water Quality – Fair Water Quantity – Fair Road and Trail – Poor Soil – Fair Fire Effects/Fire Regime – Fair Terrestrial Invasive Species – Fair Rangeland Vegetation – Fair	Functioning at Risk
Bright Angel Wash 150100040801	2,305	23%	Aquatic Biota – Fair Road and Trail – Poor Fire Effects/Fire Regime – Fair Terrestrial Invasive Species – Poor Forest Health – Fair Rangeland Vegetation – not rated	Functioning at Risk
Gann Tank 150100040805	1,866	19%	Aquatic Biota – Fair Road and Trail – Poor Fire Effects/Fire Regime – Fair Terrestrial Invasive Species – Fair Rangeland Vegetation – Fair	Functioning Properly
Lower Coconino Wash 150100080807	1,862	5%	Aquatic Biota – Fair Road and Trail – Fair Soil – Fair Fire Effects/Fire Regime – Fair Terrestrial Invasive Species – Fair Rangeland Vegetation – Fair	Functioning Properly
Pasture Wash 150100041004	389		Not Rated	Not Rated

** Indicators with ratings below good (highest rating) and their respective condition ratings are identified.*
***Denotes improved condition upon completion of essential projects in WRAP. Submitted for improved condition in 2015 due to improvements in fire effects/fire regime, road and trail condition, and terrestrial invasive species condition.*

Since 2010, watershed condition has only been reevaluated for one watershed within the Rain Tank Allotment boundary. Coconino Wash Headwaters (1501000802) was established as a priority watershed in 2011, and the Watershed Restoration Action Plan (WRAP) developed to improve its condition targeted excessive fuel loading within the forested parts of the watershed (fire effects or fire regime indicator), the dense and largely unmaintained road network (road and trail indicator), and infestations of cheatgrass (*Bromus tectorum*) and Dalmatian toadflax (*Linaria dalmatica*) (terrestrial invasive species indicator). In 2015, upon successful implementation of the essential projects in the Coconino Wash Headwaters WRAP and resulting improvements in the condition of the targeted indicators, the watershed was moved to an improved condition class. Conditions in other watersheds on the allotment have not been reevaluated to determine improvement in conditions for any indicator. Existing conditions for rangeland vegetation, terrestrial and invasive species, and fire effects/fire regime are discussed based on recent monitoring and assessments efforts in other sections of this document.

Stream Channel Condition

There are approximately 205 miles of named and unnamed streams within the allotment. Stream flows are primarily intermittent and ephemeral with no documented riparian areas or wetlands. Allotment streams are headwater streams, dominated by upland vegetation. Nonetheless, they provide important watershed functions such as maintaining water quality, mitigating flooding, recharging groundwater, recycling nutrients, supporting diverse native plant communities, and providing wildlife habitat (Levick et al. 2008, Meyer et al. 2003).

Stream channel condition is assessed using relevant indicators from the watershed condition classification (water quality, water quantity, aquatic habitat, aquatic biota), analysis of aerial imagery, and field assessment.

Watershed Condition indicators relevant to stream channel condition are summarized in Table11. However, these ratings are of limited utility for evaluating the intermittent and ephemeral streams occurring within the allotment.

Table 11. Watershed Condition Framework Stream Condition Indicators in Rain Tank Allotment

Watershed	Miles of Stream	Water Quality	Water Quantity	Aquatic Habitat	Aquatic Biota	Overall Watershed Condition
Upper Coconino Wash 150100040804	63.4	Good	Good	Good	Fair	Functioning Properly
Heather Wash 150100040808	58.2	Good	Fair	Good	Fair	Functioning Properly
Coconino Wash Headwaters 1501000802	39.0	Fair	Fair	Good	Fair	Functioning Properly
Rain Tank Wash 150100040803	28.4	Fair	Fair	Good	Fair	Functioning at Risk
Bright Angel Wash 150100040801	7.4	Good	Good	Good	Fair	Functioning at Risk
Gann Tank 150100040805	4.3	Good	Good	Good	Fair	Functioning Properly
Lower Coconino Wash 150100080807	4.1	Good	Good	Good	Fair	Functioning Properly

Field assessments have not yet occurred but should be used to develop a baseline stream channel condition inventory within the allotment. This should take place prior to implementation of the selected action so that the results can be used a baseline that can be used to measure stream condition trends. Field survey methods should be based on field assessment protocols such as California Wetland Monitoring Workgroup (2013, 2020) and Army Corps of Engineers (2013); methods derived from these protocols should also be used for spatial analysis. Named streams (Table 12), which have the largest and most developed channels in the allotment, should be prioritized for survey, and additional tributary streams may be evaluated to assess overall condition. Stream condition indicators should emphasize attributes derived from Forest Plan desired conditions. Example indicators could include stream channel morphology (i.e., width, depth, entrenchment), channel stability (i.e., erosion and sedimentation, bank stability, gullying), floodplain connectivity, and the condition of the aquatic management zone or filter strip (the vegetative community buffering the stream channel from nutrients and sediment carried by runoff from the surrounding uplands).

Table 12. Named streams in Rain Tank Allotment. These streams, along with a selection of smaller tributary streams, will be surveyed to determine stream channel condition in the allotment

Stream Name	Pasture(s)	Length (mi)	Percent Total Allotment Stream Length
Coconino Wash	Rain Tank, O'Connell	11.5	5.6
Heather Wash	Sheep	8.5	4.2
Rain Tank Wash	Curry	5.7	2.8
Prairie Wash	Sheep	4.3	2.1
Bright Angel Wash	O'Connell	2.8	1.3
	Total	*32.7*	*16.0*

Desired Conditions - Watersheds and Natural Waters

Specific, project-level desired conditions are derived from Forest Plan desired conditions and best available scientific information (Table 13). A properly functioning watershed supports the natural waters within and downstream of it by: 1) exhibiting high geomorphic, hydrologic, and biotic integrity relative to its potential condition.; 2) supporting the magnitude, frequency, timing and duration of runoff within a natural range of variability; 3) maintaining the movement of water and sediment from the surrounding uplands through the channel system in a manner that sustains the health and function of the channel and floodplains; and 4) exhibiting resiliency to human activities and natural disturbances.

Table 13. Specific Desired Conditions for Watersheds and Natural Waters

Watersheds and Natural Waters Forest Plan Direction	Specific Desired Condition	Example of How Desired Condition May Be Measured
Vegetation conditions within watersheds contribute to downstream water quality and quantity. Surface runoff, sheet, rill, and gully erosion, and subsequent sedimentation into connecting waters downstream is minimal.	Aquatic management zones, or vegetative buffers, are intact adjacent to streams and effectively filter runoff from upland areas. Upland soil condition, as compared to local TES map unit, is maintained or improved.	Use Stream Channel Condition Monitoring (e.g., CWMW 2020, CWMW 2013, ACOE 2013, or similar) to document aquatic management zones on stream channel monitoring reaches. Use Soil Condition Monitoring (USDA FS 2024) to document trends in upland soil condition.

Flooding maintains normal stream characteristics (e.g., water transport, sediment, woody material) and dimensions (e.g., bankfull width, depth, slope, and sinuosity). Vertical down cutting and embeddedness are absent in drainages. Stream channel stability and aquatic habitats retain their inherent resilience to disturbances and climate fluctuations. Stream channel morphology reflects changes in the hydrological balance, runoff, and sediment supply appropriate to the landscape setting.	Stream channel morphology is stable in key stream reaches, with little to no evidence of impacts to streambanks, downcutting, and/or widening. Sediment transport and deposition are within natural range of variability. Floodplain connectivity is maintained.	Use Stream Channel Condition Monitoring to document stream channel geometry, bank stability, sediment deposition, and floodplain connectivity.

Existing Condition - Soils

Soil development is intricately linked to geology, climate, vegetation, and landforms within the project area. The soils of the Kaibab NF are described, characterized and classified in the Terrestrial Ecosystem Survey (TES; Brewer et al., 1991).

The Rain Tank Allotment is dominated by lithic ustochrepts soils, which are characterized by a surface horizon with little organic matter and light coloration. Allotment soils often have high rock fragment content and are within 50 cm of bedrock. The entire allotment is underlain by limestone and sandstone bedrock, and soils are derived from this parent material. Many are calcareous, with high lime content and a slightly basic pH. Most units are classified as “low sun” (dominated by winter precipitation) “cold” (mesic to frigid soil regime) TES climatic gradient. Vegetation is primarily pinyon-juniper woodlands or ponderosa pine forests. The units mainly occur on slopes ranging from 1 percent (nearly level) to 20 percent (moderately sloping). This is consistent with the Upland Plateau physiographic province, which is characterized by undulating plains developed from extensive consolidated sedimentary rock formations with some incised canyons.

In the Terrestrial Ecosystem Units (TES) Report, and their respective soils are mapped as different units across the forest; map unit is a collection of areas defined and named in terms of their soil, vegetation, climate, and geomorphic components. TES map units are identified by numbers; in the Rain Tank Allotment, these numbers range from 11 to 683. There are 16 TES map units in the allotment (Table 14).

Table 14. TES Map Units in Rain Tank Allotment

TES Map Unit	Acres in Allotment	Percent Area in Allotment	Soil Classification (Family)	Potential Vegetation Community	Soil Erosion Hazard
260	18,753	29.5	Lithic Ustochrepts, LSC 4 +1, loamy-skeletal, mixed, mesic, calcareous, very gravelly very fine sandy loam	PIED/ QUGA/ ARTR2/ STCO4	Moderate
263	10,152	16.0	Lithic Ustochrepts, LSC 4 0, loamy-skeletal, mixed, mesic, calcareous, very gravelly loam	PIED/ JUOS/ ARTR2/ STCO4	Moderate
250	9,099	14.3	Lithic Ustochrepts, LSC 4 0, loamy-skeletal, mixed, mesic, calcareos, very fine sandy loam	PIED/ JUOS/ ARTR2/ STCO4	Moderate
275	7,616	12.0	Lithic Ustochrepts, LSC 5 -1, loamy-skeletal, mixed, frigid, cobbly very fine sandy loam	PIPO/ PIED/ QUGA/ ARTR2	Slight

TES Map Unit	Acres in Allotment	Percent Area in Allotment	Soil Classification (Family)	Potential Vegetation Community	Soil Erosion Hazard
683	3,890	6.1	Lithic Ustochrepts, LSC 4 +1, loamy-skeletal, mixed, mesic, calcareous, moderately deep, gravelly very fine sandy loam	ARTR2 / STCO4/ AGCR/ QUGA	Slight
634	2,775	4.4	Typic Ustochrepts, LSC 4 0, loamy-skeletal, carbonatic, mesic, moderately deep, gravelly loam	ARTR2/ AGCR/ STCO4/ PIED	Moderate
272	2,628	4.1	Typic Haplustalfs, LSC 4 +1, clayey-skeltal, montmorillonitic, mesic, gravelly loam	PIED/ JUOS/ QUGA/ ARTR2	Slight
283	2,287	3.6	Typic Eutroboralfs, LSC 5 -1, fine, montmorillonitic, gravelly, very fine sandy loam	PIPO/ PIED/ QUGA/ ARTR2	Slight
261	1,748	2.8	Lithic Ustochrepts, LSC 4 +1, loamy-skeletal, mixed, mesic, calcareous, very gravelly fine sandy loam - rock outcrop complex	PIED/ QUGA/ ARTR2/ STCO4	Severe
23	1,515	2.4	Fluventic Ustochrepts, LSC 4 0, fine-loamy, mixed, mesic, deep, loam	ARTR2/ BOGR2/ PIED	Slight
251	1,382	2.2	Lithic Ustochrepts, LSC 4 0, loamy-skeletal, mixed, mesic, calcareous, very gravelly fine sandy loam - rock outcrop complex	PIED/ JUOS/ ARTR2/ STCO4	Severe
276	1,066	1.7	Lithic Haploborolls, LSC 5 -1, loamy-skeletal, mixed, very cobbly loam - rock outcrop complex	PIPO/ PIED/ QUGA/ ARTR2	Severe
11	250	0.4	Cumulic Haploborolls, LSC 5 0, fine-loamy, mixed, deep, very fine sandy loam	POPR/ MUMO	Moderate
277	185	0.3	Lithic Ustochrepts, LSC 4 0, loamy-skeletal, mixed, mesic, calcareous, very gravelly very fine sandy loam	PIED/ JUMO/ STCO4	Moderate
281	104	0.2	Typic Ustochrepts, LSC 4 0, loamy-skeletal, mixed, mesic, moderately deep, gravelly fine sandy loam	PIED/ JUOS/ ARTR2	Slight
682	67	0.1	Typic Haplustalfs, LSC 4 +1, fine-loamy, mixed, mesic, deep, loamy very fine sand	ARTR2/ AGCR/ QUGA	Moderate

Slope

Topographical features in the allotment range from gently undulating plains to rolling hills to incised canyons. Slope ranges are assigned to each TES map unit. Slopes of up to 40 percent are considered suitable for livestock grazing. Division of slope classification (Tables 15 and 16) for livestock utilization analysis is a way of ensuring adequate forage production is available and within reach of livestock. Livestock tend to eat vegetation closer to water sources and on flatter ground first before moving further away from water and up steeper slopes. According to Holechek (2011), grazing areas with slopes greater than 60 percent receive little to no use by cattle. Overall, the allotment is relatively flat, with roughly 94 percent of the project area less than 20 percent slope.

Table 15. Slope classes across Rain Tank Allotment

Slope (Percent)	Acres	% Allotment Area
0-15	59,483	94.4
15-40	3,140	5.0
40-60	315	0.1
>60	47	0.0

Table 16. Acres in slope classes in each Rain Tank pasture

Pasture	0-20 percent	20-40 percent	40-60 percent	>60 percent	Total
Curry	14,121	1,560	103	16	15,800
O'Connell	8,550	534	131	8	9,223
Rain Tank	10,340	618	69	4	11,031
Sheep	17,982	420	12	0	18,414
Wheat	8,491	8	0	0	8,499

Soil Condition Assessment

Soil condition is primarily determined by evaluating surface soil properties. This is the critical area where plant and animal organic matter accumulate, begin to decompose and eventually become incorporated into soil (USDA-FS, 1999, 2024). It is also the zone of maximum biological activity and nutrient release. The physical condition of this zone plays a critical role in soil stability, nutrient cycling, water infiltration and energy flows. The presence and distribution of the surface soil is critically important to productivity.

For this assessment, soil condition was evaluated by using a combination of field inspections, spatial analysis, and information from the TES Report. Field survey the USDA – Forest Service (2024) protocol for soil quality assessment in the Southwest Region. This method evaluates soil quality based on an interpretation of factors that affect vital soil functions, such as the soils' ability to hold and release water (hydrologic function), the ability of the soil to resist erosion and degradation (soil stability), and the soils' ability to accept, hold and release nutrients (nutrient cycling). A total of 33 sites in 10 TES map units were surveyed for soil condition; all units with an extent greater than 5 percent of the allotment area were surveyed. Spatial analysis was used to supplement field observations and focused on evaluating vegetation condition based on aerial imagery, prescribed and wildfire history, and treatment history. Information from the TES report was used for units that were not evaluated using either of these two methods.

Once evaluated, soils were assigned to a soil condition category, (i.e. satisfactory, impaired, unsatisfactory, or unstable), which reflects soil function. The following definitions describe each class (USDA-FS, 1999):

- Satisfactory: Indicators signify that soil function is being sustained and soil is functioning properly and normally. The ability of the soil to maintain resource values and sustain outputs is high.

- Impaired: Indicators signify a reduction in soil function. The ability of the soil to function properly and normally has been reduced and/or there exists an increased vulnerability to degradation. An impaired category indicates there is a need to investigate the ecosystem to determine the cause and degree of decline in soil function. Changes in land management practices or other preventative measures may be appropriate.
- Unsatisfactory: Indicators signify that a loss of soil function has occurred. Degradation of vital soil functions result in the inability of the soil to maintain resource values, sustain outputs, or recover from impacts. Unsatisfactory soils are candidates for improved management practices or restoration designed to recover soil functions.

Satisfactory soil conditions exist across the majority of the allotment (Figure 5, Table 17). Impaired and unsatisfactory soil conditions generally occur 1) where high-intensity prescribed fire impacted ground cover, leading to locally increased erosion, 2) on steep slopes where modeled erosion loss from the TES Report was high, 3) in soils that are highly susceptible to compaction, and 4) in areas close to stock tanks. Table 18 outlines soil condition for each unit and how ratings were determined overall.

Table 17. Overall Soil Condition in Rain Tank Allotment

Soil Condition	Acres in Class	Relative Percent of Allotment
Satisfactory	59,269	93
Impaired	1,800	3
Unsatisfactory	2,448	4
Total	***63,517***	***100***

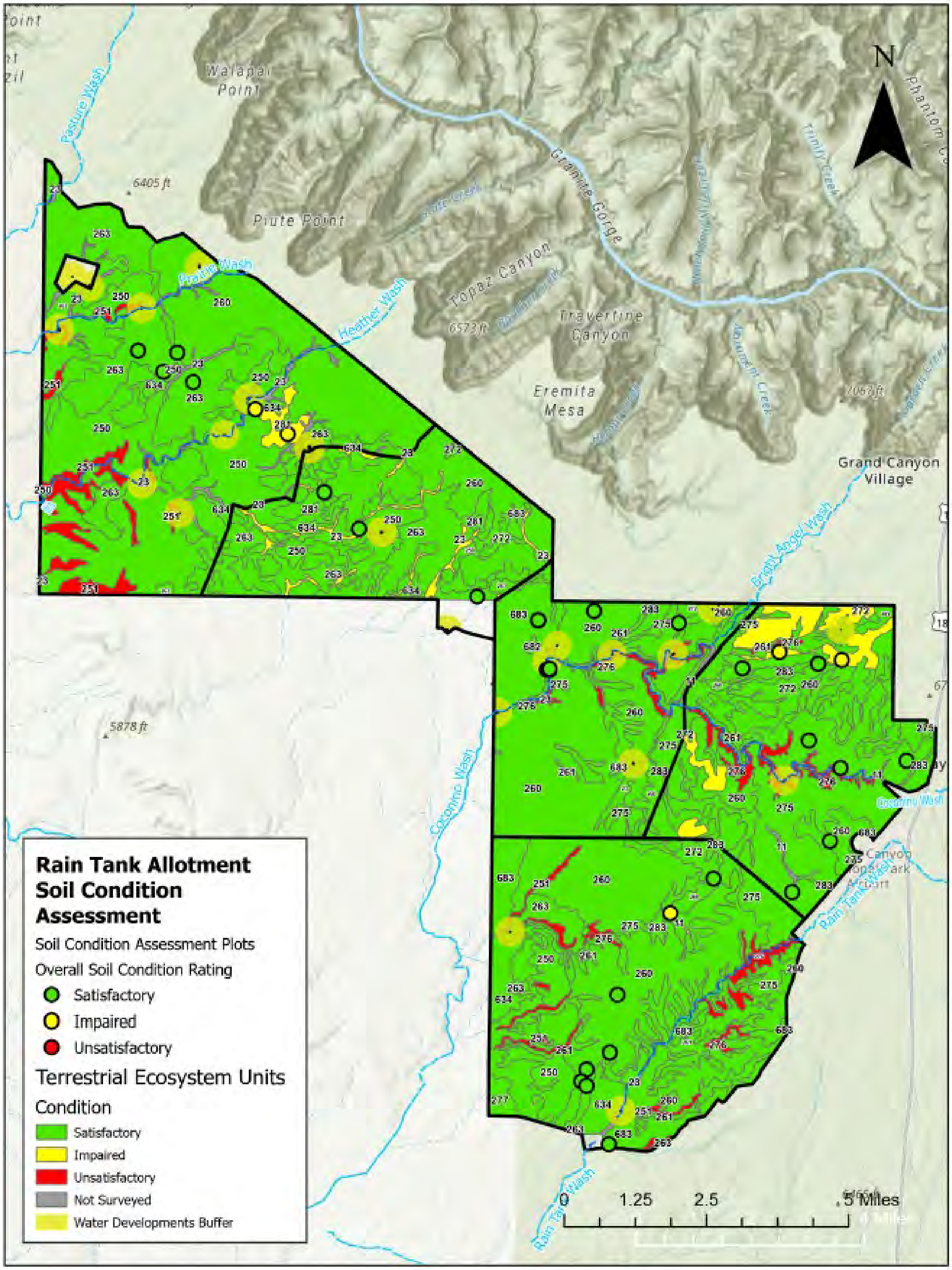

Figure 5. Rain Tank Allotment Soil Condition

Note: Buffered yellow areas around water developments were not used in calculations of soil condition; rather, they indicate where additional impaired soils may occur.

Table 18. Soil Condition Result of Rain Tank Allotment by TES and Pasture

TES Map Unit	Acres	Percent Area in Allotment	1990 Forest-Wide TES of the Kaibab NF Soil Condition	May and June 2024 Field Validated Soil Condition by Pasture	June 2024 Final Representative Soil Condition Allotment-Wide
260	18,753	30	Sat/Sat	Rain Tank – 1 Sat Curry –3 Sat O'Connell – 1 Sat Wheat – Poor Access Sheep – 1 Sat	All pastures Satisfactory
263	10,152	16	Sat/Sat	Rain Tank – No Acres Curry – 1 Sat O'Connell – No Acres Wheat – 1 Sat Sheep – 2 Sat, 1 Impaired	All pastures Sat except about 400 acres (estimated) or 2-3% of pasture is Impaired in TES 263 within about 0.5 miles of stock tanks.
250	9,099	14	Sat	Rain Tank – No Acres Curry – 1 Sat O'Connell – No Acres Wheat -1 Sat Sheep – 1 Impaired	All pastures Sat except about 400 acres (estimated) or 2-3% of pasture is impaired within TES 250 within about 0.5 miles of 2 stock tanks. Recommend additional monitoring
275	7,616	12	Sat	Rain Tank – 4 Sat Curry – Minor Acres O'Connell – 1 Sat Wheat -No Acres Sheep – No Acres	All pastures Satisfactory
683	3,890	6	Sat/Sat	Rain Tank – No Acres Curry – 1 Sat O'Connell – 2 Sat Wheat -Very Minor Acres Sheep – No Acres	All pastures Satisfactory
634	2,775	4	Sat/Sat	Rain Tank – No Acres Wheat – 1 Sat Sheep – 1 Sat Other Pastures – Minor Area	All pastures Satisfactory
272	2,628	4	Sat/Sat	Rain Tank – 2 Sat (where no prescribed fire) and 2 Impaired (where prescribed fire occurred) Curry – 1 Sat Other Pastures – Minor Area	All pastures Satisfactory except areas north of FR 328 are Impaired where prescribed fire occurred about 15 years ago Estimate about 700 acres or 6-7% if pasture
283	2,287	4	Sat/Sat	Minor Area, <5% Overall	All pastures Satisfactory
261	1,748	3	Unsat	Wheat – 1 Sat Other Pastures – Minor Area <5% Overall	All pastures Satisfactory
23	1,515	2	Sat/Sat	Wheat –1 Impaired O'Connell – 1 Sat Other Pastures – no Acres or Minor Area	Occurs in Curry, O'Connell, Trap and Sheep in minor amounts in valley plains (< about 2% of allotment). Sat in

TES Map Unit	Acres	Percent Area in Allotment	1990 Forest-Wide TES of the Kaibab NF Soil Condition	May and June 2024 Field Validated Soil Condition by Pasture	June 2024 Final Representative Soil Condition Allotment-Wide
				<1% Overall	O'Connell and Impaired in Wheat where close to stocktank (estimate 20% or 300 acres of allotment)
251	1,382	2	Unsat	Minor Area, 2% Overall	Unsatisfactory based on Kaibab NF (KNF) TES. About 2% of allotment
276	1,066	2	Unsat	Minor Area, 2% Overall	Unsatisfactory based on KNF TES. About 2% of allotment
11	250	<1	Sat	Curry – 1 Impaired Other Pastures – no Acres or Minor Area <1% Overall	Occurs in Curry, O'Connell and Rain Tank pastures in valley plains in very minor amounts (<.4% of allotment). Curry appears Impaired adjacent to trick tank
277	185	<1	Sat	Minor Area, <1% Overall	Satisfactory based on KNF TES. Less than 1% of allotment
281	104	<1	Sat/Sat	Minor Area, <1% Overall	Satisfactory based on KNF TES. Less than 1% of allotment
682	67	<1	Sat	Minor Area, <1% Overall	Satisfactory based on KNF TES. Less than 1% of allotment

Notes about Table 18: Some TES map units consist of 2 soil components and represented with a diagonal slash /. Where that occurs, soil condition data presented is based on the most dominant map unit in the polygon. There may be smaller areas or inclusions of other soil condition classes in that map unit polygon.

Some of the indicators contributing to overall soil condition are of particular interest either because they are specifically identified in Forest Service policy or because they are susceptible to impacts from managed grazing. These indicators include vegetative ground cover, ground cover from biological soil crust, soil redistribution (erosion and deposition), and alterations to soil structure. Table 19 summarizes field observations of these indicators by map unit. Evidence of compaction and some soil redistribution was observed at sites where livestock grazing is not currently active; scat and hoof prints indicated that grazing by wildlife is present in many of these areas.

Table 19. Summary of key soil condition indicators from May-June 2024 field surveys

TES Map Unit	Number of Field Sites	TES Natural Vegetative Ground Cover (%)	Observed Vegetative Ground Cover (%)	Ground Cover from Biotic Soil Crust (%)	TES Soil Erosion Hazard	Average Soil Redistribution Class*	Evidence of Compaction at Some Sites?
260	6	65	45.0	2.5	Moderate	1.4	Yes
263	4	30	33.3	1.8	Moderate	1.0	Yes
250	3	50	33.3	trace	Moderate	1.3	Yes
275	5	85	52.2	0.4	Slight	0.9	Yes
683	3	70	36.7	5.5	Slight	1.0	Yes

TES Map Unit	Number of Field Sites	TES Natural Vegetative Ground Cover (%)	Observed Vegetative Ground Cover (%)	Ground Cover from Biotic Soil Crust (%)	TES Soil Erosion Hazard	Average Soil Redistribution Class*	Evidence of Compaction at Some Sites?
634	3	55	39.3	4.3	Moderate	1.0	Yes
272	5	65	41.4	0.1	Slight	1.2	No
261	1	65	63.0	none	Severe	1.0	No
23	1	55	45.0	none	Slight	0.0	Yes
11	1	80	80.0	none	Moderate	0.0	Yes

**Soil redistribution classes are determined by both observable and measurable metrics as described by Burkett et al. (2014). The USDS-FS (2024) protocol considers a soil redistribution class of 0 or 1 satisfactory, 2 or 3 impaired, and 4 unsatisfactory.*

Desired Condition- Soils

Specific, project-level desired conditions are derived from Forest Plan desired conditions and best available scientific information (table 20). Soils in satisfactory condition supports the diverse, productive native plant communities and maintain healthy watersheds by: 1) cycling and storing nutrients to sustain long-term soil productivity, 2) absorbing and storing water, and 3) maintaining a stable ground surface without excess erosion or sedimentation.

Table 20. Specific Desired Conditions for Soils

Soils Forest Plan Direction	Specific Desired Condition	Examples of How Desired Condition May Be Measured
Vegetative ground cover is well distributed across the soil surface to promote nutrient cycling and water infiltration. Soils provide for diverse native plant species.	Maintain or improve, as compared to local TES map unit, native plant functional group diversity and vegetative ground cover.	Use Soil Condition Monitoring (USDA-FS 2024) to document native plant functional group diversity and vegetative ground cover. Use Range Utilization Monitoring to document herbaceous perennial grass utilization.
Accelerated soil loss is minimal, especially on sensitive or highly erodible sites. Soils can… resist erosion.	Maintain or improve soil redistribution class across the allotment area.	Use Soil Condition Monitoring to document soil redistribution class during soil condition monitoring. If a monitoring site is rated as impaired, revisit site within 5 years to establish a trend.
Soils can readily absorb, store, and transmit water vertically and horizontally… Infiltration rates are good in TES soil units that are described as well drained and moderately well drained.	Evidence of alterations to soil structure, such as soil compaction and decreased porosity, is low and discontinuous.	Use Soil Condition Monitoring to document evidence of impacts to soil structure (e.g., strong platy or blocky structures, horizontal rooting, and vesicular pores/absence of pores).
Soils can… accept, hold, and release nutrients.	Soil organic matter content is similar to potential. Soil surface layers have higher organic matter content than subsurface layers.	Use Soil Condition Monitoring to document relative color differences between surface and subsurface soil layers. If surface layer is relatively darker than subsurface, then it is assumed to have a higher organic matter content.

Soils Forest Plan Direction	Specific Desired Condition	Examples of How Desired Condition May Be Measured
Biological soil crusts (mosses, lichens, algae, liverworts) are stable or increasing in semi-desert grasslands, desert, pinyon-juniper, and sagebrush communities.	Biological soil crust is promoted by minimizing compaction and maintaining desirable ground cover that enhances soil productivity.	Incorporate TES map units where biological soil crusts were observed into short- and long-term soil monitoring plans. Use Soil Condition Monitoring to document biocrust ground cover, total vegetative ground cover, and soil structure.

Effects of the Proposed Action – Soils and Watersheds

Alternative A – Proposed Action

This analysis incorporates Project Design Features listed in Appendix A of this EA.

Direct and Indirect Effects

Overall, the Proposed Action could have direct and indirect effects to watershed, stream, and soil conditions in the Rain Tank Allotment area. However, many effects are expected to be localized over a relatively small area. Best management practices, monitoring, and adaptive management would mitigate effects over the larger allotment area.

Watershed and Natural Waters

The majority of watersheds in the allotment (5 out of the 7 assessed, accounting for 86 percent of the allotment area) are in properly functioning condition. Only two watersheds, accounting for 14 percent of the allotment area, are functioning at risk. Although a stream condition inventory has not yet been completed, streams should reflect overall watershed condition.

Note: Watershed Condition Indicators

The Watershed Condition Classification identified twelve indicators of overall watershed health. These indicators can be divided into upland (road and trail network, soil, fire effects or fire regime, rangeland vegetation, terrestrial invasive species, forest cover, and forest health) and stream (water quality, water quantity, aquatic habitat, aquatic biota, and riparian vegetation) condition indicators. Some of these indicators are unlikely to be affected directly or indirectly, by the Proposed Action, such as the road and trail network and forest cover. Others are not relevant to the Rank Tank Allotment area, such as riparian vegetation. These indicators are therefore not discussed in relation to the Proposed Action. Effects to all other indicators are discussed below.

Upland Conditions

Impacts to soil condition are discussed more in depth in the Soils section. Impacts are likely to be most pronounced around water developments, which represent a small area within the overall watershed. Recommended best management practices and adaptive management discussed in this report are likely to reduce many of these impacts and maintain soil condition.

Livestock grazing could also directly affect rangeland vegetation condition. However, the Proposed Action includes monitoring and management practices to respond to monitoring which would ensure allowable vegetation use thresholds are not exceeded (utilization of 30-40 percent). Additionally, drought mitigations are particularly important to maintaining or improving rangeland vegetation condition.

Grazing and proposed range improvements may increase the size and distribution of terrestrial invasive species. Constructing stock tanks, troughs, and trick tanks increases the amount of area disturbed and where livestock congregate in high densities. Potential impacts from invasive species would likely be localized around water developments.

Changes to rangeland vegetation and terrestrial invasive species have potential to indirectly influence fire effects and the fire regime by changing the availability of fine, flashy fuels on the forest floor. This also has the potential to indirectly affect forest health. So long as utilization is limited to 30-40 percent, grazing should not have a large impact on these indicators.

Overall, the Proposed Action is unlikely to change upland watershed conditions substantially if best management practices and adaptive management practices are followed. Localized areas of impact around water developments are expected, but these are small compared to the overall watershed.

Stream Condition

Upland conditions within the watershed can indirectly affect stream condition. Soil compaction, decreased infiltration, and loss or alteration of upland vegetative ground cover can cause increased runoff and higher peak flows, leading to channel adjustments and decrease in stream function (Gori and Backer, 2005). In the uplands, areas around water developments are most likely to experience these effects. However, due to the relatively small size of these more heavily utilized areas compared to the watershed as a whole, the effect to stream condition is expected to be minimal. If management prescriptions are followed and cattle are moved when use guidelines are met, the negative indirect effects of grazing would be minimized.

Stream channel and bank stability, vegetation within and adjacent to stream channels, channel bottom embeddedness from sedimentation, and floodplain function are all stream conditions that can be directly and indirectly affected by livestock grazing practices. These indicators of stream condition also affect aquatic habitat and aquatic biota.

As with upland watershed condition, stream condition is most likely to be affected around in-channel water developments. These developments attract cattle into the channels, impacting the entire system through localized removal of stabilizing vegetation, streambanks through trampling, stream channels through compaction, aquatic management zones through trailing (which results in concentration of runoff and erosion into the stream), floodplains through compaction. Additionally, in-channel water developments directly affect natural flow regimes by retaining water and sediment at those locations; however, the amount of water to be retained would be negligible at the subwatershed scale. Overall, these direct impacts to stream condition would likely only affect the stream over a relatively short reach.

Effects beyond these localized areas are expected to be more dispersed and to have a minimal impact on stream condition overall. Monitoring of stream condition and adaptive management will help to preserve natural stream morphology, avoid channel downcutting or widening, maintain natural sediment variability, and support healthy vegetative buffers.

Water Quality

Managed livestock grazing can directly affect water quality when sediment and nutrient delivery to streams is increased due to impacts to uplands and streams. If overall watershed and stream condition are maintained, minimal impacts to water quality are expected.

Soil Condition
The majority of soils (about 59,269 acres or 93 percent) within the Rain Tank Allotment are in satisfactory condition; impaired soil conditions amount to about 1,800 acres or 3 percent of the allotment; unsatisfactory soil conditions amount to about 2,448 acres or 4 percent of the allotment.

Vegetative Ground Cover
Cattle indirectly impact soils by removing vegetation, resulting in a loss of protective ground cover, including litter. The loss of vegetation and litter reduces infiltration and exposes the soils to raindrop impact and overland flow, thus leading to soil crusting and increased erosion. The reduced cover can also result in a loss of soil organic matter and a reduction in soil microbes which play a significant role in nutrient cycling. Soils that are lower in organic matter have poorer structure which also affects infiltration and root growth.

Under the Proposed Action, utilization would be limited to 30-40 percent. This threshold would allow enough litter to remain on the forest floor to mitigate these effects on the Rain Tank Allotment. The Proposed Action includes monitoring and management practices to respond to monitoring which would ensure allowable vegetation use thresholds are not exceeded.

Soil Structure
Hoof action of cattle can cause direct impacts by compacting soils. Compaction decreases water infiltration, restricts rooting depth, and increases the hazard of water erosion (NRCS 1996). Soil compaction is expected to occur around livestock waters, trails, and valley bottoms, where livestock tend to congregate for longer periods of time. The risk for compaction is greatest when soils are wet (NRCS, 1996). The Proposed Action is for a grazing season from April 1 to October 31. Soils are expected to be the wettest outside of the grazing season, therefore the timing of the proposed grazing season would mitigate effects from grazing to soil structure.

Additionally, ground disturbing activities from the addition and maintenance of pipelines, and water developments, and other range improvements may create some localized, short-term soil compaction or topsoil loss; however, no long-term issues effecting desirable site stability and productivity are anticipated with the proper implementation of soil best management practices.

Biological Soil Crust
Biological soil crusts bind and protect soil from both water and wind erosion. Grazing can have detrimental effects on the retention of biological soil crusts, which is marked by an increase in bare soil (Beymer and Klopatek, 1992). This, in turn can lead to increased sediment yield in grazed areas (Fick et al., 2020).

Grazing authorization under the Proposed Action would likely have long-term effects to the extent of biological soil crusts within the allotment. These impacts are expected to be greatest around water developments. However, biological crusts on soils with high clay content are less susceptible to disturbance when crusts are dry. Under the Proposed Action, stocking would take place between April 1 and October 31, generally outside of the winter and early spring, when the wettest soil conditions are expected; stocking when crusts are dry and less susceptible to disturbance should mitigate impacts to biological soil crusts within the allotment. Monitoring of ground cover from biological soil crust at key sites and adaptive management should also help to mitigate detrimental effects to biological soil crust. Additionally, some impacts to biological soil crust can be expected due to installation and maintenance of allotment infrastructure, for example by driving vehicles cross-country to these sites. Impacts to biological soil crusts increase with the number of vehicle passes over an area (Ouren et al., 2007). If design features are in place, cross-country travel is limited to the minimal number of passes required, and travel routes target areas with relatively low biocrust development, minimal impacts are expected from cross-country travel to and from sites. Localized impacts are expected where ground disturbance occurs as structures are installed, but this disturbance should have a small overall footprint.

Soil Redistribution

Under the Proposed Action, direct effects to soil disturbance and resulting increased soil redistribution (erosion and sedimentation) from livestock grazing likely would occur. Given the generally low slopes across the allotment and limited utilization of 30-40 percent that would maintain vegetative ground cover, these effects are likely to be minimal. The largest expected increases in soil disturbance from grazing would be around new water developments and where nonfunctional water developments are repaired. Effects to soil redistribution in these areas would be long term and would likely similar to that in areas near existing functional livestock waters. However, these areas are fairly small compared to the overall allotment.

Additional short-term soil disturbance and resulting increases to soil redistribution would be associated with the construction of a new pipeline, troughs, and trick tanks and with maintenance of existing water features and fence line. Disturbed areas along the fence line and pipeline would likely revegetate relatively quickly under a normal precipitation regime, at which point the increased disturbance in those areas would be eliminated.

Note: Water Developments and Soil Condition

Water developments, where cattle are expected to congregate, are where soil conditions are likely to be the most impacted by the Proposed Action. The maintenance or addition of water developments should help better distribute cattle across the allotment. However, placing new waters in areas that have received little use would likely cause new areas of heavy use (McAuliffe, 1997). Salt attractants may be used as a management tool to increase cattle distribution or attract cattle away from areas with impaired soils. Salting is an important management practices which would help limit use in areas with impaired soils, such as those around water sources.

Cumulative Effects of the Proposed Action –Soils and Watersheds

The geographic setting for the cumulative effects analysis for soils and watersheds includes all of the 6th-level (HUC12) hydrologic unit watersheds within the Rain Tank Allotment. The timeframe for past actions is 10 years, based on soil productivity and vegetative response.

Fire and Fuels Management

Long-term watershed benefits are expected to occur due to improvements in fire effects and fire regime as well as forest health. Additionally, long-term water quality would benefit from treatment of upland areas currently not meeting desired conditions because of departures in vegetation and fuel composition. Increased vegetative ground cover and decreased heavy fuel loading would promote stability in natural flow and sediment regimes and improve soil function. Although there may be isolated, short-term disturbance of soils and vegetative cover from implementation of these treatments, best management practices would maintain watershed, stream, and soil condition.

South Zone Grassland Treatments

Long-term watershed functionality would likely improve with the proposed mechanical treatments and prescribed fire, bringing portions of the uplands to desired conditions. Departures from historical ranges of variability in vegetation and fire regimes have the potential for alteration of hydrologic regimes. The existing condition of soils rated as satisfactory would be maintained or improved with proper implementation of soil best management practices during restoration vegetation treatments. Where prescribed amounts of coarse woody debris are maintained during restoration treatments and natural recovery of vegetative ground cover is well developed, soils would be adequately protected and infiltration rates would be maintained, and runoff and resulting soil redistribution would be minimized. In areas with extensive biotic soil crust development, a short-term increase in erosion may occur where the soil crust is disturbed. This impact can be reduced to some extent by limiting mechanical entry to times when biotic soil crusts are least susceptible to disruption, such as very dry periods. Short-term impacts to soil and watershed condition may be expected during implementation including from temporary roads that should be decommissioned after use, but proper implementation of best management practices should mitigate many of these impacts.

Off Highway Vehicle Use

Dispersed camping and OHV/ATV use have the greatest potential for adverse cumulative effects on soil and watershed condition through disturbance, erosion, compaction, potential transport of terrestrial invasive species (weeds), weakening of streambanks, and trampling of herbaceous ground cover (Ouren et al., 2007). These adverse effects are limited to areas where those activities occur. The Travel Management Rule (TMR) restricts cross country travel and designates travel routes on system roads, reducing adverse effects to watershed, stream, and soil conditions across the project area. While OHV guiding occurs within the Rain Tank Allotment area, it should be restricted to TMR roads.

However, public use of unauthorized routes and cross-country travel still occurs. Where this unauthorized access develops compacted, denuded paths, these can be a source of concentrated runoff which can lead to localized soil erosion downslope from roads. Because no or minimal direct and indirect effects to soils are anticipated from grazing authorization on the Rain Tank Allotment, no significant cumulative effects are expected when added to the effects of existing motor vehicle management.

Wildlife Use

Wild ungulate utilization in the allotment is expected to continue regardless of the selected action. Grazing and hoof action from wild ungulates impacts watershed uplands, soils, and streams in much the same way that livestock grazing does, including a concentration of impacts around water sources. Utilization of forage, soil compaction, increased soil disturbance and soil redistribution, impacts to biotic soil crust, trampling o stream banks and beds near water sources, and trailing from wildlife is expected to continue. Under the Proposed Action, improved and new water developments would serve to better distribute impacts from not only cattle, but from wild ungulates as well.

Tusayan Wildlife Waters Project

Construction of additional wildlife waters would have the same effects as construction of water features for livestock. Short-term, localized effects to soils, including soil compaction, disturbance and redistribution, and reduction in vegetative ground cover and biotic soil crust are expected in the construction areas. However, these areas would recover within a few years. Long-term effects to soils are expected directly around the wildlife waters due to soil compaction, loss of vegetative ground cover, and localized soil disturbance and redistribution. However, these waters would also disperse impacts across the allotment and reduce wildlife concentrations around existing water features; where they are accessible to livestock, they would also help to better distribute livestock across the allotment and disperse their impacts as well.

Effects of the No Grazing alternative - Watershed and Natural Waters

Under this alternative, livestock grazing would be eliminated from the Forest Service administered lands within the Rain Tank Allotment. Ground disturbing impacts from livestock, such as compaction, would be eliminated. Where livestock grazing is currently managed on the allotment, stress applied to herbaceous vegetation would be eliminated, and vegetation would recover more quickly than under the

Proposed Action. Invasive plant species would continue to occur in areas where populations currently exist across the allotment.

Improved upland conditions associated with no grazing would benefit downstream water quality by increasing herbaceous ground cover and infiltration, and reducing compaction, runoff and sediment delivery to drainages.

Effects of the No Grazing Alternative – Soils

Under the No Grazing alternative, ground disturbing impacts from livestock, such as soil disturbance and resulting soil redistribution, would be eliminated. Soil stability, structure and pore space would improve in areas where livestock grazing occurred. Where compaction due to managed livestock impacts soil structure, it would decrease slowly overtime through natural processes, such as freeze-thaw and wetting-drying cycles, and improved vegetative ground cover. A reduction of trampling to would also improve soil stability, structure, pore space, infiltration rates, and water holding capacity. Stress applied to herbaceous vegetation (utilization) by managed livestock would be eliminated, and vegetation would recover more quickly than under livestock grazing. Nutrient cycling would occur at more consistent rates across the project area as vegetative ground cover improves in areas where livestock grazing occurred.

While soil conditions adjacent to water developments would likely improve in areas that are currently authorized under the temporary grazing permit, impaired soil conditions may persist in areas adjacent to functional water developments due to grazing and trampling impacts by wild ungulates. Impaired and unsatisfactory soil conditions that occur on steeper slopes, in areas with high pinyon/juniper canopy cover and areas with shallow soil would continue to occur.

Wildlife

Existing Conditions - Wildlife Species

The Rain Tank Allotment is located in Game Management Unit 9. Topography in the allotment is mostly flat, but topographical features do include multiple knolls and ephemeral drainages. The lower elevations to the north and west area of the allotment are comprised of a conifer woodland vegetative community characterized by juniper (*Juniperous spp*.) and pinyon (*Pinus edulis*) tree species. These species are generally openly spaced with perennial grasses intermixed. Other species include snake weeds (*Gutierrezia sp.),* sage (*Artemeisa sp*.), and rabbit brush (*Chrysothamnus viscidiflorus*). Moving east across the allotment, as elevation increases, the landscape changes to primarily conifer forest, dominated by ponderosa pine (*Pinus ponderosa*) which includes an understory of alligator juniper (*Juniperus deppeana*), scrub oaks (*Quercus spp*.), manzanita (*Arctostaphylos spp*.), and perennial grasses.

Juniper treatments and ponderosa pine restoration treatments have been conducted in this allotment as far back as the early 1900s. These restoration treatments are ongoing under South Zone Grassland Restoration and necessary because fire suppression has led to the invasion of juniper in areas that previously were more open grassland.

Desired Conditions - Wildlife Species

Desired Conditions for Wildlife (All Species):

- Native wildlife species are distributed throughout their potential natural range. Desirable nonnative wildlife species are present and in balance with healthy, functioning ecosystems.
- Habitat is available at the appropriate spatial, temporal, compositional, and structural levels such that it provides adequate opportunities for breeding, feeding, nesting, and carrying out other critical lifecycle needs for a variety of vertebrate and invertebrate species.

- Species with specific habitat needs (e.g. snags, logs, large trees, interlocking canopy, and cavities) are provided for.
- Grasses, forbs, and shrubs provide forage, cover, fawning, and nesting sites.
- Interconnected forest and grassland habitats allow for movement of wide-ranging species and promote natural predator-prey relationships, particularly for strongly interactive species (e.g. mountain lions).
- Habitat configuration and availability allow wildlife populations to adjust their movements (e.g. seasonal migration, foraging, etc.) in response to climate change and promote genetic flow between wildlife populations.
- Human-wildlife conflicts are minimal. Hunting, fishing and other wildlife-based recreation opportunities exist, but do not compromise species populations or habitat.

Desired Conditions for Threatened, Endangered, and Sensitive Species:

- Threatened, endangered, and sensitive species have quality habitat, stable or increasing populations, and are at low risk for extirpation.
- Goshawk nest areas are multi-aged forests dominated by large trees with interlocking crowns and are generally denser than the surrounding forest.

Desired Conditions for Rare and Narrow Endemic Species:

- Habitat and refugia are present for narrow endemics or species with restricted distributions and/or declining populations.
- Location and conditions of rare and narrow endemic species are known.

Effects of the Proposed Action - Wildlife Species

General Effects of Livestock Grazing and Associated Improvements on Wildlife Habitat

Livestock grazing has a wide range of direct and indirect effects on ecosystem structure and function and thus on wildlife habitat. The primary effects of livestock grazing on wildlife habitat are the direct and indirect effects associated with repeated reductions in understory vegetation (such as cover, density, biomass, and/or frequency) due to grazing and trampling by livestock. This results in reduced food resources available for a wide variety of invertebrate and vertebrate species that eat plant parts (leaves, flowers, fruits, seeds) and reduced cover for a wide variety of invertebrate and small vertebrate species (e.g., lizards, snakes, ground-nesting birds, small mammals). Cover provided by both live herbaceous vegetation as well as the herbaceous litter layer is reduced by livestock grazing. Reduced cover can negatively affect microhabitat conditions for some of these species and potentially results in increased predation risk.

Livestock grazing also alters the composition of plant communities. Plant species vary in their palatability to livestock. Plant species that are less palatable to livestock tend to increase over time as a result of herbivory on plant species that are more palatable, which tend to decrease over time.

Livestock grazing also has had many indirect effects on ecosystem structure and function and thus wildlife habitat as a result of effects on fire regime and tree establishment patterns. Fire frequency in southwestern ponderosa pine forests decreased substantially about the time that large numbers of livestock began grazing, most likely due to the annual removal of herbaceous fine fuels by grazing livestock (Swetnam et al. 1999). In addition, reductions in herbaceous vegetation cover by grazing livestock resulted in reduced plant competition for pine seedlings and created more areas of mineral soil favorable to establishment of pine seedlings (Rummell 1951, Milchunas 2006). Thus, livestock grazing, in conjunction with active fire suppression, has likely resulted in losses of grassland areas and widespread transformation of savannas and woodlands into denser woodlands and forests (Johnsen 1962, Swetnam et al. 1999, Saab et al. 1995).

Although livestock grazing affects wildlife habitat, the existing current environmental baseline within the Rain Tank Allotment is a landscape that has been continuously grazed by livestock for approximately 130 years. Numbers of livestock grazed today on the Rain Tank Allotment and throughout the western U.S. are a fraction of numbers grazed during the late 1800s and early 1900s (Milchunas 2006). Many of the greatest ecological impacts of livestock grazing (e.g., severe erosion and loss of palatable forage species) likely occurred by the early 1900s (Milchunas 2006), since then rangeland management in the National Forest System has adjusted its practices to mitigate the effects and reduce the overall level of impact associated with livestock grazing. It is important to note that all negative effects listed for the species below are limited with the 40 percent utilization limit, as described in the proposed action. 40 percent utilization maintains consistency of biomass across the landscape. Based on the Range Monitoring report, this number may reduce habitat quality to some degree but would not have any population level reductions which trend the species toward listing or result in a loss in viability of the species.

Species Listed Under the Endangered Species Act
This section considers all species identified by the Arizona Ecological Services Field Office pursuant to Section 7 if the Endangered Species Act (ESA), updated on October 22, 2024. The list was generated through iPAC and identifies threatened, endangered, proposed, and candidate species, as well as designated and proposed critical habitat that may occur within the project area. Species generated in iPAC are listed on Table 21.

We have determined the California condor (Gymnogyps californianus) occurs in or near the project area or has habitat in the project area and warrants additional analysis. The remaining species either do not occur in the project area or there is no suitable habitat, therefore there are no additional consultation requirements under Section 7 of the ESA.

There is no critical habitat identified in the project area.

Table 21: Species Considered Under the ESA

Species	Status	Project Considerations	Effect Determination
Mexican Wolf *Canis lupus baileyi*	Endangered	Does not occur in the project area	No Effect
California Condor *Gymnogyps californianus*	Experimental Population, Non- Essential	Occurs in/near project area	Not likely to jeopardize
Mexican Spotted Owl *Strix occidentalis lucida*	Threatened	Does not occur in the project area	No Effect
Southwestern Willow Flycatcher *Empidonax traillii extimus*	Endangered	Does not occur in the project area	No Effect
Yellow-billed Cuckoo *Coccyzus americanus*	Threatened	Does not occur in the project area	No Effect

California condor
The Rain Tank Allotment is within the experimental nonessential population area designated for the reintroduced California condor. Condors have been known to fly widely, but now generally travel between two main areas, the Grand Canyon Ecoregion/Colorado River corridor in Arizona and the Kolob

Terrace/Zion National Park area in Utah (USFWS 2012). Condors have reportedly been detected on the Tusayan District, but such occurrences are rare and short in their duration. There are no known condor nest sites in the project area, nor are there sites where condors are known to roost. Condors are opportunistic scavengers that feed primarily on large dead mammals such as deer, elk, and domestic livestock. The amount or distribution of carrion would not be affected by the proposed action. Suitable foraging habitat in the project area includes grassland, sagebrush, pinyon-juniper woodland, and ponderosa pine forest. California condors likely meet most of their water demands from the carrion they eat. It is unlikely that condors would use the proposed water developments in this project. Habitat loss and modification caused by construction of water development facilities would unlikely affect condors because 1) only a small area would be impacted, 2) condors range over vast areas, 3) condors so rarely occur on the Tusayan District.

The California Condor population is under Section 10(j) of the Act and classified as nonessential. Because the nonessential experimental population is, by definition, not essential to the continued existence of the species, the effects of proposed actions affecting the nonessential experimental population would not rise to the level of jeopardizing the continued existence of the species. As a result, a formal conference with USFWS was not necessary.

<u>Effects determination:</u> Implementation of either the proposed action or the No Grazing alternative would have no effect on the species and would not jeopardize the continued existence of the California condor.

Forest Service Sensitive Species (Wildlife)
The following Forest Service Sensitive Species are known to occur or potentially occur on the Tusayan Ranger District based on geographical range and presence of suitable habitat: northern leopard frog (*Rana pipens*), Bald eagle (*Haliaeetus leucocephalus*), Northern goshawk (*Accipiter gentilis*), American peregrine falcon (*Falco peregrinus anatum*), Burrowing owl (*Athene cumicularia hypugaea*), spotted bat (*Euderma maculatum)*, Allen's lappet-browed bat (*Idionycteris phylliotis*), pale Townsend's big-eared bat (*Corynorhinus townsendii pallescens*), Navajo Mogollon vole (*Microtus mogollonensis Navaho*).

Northern leopard frog
The Kaibab NF has not documented the presence of northern leopard frogs on the Tusayan Ranger District, and the distribution map in AGFD's Heritage Data Management System does not show any occurrences on the district (https://awcs.azgfd.com/species/amphibians/rana-pipiens). Suitable habitat for this species is characterized as perennial water bodies with rooted aquatic vegetation and adjacent wet meadows. Suitable wetland habitat does not occur on the Tusayan District. The Proposed Action would not affect northern leopard frogs because it would not affect individuals or suitable habitat.

<u>Effect Determination:</u> Implementation of either the proposed action or the No Grazing alternative would have no effect on northern leopard frogs and would not trend the species toward federal listing or a loss of viability for the species or population.

Bald eagle
On the Tusayan Ranger District, Bald eagles are primarily migratory and occur in the area from November to February. There are currently no known Bald eagle nesting sites within the project boundary. Bald eagles are often seen at fishing lakes where they prey on fish and waterfowl. They also prey on small mammals such as rabbits or ground squirrels. They can also be found feeding on carrion from road-kill animals (primarily elk and mule deer) along highways and on gut piles of hunter-killed elk and deer scattered across the district. Bald eagle surveys are conducted every January on the forest. Sightings are variable year to year but there are no known winter roosts on the allotment.

Grazing does not affect Bald eagle nest or roost sites, but it does affect herbaceous and shrubby vegetation, which in turn may have an indirect effect on small mammal abundance. Because grazing would continue to result in decreased forage availability and cover for some Bald eagle prey species, it is determined that livestock grazing under the proposed action result in decreased quality of Bald eagle foraging habitat.

Water development has additional indirect effects to wintering Bald eagles. Trampling and heavy use near watering areas, with a gradient of increased use as distance to water decreases, the new water developments would result in increased uniformity of vegetation use by livestock. In flat terrain, this would reduce the mosaic complexity or habitat type diversity of the understory, resulting in a lack of heavy escape cover for prey species. While there is an indirect effect from a reduction in available forage/some types of cover, it should be reiterated that this species scavenges from all available food sources, so the effect is expected to be minimal.

It is unknown whether additional water developments would provide much benefit for Bald eagles because Bald eagles are present on the district during the winter when animal water demands are much less than during the summer. Habitat loss and modification caused by construction of water development facilities would not contribute to a trend towards federal listing or loss of population viability of Bald eagles due to the small scale of development under the proposed action.

<u>Effect Determination:</u> Implementation of either the proposed action or the No Grazing alternative may have some un-measurable effects to individuals but would not trend the species toward federal listing or a loss of viability for the species or population.

Northern goshawk

Most northern goshawk territories on the Tusayan Ranger District and in Northern Arizona occur in ponderosa pine forest (Beier and Maschinski 2003). Goshawks prey on a wide variety of small mammals and bird species including; American robin, band-tailed pigeon, Stellar's jay, northern flicker, chipmunks, ground squirrels, and tree squirrels with mammals providing most of the prey biomass (Beier and Maschinski 2003). There are several known goshawk nesting territories in the vicinity of the Rain Tank Allotment, but they may use other areas for foraging.

Small mammal species are present in the project area and each feeds on various herbaceous plant parts. Livestock grazing reduces food availability for these prey species as well as vegetative cover. Because grazing may affect habitat quality for some goshawk prey species, livestock grazing under the proposed action would result in decreased habitat quality for many northern goshawk prey species. Many prey species use other forms of cover and forage. This indirect effect is not inclusive to all prey for the northern goshawk.

The pipeline and water developments are located in pinyon-juniper woodland and some suitable goshawk habitat. The Proposed Action would affect suitable habitat for goshawks and likely result in a small increase in habitat quality because various species of raptors and certain goshawk prey species are known to benefit from water developments (Rosentock et al. 1999, Rosenstock and Rabe 2004). The positive and negative indirect effects are likely to offset for the northern goshawk. Direct habitat loss and modification caused by construction of water development facilities would not contribute to a population decline, trend towards federal listing, or loss of population viability because of the small spatial scale of direct habitat loss/modification.

<u>Effect Determination:</u> Implementation of the proposed action and No Grazing alternatives may have some unintentional effects to individuals but would not trend the species toward federal listing or a loss of viability for the species or population.

American peregrine falcon
Peregrine falcons nest on cliffs near concentrations of avian prey. Peregrine falcons nest in the Grand Canyon just north of the Tusayan District, but there are no known peregrine falcon nesting records on the district. Some suitable foraging habitat on the Tusayan District includes grassland, sagebrush, and pinyon-juniper woodland habitat types and it is assumed that this habitat is occasionally used. The project area however, lacks other types of foraging habitat like marshes and lakes where they would feed on waterfowl.

Primary threats to peregrine falcons continue to be chemical contamination from organochlorine compounds and disturbance from rock climbing near nest sites. There would be no impacts to nest areas or nesting falcons under the proposed action or the No Grazing alternative. Any habitat loss or modification caused by construction of water development would have minimal direct effects from a direct loss of habitat, but some beneficial indirect effects by providing additional water sources for prey species. These effects are assumed to be offset.

Effect Determination: Implementation of either the proposed action or the No Grazing alternatives would not trend the species toward federal listing or a loss of viability for the species or population.

Burrowing owl
There are no known occurrences of burrowing owls on the Tusayan Ranger District. Burrowing owls occur in a wide variety of open habitats, including agricultural fields. Nesting typically occurs in abandoned burrows of small mammals, such as ground squirrels and prairie dogs. There are two known prairie dog colonies on the Tusayan Ranger District.

Main threats to burrowing owls are the conversion of grasslands to woodlands and the loss of burrowing mammal colonies such as prairie dogs and ground squirrels. The response of burrowing owls to grassland grazing has been positive. Saab et al. (1995) concluded that livestock grazing favors burrowing owl habitat. Habitat loss and modification caused by construction of water development facilities would occur on a small spatial scale. This direct negative effect would be offset by the positive effects from grazing.

Effects Determination: May Impact Individuals or Habitat, but Will Not Likely Contribute to a Trend Towards Federal Listing or Loss of Viability to the Population or Species.

Spotted bat, Allen's lappet-browed bat, and Pale Townsend's big-eared bat
Spotted bats roost in crevices and cracks in cliff faces and rock outcrops and forage in a wide variety of habitat types including ponderosa pine forests. Spotted bats forage primarily for moths in open meadows but they occasionally forage around individual trees or isolated clumps of trees (Luce and Keinath 2007). Spotted bats are known to occur on Grand Canyon National Park and have been detected within the Rain Tank Allotment.

Allen's lappet-browed bats have been detected at a variety of sites on the Tusayan Ranger District. They roost in caves and crevices and behind pieces of loose bark in large conifer snags and trees. Small moths are the primary food source of these bats. They are known to forage in a variety of forest and woodland types.

Distribution of the Pale Townsend's big-eared bat on the Tusayan Ranger District is unknown, although it has been detected on the district. It typically roosts in caves and old mines. Small moths are the primary food of these bats. They forage along forested edges taking prey from leaves and in flight.

Livestock grazing has very little to no effect on roosting habitat of all these species. Direct effects would be sporadic and circumstantial from livestock knocking over snags or trampling. Potential indirect effects on foraging habitat would primarily occur from the reduction in biomass as a result of livestock grazing. Reduction in biomass could decrease the quantity and composition of available insects, resulting in an overall reduction in foraging habitat/conditions. These indirect effects are difficult to quantify, but the 40 percent utilization is expected to limit this effect.

Effect Determination: May Impact Individuals or Habitat, but Will Not Likely Contribute to a Trend Towards Federal Listing or Loss of Viability to the Population or Species.

Navajo Mogollon vole

In Coconino County, Mogollon voles (formerly referred to as Navajo Mexican voles) have been found in the Grand Canyon, in the Flagstaff area, and the Williams Area, but AGFD's Heritage Data Management System shows no occurrences on the Tusayan District (http://www.azgfd.gov/w_c/edits/images/micrmena_000.gif). Suitable habitat on the Tusayan District includes grassland, sagebrush, pinyon-juniper woodland, and ponderosa pine forest. Voles do not rely on free-standing water (they meet their water demands through water content of the herbaceous vegetation they eat).

Mogollon vole, like other voles (*Microtus* spp.), rely on herbaceous vegetation (especially grasses) for food and cover. This is a small mammal dependent on the herbaceous vegetation layer for food resources and cover, so annual reductions in herbaceous vegetation and litter because of livestock grazing would result in reduced habitat quality. Construction of pipelines, water lots, water catchments, fences, and corrals under the proposed action would cause ground disturbance which could negatively affect Mogollon vole. The temporary use of these corrals result in an increased density of livestock, would subject portions of habitat to trampling. These effects are reduced with the advent of seasonal grazing with a 40 percent utilization limit.

Effect Determination: May Impact Individuals or Habitat, but Will Not Likely Contribute to a Trend Towards Federal Listing or Loss of Viability to the Population or Species.

Migratory Birds

Numerous migratory bird species occur within the project area. Several species are evaluated in the Endangered Species Act section and the Forest Service Sensitive Species section. Species of conservation concern were identified as Arizona Partners in Flight Priority Species (Latta et al. 1999) and U.S. Fish and Wildlife Service (https://ecos.fws.gov/ipac/). Species that are known to occur or potentially occur in the project area are Bendire's Thrasher, Black Throated Sparrow, Black-chinned Sparrow, Black-throated Gray Warbler, Brewer's Sparrow, Burrowing Owl, Chestnut-collared Longspur, Clark's Grebe, Elf owl, Golden Eagle, Grace's Warbler, Gray Vireo, Lark Bunting, Lesser Yellowlegs, Lewis's Woodpecker, Long-billed Curlew, Long-eared Owl, Marbled Godwit, Mexican Whip-poor-will, Olive-sided Flycatcher, Phainopepla, Pinyon Jay, Red-faced Warbler, Rufous Hummingbird, Rufous-winged Sparrow, Virgina's Warbler, Willet, Willow Flycatcher.

Under the proposed action in Rain Tank Allotment Grazing Re-authorization Project, unintentional take of individual migratory birds may occur, but there would be no intentional take of these species during project implementation.

Conclusions

Implementation of either alternative would have both positive and negative effects to wildlife and their habitat. Conservative utilization would prevent any permanent degradation of habitat. The direct, indirect and cumulative effects analysis demonstrates that 40 percent utilization would not reduce available biomass for wildlife to result in significant effects.

Cumulative Effects of the Proposed Action - Wildlife Species

This section summarizes the combined effects of the Rain Tank Allotment Re-authorization Project with past, present, and reasonably foreseeable future actions occurring on the Tusayan Ranger District. The cumulative effects analysis area is the project area with a 2-mile spatial buffer; individual animal territories can overlap the project boundary. Past, present and reasonably foreseeable projects which are determined to have potential effects to wildlife are listed below:

- South Zone Grassland Restoration
- Travel Management Revision
- 4FRI
- Tusayan Wildlife Waters

The South Zone Grassland Restoration EA aims to restore grasslands to their historic pre-settlement conditions through mechanical treatments and prescribed fires. The thinning of encroached trees and inclusion of normal fire regimes are expected to improve habitat quality for numerous wildlife species. While the analysis demonstrates some negative indirect effects from solely grazing livestock, with authorized livestock grazing utilization remaining at conservative levels, foraging habitat for the peregrine falcon, bald and golden eagle, burrowing owl, pronghorn and Mogollon Vole are expected to be improved. This is because through fire and mechanical treatment associated with South Zone Grassland Restoration, the overall amount of available habitat would increase, which would increase the carrying capacity for these target species. There are some negative effects associated with operating heavy machinery in both proposed projects but were not determined to be cumulative effects based on their relative temporal spacing of project implementation.

Human recreational activities can have impacts on nesting, foraging, and general movements of wildlife. After the Kaibab NF signed the Travel Management Revision that closed several hundred miles of road, some of which occur within this project boundary. This would further aid in reducing unnecessary resource damage to soil through erosion and improve wildlife habitat throughout the project area.

4FRI implementation on the Tusayan Ranger District has not experienced much success in commercial timber harvesting but continues to implement the project through hand thinning treatments and RX fire. By maintaining conservative and responsible utilization numbers on the limited portions of Rain Tank Allotment that overlap with the 4FRI footprint, wildlife objectives would continue to be met. Suitable wildlife habitat would steadily increase with the continued implementation of both restoration projects.

There is no indication that this project, in conjunction with other projects in the area would result in loss of viability of any of the species considered in this report.

Effects of the No Grazing Alternative – Wildlife Species

Implementation of the No Grazing alternative would have a beneficial effect on all but one species analyzed in this report. It is determined that the No Grazing alternative would not lead to a trend toward federal listing or a loss of viability for the species analyzed in this report.

Many of the positive direct and indirect effects associated with no livestock grazing on the Rain Tank Allotment are due to the potential for reduced competition between native wildlife species and livestock for forage availability. Under this alternative, there would be a broad increase in vegetation cover for small mammals. The associated increase of vegetation cover related to the removal of livestock on this allotment is expected to have direct negative effects to only one species analyzed in this report

(Burrowing owl). The increase in vegetation cover is expected to have positive direct and indirect effects as it pertains to a broad increase in biomass availability and reduced competition for resources.

Selecting the No Grazing alternative would present result in some broad negative effects to most wildlife species considered in this report. Maintenance of range structures would no longer occur on the allotment if livestock grazing is not authorized. The producer would no longer haul water to existing watering areas, existing water catchments would eventually become inoperable and fencing across the allotment would become dilapidated. The reduction in water availability would have direct negative effects to target and native non-target species that rely on surface water across the allotment. Unmaintained fencing would result in entanglement hazards for large ungulates across the allotment. Lack of fence maintenance could reduce habitat continuity due to the accidental death of wildlife as bird strikes and fatal entanglements may increase across the allotment.

Heritage

Existing Conditions – Heritage Resources

The Kaibab NF heritage program has completed an analysis to determine the potential effects to heritage resources that could result if the proposed action to reauthorize livestock grazing on the Rain Tank Allotment is selected. The study analyzed previously recorded archaeological sites and undertook surveys of proposed infrastructure improvements including a proposed fence alignment, a pipeline alignment, trick tanks and livestock watering facilities. Future improvements, including emerging technologies, not yet identified would comply with Section 106 of the National Historic Preservation Act of 1966 as amended. These improvements would be subject to a comprehensive field survey, analysis, and consultation to identify unrecorded archaeological sites and evaluate the effect of the undertaking on heritage resources. The Forest Service initiated consultation with the Arizona State Historic Preservation Office (SHPO) and Native American Tribes, including the Havasupai, Hopi, Hualapai, Kaibab Paiute, Navajo, Pueblo of Zuni, and Yavapai Prescott, for the reauthorization of grazing and proposed infrastructure improvements under Section 106 of the NHPA. On December 20, 2024, the Kaibab National Forest received concurrence from the SHPO on a finding of "No Adverse Effect to Historic Properties," for the proposed undertaking. The Kaibab National Forest will continue consultations for future allotment improvement proposals and provide requested informal monitoring data to the SHPO and Native American Tribes. Refer to Chapter 4 for a more comprehensive consultation summary.

Approximately 23,798 out of 63,855 acres, or 37 percent of the Rain Tank Allotment, have been previously surveyed for the presence of heritage resources. Within the inventoried areas, 486 archeological sites have been documented. The 486 sites represent a range of archaeological site types including precontact artifact scatters, precontact habitational sites, precontact field houses/agricultural features, historic refuse areas, rock art, rock shelters, historic railroad grades, historic logging/mining camps, and historic structural foundations.

All known heritage resources within the Rain Tank Allotment were reviewed and analyzed to identify range-sensitive sites that could be impacted by grazing effects. Additionally, a spatial analysis was conducted to identify archaeological sites located in areas that may be more prone to cow congregation including proximity to water sources, locations in grassland vegetation types, and locations on gentle slopes. Excessive use of these areas may be intense enough to cause degradation of the environment and/or heritage resources through erosion, compaction, or trampling.

Sites on NFS lands in the Southwestern Region "have been subjected to grazing for hundreds of years, at levels much higher than current grazing practices;" therefore, many of the impacts to heritage resources from grazing have already occurred. The establishment of allotments and grazing management substantially decreased threats to heritage resources with large reductions in livestock numbers, regulations on time of year and the amount of time livestock can graze in particular areas. Adaptive management strategies and practices have greatly reduced the threat of adverse effects to sites from activities associated with grazing (USDA 2009).

Through an office and field-based analysis, an additional 188 acres encompassing the proposed infrastructure improvements were inventoried for heritage resources and 148 previously recorded archaeological sites were identified as being potentially sensitive to grazing impacts. A comprehensive sample of these sites were ground-truthed and monitored by Kaibab NF Heritage staff in the summer of 2024. Although cattle grazing occurs in various areas across the Rain Tank Allotment results of the investigation identified that, overall, the current grazing management of the Rain Tank Allotment has had little to no observable effects on historic properties across the allotment.

Desired Conditions – Heritage Resources

The Forest plan lists the following desired condition: cultural resources, including known traditional cultural properties, are preserved, protected, or restored.

The following additional desired conditions have been identified by Kaibab N.F. archeologists, and would assist in moving toward the desired condition for the Heritage resource that is stated in the Forest Plan:

- Improved vegetation cover, and more stable soils, and better distribution of cattle across the allotment thereby reducing the potential for direct or indirect impacts to historic properties.
- Reduction in moderate to high-severity wildfire risk to fire sensitive cultural sites and sustain existing archaeological sites, traditional cultural properties, sacred sites, and forest resources associated with traditional practices.
- Surrounding landscapes are resilient to natural ecological processes.

Effects of the Proposed Action – Heritage Resources

The results of both the office-based analysis and the field-based ground truthing show that the proposed reauthorization of grazing within the Rain Tank Allotment would have no measurable direct or indirect effects to cultural resources within the allotment. The use of adaptive management within the Rain Tank Allotment is expected to benefit historic properties and heritage resources by improving the distribution of cattle across the allotment leading to improved vegetation cover, and more stable soils thereby reducing the potential for direct or indirect impacts to historic properties. The proposed infrastructure improvements shall adhere to the protective mitigation measures outlined in the Heritage Specialist Report (Rhone, 2024). If all mitigation measures are followed and implemented, the proposed infrastructure improvements would not adversely affect historic properties. However, if any negative impacts to sites are observed in the future, Kaibab NF archeologists will work with the range staff to develop and implement mitigation measures pursuant to Appendix H of the Standard Consultation Protocol for Rangeland Management to mitigate any adverse effects to sites. Any future projects or federal undertakings in the Rain Tank Allotment will be required to comply with Section 106 of the NHPA.

Cumulative Effects of the Proposed Action – Heritage Resources

Because implementation of the proposed action is not anticipated to have measurable direct or indirect effects to cultural resources within the allotment, no cumulative effects are anticipated. Further, no cumulative effects are anticipated to result from implementing future projects in the allotment because future projects will be designed to avoid adverse effects to heritage resources.

Kaibab NF archaeologists will continue to monitor sites within the Rain Tank Allotment as part of the professional cultural resource specialist's day-to-day activities. Archaeologists will observe and report on grazing activities, assess the effectiveness of the grazing strategy, and identify potential impacts on heritage resources. Therefore, the reauthorization of the Rain Tank Allotment grazing permit is consistent with the Forest Plan's management approach (USDA Forest Service 2014, page 60) for cultural resources because the Kaibab NF continues to work to identify, evaluate, and protect cultural resources.

Effects of the No Grazing Alternative – Heritage Resources

The No Grazing alternative would have no measurable direct, indirect, or cumulative effects on cultural resources as no cattle would be placed on the allotment.

Recreation, Wilderness, and Visual Quality

Existing Conditions – Recreation, Wilderness, and Visual Quality

The primary recreational activities in the Rain Tank Allotment include dispersed camping, recreational driving and hunting. The Greenway Trail and Arizona National Scenic Trail leaves Tusayan and enters Grand Canyon National Park essentially paralleling Highway 64.

Most of the dispersed camping occurs along the primary roads and within the first few miles of the road from Highway 64. During hunting season camps will push further back into the forest. Recreational driving is a popular activity on the Tusayan Ranger District and the Rain Tank Allotment.

Currently there are two permitted Jeep tour companies, and one guided horseback company. Many hunting guides are permitted for the entire game unit 9, which encompasses the Rain Tank Allotment.

Desired Conditions- Recreation, Wilderness, and Visual Quality

The Forest Plan provides desired conditions, standards, and guidelines for Recreation and Scenery Management. The main roads in the allotment have a desired scenic integrity objective of high buffer built around them while the interior areas have a desired scenic integrity objective of moderate. Below is a list of the additional desired conditions for Recreation as listed in the Forest Plan.

Desired Conditions for Recreation and Scenery

- A wide spectrum of high-quality recreation settings exists. Users have access to a variety of developed and dispersed opportunities.
- The Kaibab NF provides sustainable recreation consistent with public demand. Use levels are compatible with other resource values.
- Opportunities for off-highway vehicle riding and driving for pleasure are available on the designated system of NFS roads and motorized trails.
- Recreation management activities complement and support local economies and tourism.
- User conflicts are infrequent.

Desired Conditions for Recreation – Front Country

- Recreation settings retain high to moderate scenic quality. Some human influenced elements in the background are present.

Desired Conditions for Recreation – Backcountry

- Back-country areas are mostly undeveloped places where people engage in a variety of more primitive recreation activities. Visitors rely on their outdoor skills and provide their own equipment as they engage in recreation activities.
- Facilities are few in number, use the minimum area needed, and have simple construction designs that blend in with the surrounding area. They are made of native materials or other well-matched materials. Constructed facilities provide for natural resource protection.
- Users have low to occasional contact with other visitors and Forest Service personnel.
- Back-country recreation settings retain high to moderate scenic quality.
- Back-country areas provide opportunities for natural quiet and spiritual values.

Guidelines for Activities Affecting Recreation and Scenery

- In areas with high Scenic Integrity Objectives (SIO), only minimal alterations from landscape character goals should be allowed.
- In areas with moderate scenic objectives, only slight alterations should be allowed, and they remain visually subordinate to the landscape character.

Effects of the Proposed Action – Recreation, Wilderness, and Visual Quality

Issuing this permit at the proposed AUMs and with proposed improvements would have negligible effects on the recreational activities identified above. The presence of cattle or rangeland improvements have been part of the iconic western American identity for over a century. With livestock historically and currently utilizing these pastures, the recreating public expects their presence.

Scenic Integrity is unlikely to be impacted under this proposal. The proposed water harvest catchment in the Wheat pasture is in an area with moderate scenic integrity objectives (SIO) and would not have a negative or positive affect. The proposed water harvest catchment in the rain tank pasture may temporarily decrease the SIO in that spot during construction but would quickly become part of the visual environment as any disturbed vegetation regrows.

Cumulative Effects of the Proposed Action- Recreation, Wilderness, and Visual Quality

There would be few if any cumulative effects to the SIO or the Recreation Opportunity Spectrum when this proposed activity is combined with other activities such as prescribed fire or silviculture work.

Effects of the No Grazing Alternative- Recreation, Wilderness, and Visual Quality

Issuing no permit with zero AUMs and no proposed improvements would have negligible effects on the recreational activities identified above. There would be no shift in the Recreation Opportunity Spectrum.

Scenic Integrity is also unlikely to be impacted positively or negatively under this proposal. In a no action alternative where there aren't new improvements, the SIO would continue to be met.

Fire and Fuels

Existing Conditions – Fire and Fuels

When considering fire and fuels management, the main impact of livestock grazing is on the vegetation and fine fuels. Because fine fuels have a large impact on fire spread and fire return interval, it is helpful to look at the existing vegetation types and the associated fire regime information that is available.

Landfire provides theoretical Fire Regime Groups with fire return intervals as shown on the map below, which was snipped from ArcGIS online with Landfire data (1) for the Rain Tank Allotment area.

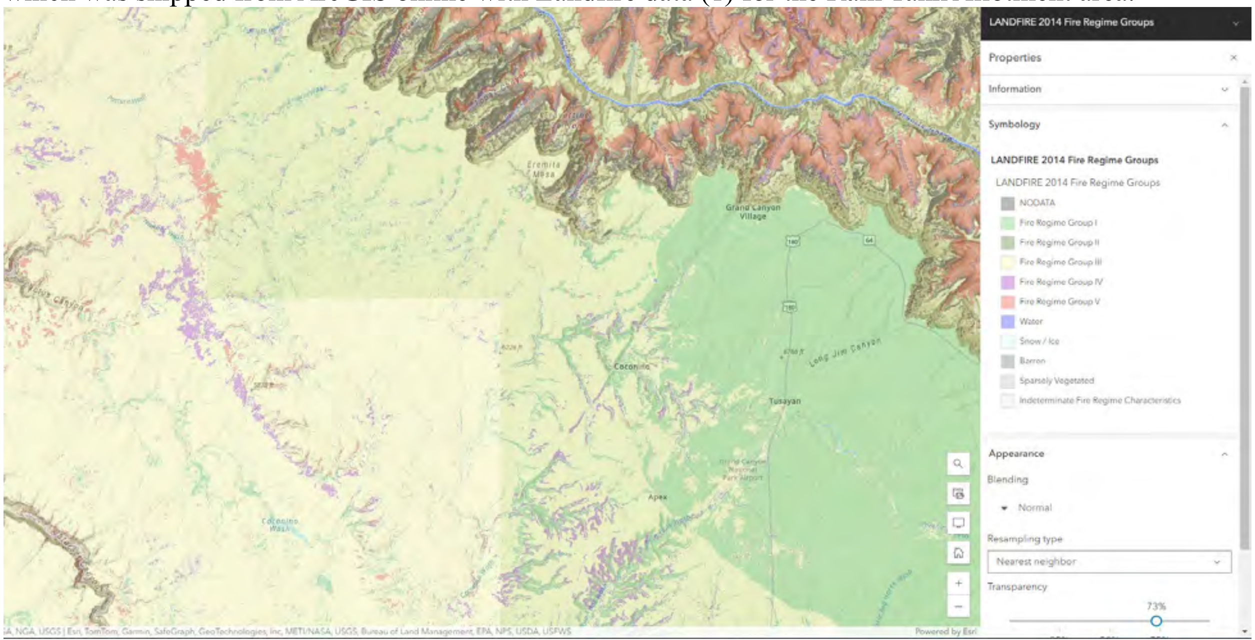

Figure 6. Fire Regime Groups within the Rain Tank Allotment

- Fire Regime Groups 1 and 2 (two shades of green) have a fire return interval ranging from 0-35 years.
- Fire Regime Group 3 (yellow) and 4 (purple) have a fire return interval ranging from 36-200 years.
- Fire Regime Group 5 (red) has a fire return interval greater than 200 years.

The eastern part of the Rain Tank Allotment is higher elevation and has significantly more ponderosa pine vegetation, so most of the green areas on the map above are in Fire Regime Group 1 and have frequent fires with a return interval averaging 10 years. Pine needles provide a readily available fine fuel at elevations above 6000 feet and therefore fires are frequent, and have fine fuel to spread. Grazing has a fairly small impact on the amount and availability of dead pine needles on the ground, which are the primary carrier of fire in this fuel type. The elevation within the allotment decreases to the west and southwest, so the next band of vegetation that occurs at elevations from 5500-6500 feet, depending upon aspect, is the pinyon juniper woodland. This area, shown mostly in yellow above, is in Fire Regime Group 3 and burns infrequently. Currently there is a relatively small amount of fine fuel or grass to support landscape-scale fire in much of the pinyon juniper woodland, so fires do not frequently play a major role in the shaping of the vegetation in these areas.

As the elevation continues to decrease, at the lowest elevations of the Tusayan Ranger District, vegetation changes to either sage/shrub or juniper grassland. In their current condition, the Landfire Model, shown above, predicts that these areas also fall into the 36-200 year fire return interval.

Another tool that shows the predicted rate of fire spread is the Interagency Fuel Treatment Decision Support System (IFTDSS) modeling program (2). Below is a map with the predicted Rate of Spread for a fire in the Rain Tank Allotment area:

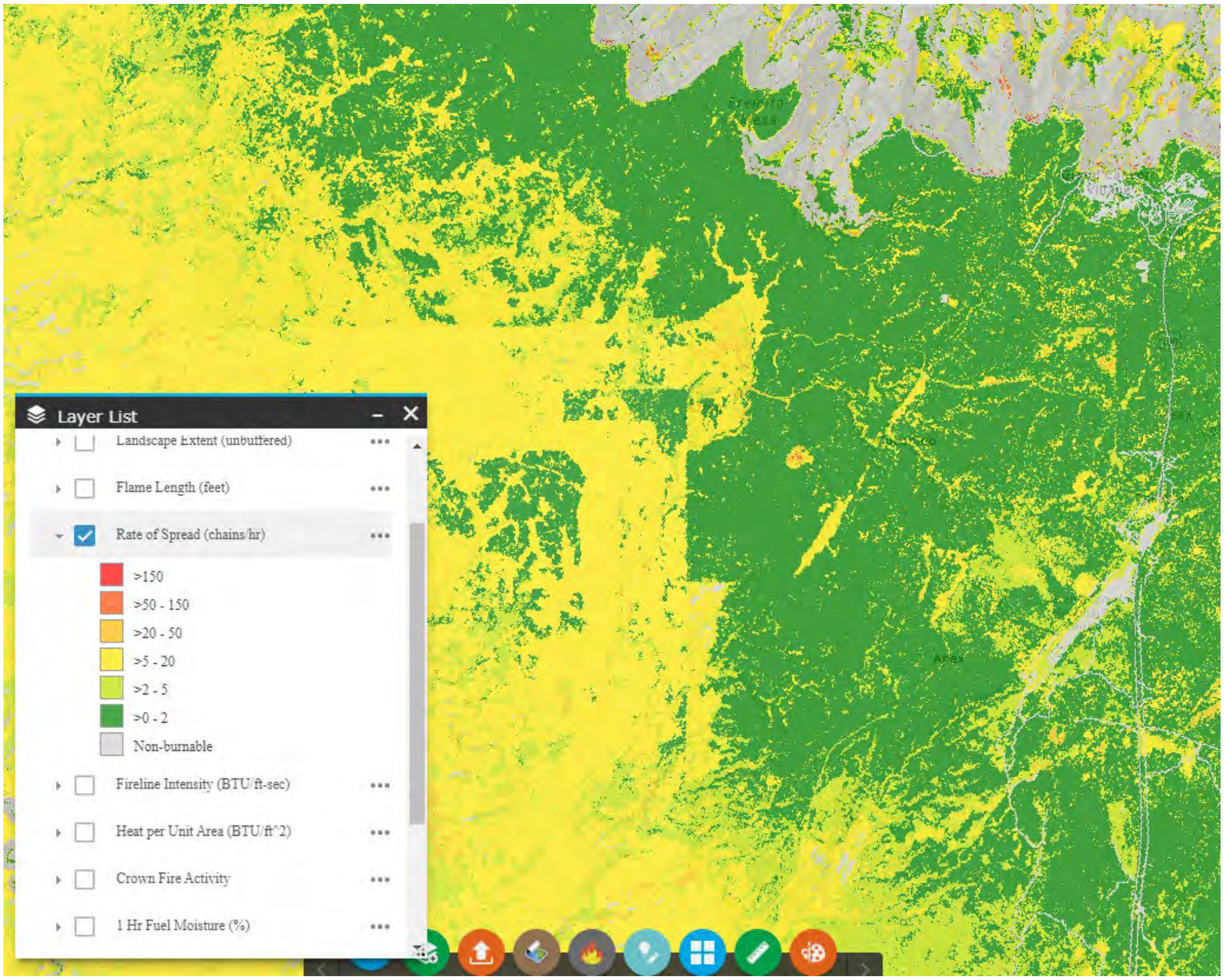

Figure 7. Predicted rates of fire spread in the project area

The green color above, which covers most of the Rain Tank Allotment, is estimating 0-2 chains/hour of fire spread, indicating that a fire that starts here either cannot spread under the average summer conditions that were entered into the model, or spreads slowly at a rate of under 2 chains/hour. Essentially this is showing that these areas do not have enough fine fuel to carry the fire at a rate of spread more than 2 chains/hour; instead the surface is bare soil or rock, or light grass that will not carry fire across the landscape. Some of the yellow areas are open grassy areas that would theoretically spread the fire at 5-20 chains/hour. Several treated areas in the Food Plot and the Curry Tank area are shown as yellow because the overstory has been removed by past Forest Service restoration projects, allowing more grass to grow. Other yellow areas on the east side of the map above, closer to Tusayan, are ponderosa pine areas with available pine fuel. Model inputs are in the project record.

Desired Conditions – Fire and Fuels

For the ponderosa pine areas, the Forest Plan (3) summarizes a desired condition where fires burn primarily on the forest floor and typically do not spread between tree groups as crown fire. Frequent low severity fires occur across the pine landscape with a return interval of 0-35 years, averaging 10 years.

For the pinyon juniper woodland areas, the Forest Plan states that 'Much of the pinyon-juniper vegetation communities are currently denser than they were historically because of changes in wildfire occurrence. Greater tree density has increased competition for water and nutrients. This, in turn, has caused a reduction in understory plant cover and diversity, a loss of ground cover, and subsequent increases in soil erosion." The desired conditions detailed in the Forest Plan, as they related to fire and disturbance, are that these pinyon juniper communities have the composition, structure, and function to be resilient to the frequency, extent, and severity of disturbance and climate variability. Fires here would be mixed to high severity and have return intervals of 35-200 years.

For the pinyon juniper grassland areas, the Forest Plan states "Impacts from grazing, logging, and fire suppression practices that started in the late 1800s are still discernible on the landscape today. These practices reduced or eliminated the vegetation necessary to carry low intensity surface fires across the landscape, thereby altering the natural fire regimes and allowing uncharacteristic forest succession to take place. Portions of grassland communities across the Kaibab NF have been encroached (i.e., invaded) by coniferous trees due to disruption of the historic fire regimes and historic grazing patterns." The desired conditions for these grassland areas, which make up a relatively small part of the Rain Tank Allotment, are that fires are typically low severity with a 0-35 year return interval.

For the sage and shrub communities, desired condition is that fires are mixed to high severity and have return intervals of 35-200 years.

Effects of the proposed Action - Fire and Fuels

In the ponderosa pine areas with more frequent fire, grazing will create a temporary reduction in fine grass fuel which may result in fires that are unable to spread across 100 percent of the landscape. Over the long run, ponderosa pine trees and other woody species may be favored and are likely to continue to encroach in these areas, reducing the overall amount of forage over time. Ideally in this fuel type, even with livestock grazing, some grass would remain to help fire spread between pine stands, and through the existing interspaces and meadows. Fire managers, when considering prescribed fire in the pine areas of the allotment, would need to coordinate with range managers to consider resting areas from grazing which would likely allow fire to spread across the entire area in a more efficient manner. Lacking grass as a fine fuel carrier, these areas can still be prescribe burned, but with a less efficient operation, and results that do not mimic natural fire.

In the pinyon juniper woodland areas, livestock grazing will not have a significant impact on fire because there is very little fine grass fuel that readily burns and/or readily spreads fire in most of this vegetation type. If tree densities continue to increase over time in these areas, high-intensity, stand-replacing fires will slowly increase in number and size. If moderate or high intensity fire moves through the woodland, changing the vegetation type from woodland to grassland, fire may be the best tool to maintain the newly established grassland areas. Fire managers, when considering prescribed fire in the newly established grassland areas of the allotment, would need to coordinate with range managers to consider resting areas from grazing which would likely allow fire to spread across the entire area in a more efficient manner.

In the sage/shrub and juniper grassland areas, grazing will temporarily decrease fine grass fuel and decrease the ability for fire to efficiently maintain the vegetation through natural processes. Fire managers, when considering prescribed fire in the grassland areas of the allotment, would need to coordinate with range managers to consider resting areas from grazing which would likely allow fire to spread across the entire area in a more efficient manner.

Cumulative Effects of the proposed action – Fire and Fuels

In the past, several vegetation management projects have occurred using chain saws and heavy equipment to remove pinyon pine, juniper, ponderosa pine, and sagebrush within the Rain Tank Allotment. Specifically, in the last 35 years, 2200 acres of the Topeka area was thinned as part of a fuel reduction and restoration project. 4200 acres of the Flying J project was thinned as part of a fuel reduction and restoration project. 700 acres of the Rain project was thinned, 2500 acres of the Curry project was also thinned, 1300 acres was thinned at the Rain Tank project, and 3000 acres was thinned in the XB project. These projects effectively reduced the number of woody species and allowed more grass to grow.

Several areas have also been treated in the last 35 years using prescribed fire. The intent of the broadcast and pile burning in these areas has been to reduce tree densities, reduce fuel loading, and increase grass cover. These areas include 2200 acres at Topeka, 4200 acres at Flying J, 3500 acres at Rain, 3500 acres at Curry, 1300 acres at Rain Tank, and 4000 acres at XB. This burning reduced fuels, killed woody species, and allowed more grass to grow.

The South Zone Grassland Restoration Project has not treated any areas within the Rain Tank Allotment to date. However, plans include possible future treatments within the Rain Tank Allotment, including the Food Plot Project, the Curry Project, and the Rain Tank Canyon project.

The Apex Burn Plan will include prescribed fire in the ponderosa pine areas in the east end of the Rain Tank Allotment over the next 10 years. This plan includes broadcast burning of 10,000 acres close to Tusayan, at the highest elevations of the Allotment.

Effects of the No Grazing Alternative – Fire and Fuels

The no grazing alternative would eliminate authorized grazing by horses and cattle. Grazing by unauthorized horses and cattle would continue, and grazing by wildlife, especially elk, would continue. In all vegetation types, as this relates to fire, this would leave more grass on the landscape, which could be expected to contribute to an increase in wildland fire. An increased amount of wildland fire spreading across the landscape would impact firefighters and people but would increase the ability for natural processes to remove accumulated fuel, create mortality in trees and other woody species, and maintain more open grassland and forest land over time.

Costs

Alternative A

Per the terms of the grazing permit, the grazing permittee would be responsible for operation, and maintenance of existing and future structural range improvements. While the permittee is responsible for a portion of the cost associated with new improvements there are existing federal programs, state agencies, and nonprofit organizations, cost-share programs, and farm bill programs that offer funding that can help offset costs.

Estimated costs for construction of proposed improvements based on 2024 USDA Natural Resource Conservation Service (NRCS) practice scenarios are as follows:

1. Pipeline (1.2 Miles)- $23,000
2. Watering facilities for pipeline (troughs and storage)- $18,000
3. Water Harvesting Catchments (two catchments)- $50,000 each
4. Fence (2.5 miles)- $38,000

No Grazing

Without a grazing permittee, the existing improvements would deteriorate, and the Forest Service or partner organizations would eventually incur the cost of removing or repairing all the non-functioning infrastructure. Estimated cost for fence removal and disposal per mile based on NRCS practice scenarios is $7,000 per mile. With 104 miles of existing fence (both boundary and interior) on the allotment, the cost to the agency could be upwards of $700,000.

Chapter 4: Agencies or Persons Consulted

The following agencies have been or will be consulted during preparation of this EA. A list of all persons consulted is available in the project record.
Arizona Game and Fish Department
Arizona State Historic Preservation Office
National Park Service – Grand Canyon National Park
Rocky Mountain Research Station
U.S. Fish and Wildlife Service

The Kaibab National Forest worked with USDA Rocky Mountain Research Station (RMRS), who, in partnership with private industry, developed several new monitoring services used for this analysis. The Rangeland Production Monitoring Service includes a retrospective dataset with the objective of mapping and quantifying annual forage production. This is used within the Service with a forage projection system that processes near real-time climate and remote sensing data to estimate the scale and timing of annual production. By partnering with the RMRS, the Forest has been able to gather datasets for the current conditions of Rain Tank to help guide development and analysis within this Environmental Assessment.

In February of 2024, the Kaibab National Forest communicated with the Arizona Ecological Services Office of the U.S. Fish and Wildlife Service about potentially affected species listed under the Endangered Species Act. The issue discussed was the appropriate level of survey for Fickeisen plains cactus to determine presence or absence of the species or suitable habitat in the project area. The Service agreed that survey methods would be best left to the discretion of Forest Service staff.

On November 5, 2024, the Kaibab National Forest initiated consultation under Section 106 of the National Historic Preservation Act of 1966, as, amended with the Arizona State Historic Preservation Office (SHPO). The Kaibab National Forest received concurrence from the SHPO on a finding of "No Adverse Effect to Historic Properties" on December 20, 2024, in adherence to the protection mitigation measures outlined in the Heritage Specialist Report titled "Cultural Resource Investigation for the Rain Tank Environmental Assessment (EA), Williams Ranger District, Kaibab National Forest, Coconino County, AZ USFS Project No. R2023030700049" (Rhone, 2024).

Tribal Consultation

The NHPA and the American Indian Religious Freedom Act, along with various other laws and regulations, require that agencies consult with culturally affiliated tribes to determine the effects of agency decisions and activities on sites and areas culturally significant to the tribes. The Tusayan Ranger District typically consults with the Kaibab Band of the Southern Paiute Indians, Hopi Tribe, Navajo Nation, and Pueblo of Zuni to identify and address issues and concerns.

On February 3, 2014 the Kaibab National Forest revised its Forest Management plan. Due to consultation with Indian Tribes and other stakeholders the Plan states, "The term permit for the Rain Tank grazing allotment should be first offered to the Havasupai Tribe if one becomes available." This allotment connects to the Havasupai Indian reservation on the west side and is ancestral Havasupai land.

On February 1, 2024, the Kaibab National Forest sent letters to the Havasupai, Hopi, Hualapai, Kaibab Paiute, Navajo, Pueblo of Zuni, and Yavapai Prescott requesting to consult on the proposal to reauthorize livestock grazing on the Rain Tank grazing allotment. Havasupai was formally invited to participate on the FS Interdisciplinary Team.

On March 4, 2024, the Kaibab NF hosted a consultation meeting with the Havasupai Tribal Council. The 7-month grazing period was discussed. The Council wondered if a longer grazing period would be easier for the Tribe to manage. On April 8, 2024, an email was sent to Havasupai Tribal Council from the Kaibab NF Tribal Liaison clarifying the proposed grazing period length. Prior to developing the proposed action, the Kaibab NF South Zone Range staff had several meetings with the manager of Rain Tank Cattle and a member of the Havasupai Tribal Council. These meetings informed the rangeland analysis and the currently proposed, analyzed action (Alternative A). The consensus decision was to maintain the current season of use (7 months), focus on rangeland infrastructure, and increase AUMs (animal numbers). On July 31, 2024, Councilman Manakaja confirmed via telephone and again in person on November 15, 2024 that the Tribal Council supports the analysis moving forward with the 7-month season of use proposed action.

On October 31, 2024 the Kaibab NF Forest Supervisor sent Tribes a consultation letter which included the cultural analysis and inventory findings conducted for the proposed renewal of the grazing permit and proposed actions. The report states there are no known historic properties within the anticipated area of ground disturbance and that an archaeological monitor shall be used during the construction of range improvements located within 50 ft. of known archaeological sites. On December 11, 2024 the Hualapai sent a letter to the Kaibab NF stating, “Upon review, we concur with the finding of no adverse effect on historic properties, given that a monitor will be present during construction within 50 ft of known archaeological sites.” No other concerns were heard from Tribes to date.

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Appendix A: Project Design Features by Resource

Table 22 includes design features and best management practices (BMPs) that would be required with the implementation of the proposed action. Table 23 includes example actions that could be employed as condition-based adaptive management strategies if degraded conditions are detected for watershed, streams or soils from monitoring results.

Table 22. Design Features and Best Management Practices

No.	Resource Protection Measure	Purpose
Range/Vegetation Management		
R1	No trees > 12" diameter at breast height will be cut to install proposed infrastructure such as fences and water catchments; slash will be managed using lop/scatter <18" height from ground.	To avoid impacts to large trees from the proposed structural improvements.
Fire and Fuels		
FF1	Coordinate with the South Zone Fuels program when fuel treatments are planned to occur near the communities of Tusayan and Grand Canyon Village.	To protect values at risk adjacent to and/or within the project area.
FF2	Coordinate pasture rest rotation with fire managers when Four-Forest Restoration Initiative (4FRI) or South Zone Grasslands project work overlaps with the Rain Tank allotment.	To aid in the selection of which vegetation management tools to use to achieve desired outcomes in specific project areas. To employ prescribed fire across the allotment when conditions are appropriate and when resources are available, this would include hand and aerial ignition while focusing on all fuel available to reduce tree encroachment and increase forage production.
FF3	Construct new infrastructure using fire-resistant materials where possible.	To avoid damage to the new infrastructure by wildland fire.
Botany and Noxious Weeds		
BNW1	Conduct at-risk plant species surveys prior to clearance for construction of improvements.	To reduce impacts to sensitive plant species.
BNW2	Wash equipment prior to entry onto NFS lands and consult best available invasive plant inventory when planning movement of equipment within NFS lands.	To avoid spreading noxious weeds.
BNW3	Exclude livestock from small portions of the project area as needed. Cattle may be excluded with new fencing, active herding, or through emerging technology such as virtual fencing.	To protect at-risk plant populations or to prevent the spread of invasive plants.
Cultural Resources		
CR1	Evaluate and manage proposed activities associated with the allotment improvements and grazing management practices in accordance with Appendix H Standard Consultation Protocol for Rangeland Management, under Amendment #1 of the First Amended Programmatic Agreement between the Arizona	To minimize impacts to known heritage resources.

No.	Resource Protection Measure	Purpose
	State Historic Preservation Officer [and other Region 3 SHPOs].	
CR2	All proposed range improvements shall avoid any new ground-disturbing work and staging within known historic properties. Livestock management practices that concentrate cattle shall be located so that areas where cattle are concentrated do not adversely affect known heritage resources.	To minimize impacts to known historic properties and heritage resources.
CR3	Archaeology monitors, along with the possibility of tribal monitors, shall be present and used during the construction of range infrastructure improvements located within or up to 50 feet from known archaeological sites.	To minimize impacts to known heritage resources.
CR4	If any adverse effects to sites are observed during the lifespan of this permit, a Kaibab NF archeologist will work with range staff to develop and implement sufficient mitigation measures pursuant to Appendix H of the Standard Consultation Protocol for Rangeland Management to avoid adverse effects to sites.	To mitigate impacts to heritage resources.
CR5	Any future projects or federal undertakings in the Rain Tank allotment, not analyzed under this EA, will be required to comply with Section 106 of the NHPA and will be contingent upon compliance with all applicable provisions of Section 106 of NHPA. The Kaibab NF Archaeologist will be notified at least three weeks in advance to ensure archaeological sites are identified, effects are mitigated, and the undertaking is in compliance with all applicable provisions of Section 106 of NHPA. If there are any changes in the proposed project planning process, consultation with the Kaibab NF Archaeologist will need to be reinitiated and the proposed changes may lead to additional Arizona SHPO and tribal consultation.	To minimize impacts to known heritage resources.
CR6	If previously unidentified cultural resources are located during the lifespan of the permit, in accordance with 36 CFR 800.13 of the Advisory Council on Historic Preservation's regulations, the permittee or their range staff shall stop all ground disturbing activities within 100 feet (30 m) of a potential archaeological discovery and 300 feet (90 m) if potential human remains are encountered and contact the Kaibab NF Archaeologist immediately to notify the Forest of the discovery and arrange for heritage staff to access the site and evaluate the resources identified.	To minimize impacts to known heritage resources.
CR7	Should any tribes identify any plants within the allotment as having traditional importance, Kaibab rangeland specialists and heritage staff will work together to identify where those plants occur within the allotment and incorporate a conservation strategy for those plants into the AOI.	To ensure that grazing management is allowing for natural regeneration of such plants

No.	Resource Protection Measure	Purpose
CR8	Kaibab NF archaeologists will continue to monitor sites within the Rain Tank allotment. If livestock are observed using these sites for shelter or impacting sites, the shelter and or area should be excluded from future livestock grazing, and or mitigations measures taken to avoid adversely affecting sites. The results of these informal monitoring activities will be discussed in the annual meetings with the SHPOs as provided for in Section XIII(D) of the Programmatic Agreement.	To understand livestock grazing effects on cultural resources and inform adaptive management.
Soils and Watershed		
SW1	Manage forage utilization by livestock to maintain healthy ecosystems. Seek to improve vegetative ground cover to enhance soil function (i.e., minimize soil erosion, promote water infiltration, and support nutrient cycling) and to improve the quality and quantity of desirable vegetation through use of the Allotment Management Plan and development of the Annual Operating Instructions.	To safeguard water and soil resources under sustained forage production and to achieve the objective of improving and maintaining long-term soil productivity and enhancing water quality
SW2	Several techniques are used to achieve proper distribution and lessen the impacts on sensitive or impaired areas or in areas that would naturally be overused. Examples of these techniques include: a. Constructing fences and grazing pastures only once in each season. b. Developing waters in areas that receive little use and closing off water developments when allowable use has been achieved. c. Riding and herding to shift livestock locations. d. Using salt or supplement feed as tools to gain proper distribution of livestock. e. During wet conditions, avoid intensive livestock grazing or concentrated use on soils that have low bearing strength and are susceptible to compaction. f. Developing sufficient watering places is one way to limit the amount of trailing.	To manage sustained forage production and forage utilization by livestock while protecting soil and water resources. To maintain healthy ecosystems for wildlife and avoid other resource concerns.
SW3	Manage livestock grazing at an intensity that will improve effective ground cover (effective ground cover is defined as the percentage of litter greater than 1.25 cm in size and % total plant basal area) to enhance soil function and to improve the quality and quantity of desirable vegetation. Target effective ground covers for each Terrestrial Ecosystem Survey (TES) Map Unit should be at a minimum equal to or greater than tolerable vegetative ground cover. Livestock grazing should be designed to move conditions toward these effective ground cover goals or maintain the current effective ground cover. During drought, livestock grazing should not decrease existing effective ground cover.	To achieve the objective of improving and/or maintaining long-term soil productivity and enhancing water quality.

No.	Resource Protection Measure	Purpose
SW4	Maintain existing range structural improvements. Install and maintain new range structural improvements as necessary. Structural range improvements such as corrals, troughs, trails, storage tanks, should not be located in hydrologically sensitive areas such as swales, drainages, and stream channels. If a structure is causing soil erosion or water quality degradation, the allotment management plan should identify corrective measures. During allotment improvement work, do not operate equipment when ground conditions are such that soil rutting, compaction or puddling can occur; to the extent possible, avoid biotic soil crusts and minimize stream crossings during cross-country travel to site locations.	To improve, maintain or restore range resources, including soil and water using rangeland improvements.
SW5	Avoid grazing soils in unsatisfactory soil condition. Where soil has been severely disturbed and vegetation needs to reestablish to minimize erosion, the appropriate measures shall be taken to establish adequate grass cover or other vegetation acceptable to the Forest Service and outlined in the allotment management plan. This measure is applied where it is expected that disturbed soils in parts of the area will require vegetative cover for stabilization and the problems would not be mitigated by other management plan provisions.	To improve long-term soil productivity. To establish a vegetative cover on disturbed sites to prevent accelerated erosion and sedimentation.
SW6	Where possible, conservative allowable use (no more than 30 percent utilization) should be implemented on impaired soils to protect long-term soil productivity. These soils have potential capability for grazing, but conservative allowable use should be implemented where possible. This could be achieved by salting away from or herding cattle from affected areas.	To improve long-term soil productivity.
SW7	Improve or decommission tank in Coconino Wash that is contributing to gully erosion within the stream course.	To effectively move towards desired resource conditions.

Table 23. Example Condition Based Strategies

Specific Desired Condition	If	Then	Follow Up
Stream channel morphology is stable in key stream reaches, with little to no evidence of downcutting, widening, or excessive sediment deposition. Sediment transport and deposition are within natural range of variability. Floodplain connectivity is maintained.	When streams are assessed, stream condition is degraded from initial condition along the length of a monitoring reach.	Move cattle away from critical area by salting, herding, and/or virtual fencing until further monitoring is conducted.	Schedule to monitor for stream condition trend within 2-3 years. After follow-up monitoring, determine if additional management action is needed to protect stream reach.
	Continued degraded stream condition on same reach with in-channel livestock watering development.	Identify new locations for improvements outside of channel (e.g., piping to a trough outside of the stream channel) or change rotation so pasture is in use during drier months.	Obtain appropriate site-specific clearances for new water locations outside of channel as needed.
	Continued degraded stream condition on same reach without in-channel livestock watering development.	Continue to move cattle away from area. Identify locations for exclosure fencing or consider reduced livestock numbers.	Obtain appropriate site-specific clearances for exclosure fencing as needed.
Aquatic management zones, or vegetative buffers, are intact adjacent to streams and effectively filter inputs of sediment and nutrients from upland.	Initial observations of new active areas of erosion and sediment transport within the AMZ that is hydrologically connected to stream.	Move cattle away from critical area by salting, herding, and/or virtual fencing until further monitoring is conducted.	Schedule to monitor for AMZ condition trend within 2-3 years.
	Continued observations of erosion and sediment transport within the AMZ. Rills and gullies develop within the AMZ and are hydrologically connected to the stream.	Identify locations for exclosure fencing or consider reduced livestock numbers.	Obtain appropriate site-specific clearances for exclosure fencing as needed.
Maintain or improve, as compared to local TES map unit, native plant functional group diversity and vegetative ground cover. Upland soil condition, as compared to local TES map unit, is maintained or improved.	When soils are assessed, a lower soil condition category indicates a reduction in soil quality. Reduction in soil quality may also be accompanied by impacts to soil redistribution, soil structure, soil organic matter, or biologic soil crust. Additional measures for impacts to those indicators are identified below.	Move cattle away from critical area by salting, herding, and/or virtual fencing until further monitoring is conducted.	Schedule to monitor for soil condition trend within 2-3 years. After follow-up monitoring, conclude if supplemental analysis is needed to adjust management.
	Follow-up monitoring indicates a continued reduction in soil quality.	Consider adjusting stocking numbers to reflect reduced capacity.	Continue follow-up monitoring until improvements are seen. Establish monitoring plots in adjacent areas of the same unit to determine how widespread degradation is as needed.

Appendix B: Activities Considered for Cumulative Effects

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

Table 24: Past, Present and Reasonably Foreseeable Actions

Activity	Description of Activity	Area Affected	Implementation Date
Recreational activities motorized and non-motorized	Dispersed camping, hunting camps, recreational driving, outfitter guides.	In its entirety	ongoing
South Zone Grassland Restoration Project	Implementation of grassland restoration treatments via mechanical treatments and potential seeding.	3,000 acres	2024-2026
Tusayan Community Trails Project	Implementation and construction of Grand Canyon History trail out of greenway Trail.	Northeast edge of allotment near HWY 64	2025
Recreation Events	Recreation events like the Tusayan ½ marathon occur on open roads in the area.	Primarily adjacent to community of Tusayan	ongoing
Fire Management (Including wildland fire)	Planned activity includes the Apex Prescribed Fire, which will be Broadcast Burning in the ponderosa pine	Northeast portion of the Rain Tank Allotment	5-10 years following this decision
Travel Management	Roads designated for public motorized use are displayed on the current Motor Vehicle Use Map (MVUM). No motorized travel is allowed in designated wilderness or beyond 30 ft from designated roads, except in pursuit of a lawful hunt. Use of existing roads not on the MVUM or cross-country motorized travel may be authorized via special use permit.	Roads are located throughout the Rain Tank Allotment.	Ongoing
Tusayan Wildlife Waters Project	The construction of wildlife waters and service lines across the landscape on the Tusayan Ranger District.	The Tusayan Ranger District	Ongoing

Appendix C: Comment Analysis

This appendix contains the substantive comments or questions received on the draft EA for the Rain Tank Allotment Grazing Reauthorization Project, and the Forest Service responses to these comments or questions. The designated 30-day notice and comment period for the draft EA was initiated with a legal notice published in the Arizona Daily Sun on May 15, 2025. During this comment period, the Kaibab NF received 7 comment letters.

Each comment letter was numbered; Table 25 provides a crosswalk between the comment letter number and the identity of the commenter. Table 26 lists these comments and designates a primary resource or specialty area affected by each comment. Comments within the letter were then given a tracking number. For example, comment 2-1 describes comment number one within comment letter number two. While this appendix provides the text of the substantive comments, the full comment letter provides additional background and may cite literature for context for the comments.

Table 25. Crosswalk between comment letter numbers, identity of commenters and project record descriptions.

Comment Letter Number	Commenter	Project Record Description
1	Cyndi Tuell, Western Watersheds Project	20250606xRainTankEAxCmtWWP
2	Jeff Burgess	20250609xRainTankEAxCmtBurgess
3	Rosa Palarino, Grand Canyon National Park	20250611xRainTankEAxEmailEmailAttchGCNP
4	Eric Gueissaz	20251613xRainTankEAxCmtLtrxEGueissazUSPS
5	Jenny Cobb, Yavapai-Prescott Broadband, Great Old Broads for Wilderness; Russell Pilcher and Gary Beverly, Sierra Club- Yavapai Group	20250613xRainTankEAxGOBWnSCxCmtLtr
6	Fabienne and Sabastian Swann	20250616xRainTankEAxCmtLtrSwann
7	Clarinda and John Vail, Bess Mabry and Chris Thurston	20250616xRainTankEAxCmtLtrxVailetal

Table 26. Comment Summaries and Responses from the KNF

Comment ID	Resource Area	Comment	KNF Response
1-01	Range	Because this allotment had been vacant for approximately 20 years until 2019, and then only partially grazed, we continue to believe this should be considered a new permit issuance and grazing authorization.	Thank you for your comment. The proposed action includes an analysis for a new permit issuance.
1-02	NEPA	Initially, the Forest Service framed this NEPA process as one that will determine whether or not to authorize grazing. However, that appears to have changed, and the range of alternatives does not reflect that as a real possibility. Indeed, it appears the No Action alternative is included only because it is legally required. We caution the Forest Service that this change in purpose and need is not supported in the record and is likely a violation of NEPA.	Thank you for your comment, as per the National Environmental Policy Act (NEPA) of 1969, as amended, Sec. 102 subsection (iii), NEPA requires, "a reasonable range of alternatives to the proposed agency action, including an analysis of any negative environmental impacts of not implementing the proposed agency action in the case of a no action alternative, that are technically and economically feasible and meet the purpose and need for the proposal" For this analysis, the no grazing alternative was the no action alternative, and the effects are analyzed and disclosed in Chapter 3. In addition, the scoping document from February of 2024 stated that the purpose of this analysis was to determine whether or not to reauthorize the term grazing permit, and if so, how to implement grazing in a manner that is consistent with the proper care of resources and other desired conditions for the potential natural vegetation types on the allotment. The difference between the purpose and need statements in the scoping documents from February of 2024 and the Draft Environmental Assessment from May of 2025 reflected issues brought forward during the scoping process and the revised purpose and need statement do not constitute a significant change in the analysis itself, or the NEPA process.
1-03	NEPA	After our review of the EA, we find the NEPA analysis significantly lacking. There is little information specific to this allotment in terms of how livestock have impacted, or how they will impact, these lands.	The effects analyses for both Alternative A and the No-Grazing alternatives are disclosed in Chapter 3, including an interdisciplinary analysis of the effects of livestock on several resources within the allotment, including the effects on vegetation, rare and endemic species of plants and animals, threatened and endangered species and their habitat, cultural resources, soils, hydrology, fire and fuels and recreation.
1-04	Range	We are also concerned that the proposed increase to up to 500 cows and 3,500 AUMs is based on a capacity analysis “inspired by Holecheck (1988)” “driven” by data from the Rangeland Analysis	The proposed increase is based off a carrying capacity analysis inspired by Holecheck (2010), driven by data from the Rangeland Analysis Platform and the Rocky Mountain Research Station’s Rangeland Production Monitoring Service

Comment ID	Resource Area	Comment	KNF Response
		Platform and Rangeland Production Monitoring Service. We are also concerned that utilization would be 30-40 percent, despite ongoing, long-term drought in the region. The current authorization is described as 200 cow-calf pairs for 7 months, or 1,970 AUMs. EA at 12. The increase is based on a capacity analysis that does not appear to have been determined by on-the ground information.	(RPMS). To prepare the proposed action for this analysis, the Kaibab NF utilized remote sensing data from RPMS to collect biomass available for livestock grazing and model forage supply across the allotment. The model considered three climate-based scenarios (drought year, average year, and high precipitation year) and incorporated a 40 percent utilization threshold. Additionally, grazeable acres were identified through a grazing distribution analysis that accounted for allotment water supply, locations, and topography. The calculated forage supply was then compared to forage demand to determine the total available Animal Unit Months (AUMs). The model indicated a capacity of 529 cow/calf pairs (equivalent to 3,500 AUMs) in an average year. This was rounded down to 500 cow/ calf pairs which serves as the upper limit for the proposed action, while the low end (200 pairs) was calculated for what the allotment could handle in a drought year, modelled from past climate data. The biomass data collected from RPMS was ground-truthed by field-collected production data using the NRCS's double sampling method collected in 17 key areas across the allotment. The Forest Service defines an (single) Animal Unit Month (AUM) as the amount of forage needed to sustain one animal unit for one month. An animal unit is a mature cow that weighs about 1,000 pounds, either with or without a calf up to six months old, or its equivalent. To summarize, the maximum permitted number (500 cow/ calf pairs) was selected as a conservative estimate based on the analysis for forage production in an average year with a 40% utilization threshold. This analysis does assume that all infrastructure in the proposed action is completed and maintained, and water is available, allowing cattle access to the areas defined in the grazing distribution analysis. The intent of the 200-500 animal range in the proposed action is to use annual data and forecasts to manage as follows: 1. Drought year- authorize 200 head of cow/ calf or animal unit equivalent (AUE), 2. Average year- authorize 350 head of cow/ calf or animal unit equivalent (AUE) 3. High production year- authorize 500 head of cow/ calf or animal unit equivalent (AUE) and disclosed in the Range Specialist Report.

Comment ID	Resource Area	Comment	KNF Response
1-05	NEPA	The section of this EA on environmental impacts is vague and the range of alternatives is insufficient.	The analysis included a range of alternatives including the proposed action (Alternative A) and the no grazing alternatives. Per the National Environmental Policy Act, there is no minimum number of alternatives required.
1-06	Range	We strongly encourage the Forest Service to pause, take a step back, and conduct a more thorough analysis that includes more site-specific information about impacts and on the-ground verification of current conditions.	Site specific information about impacts and on the-ground verification of current conditions exists is in the Range analysis folder of the project record.
1-07	Range	We ask the Forest Service to disclose whether the permittee has requested such a large increase in the number of cows graze, or whether this increase is based solely on the perceived “capacity” of the allotment.	The permittee requested an increase before the analysis was started- "An alternative was discussed during consultation with the Havasupai Tribe for a nine-month season of use and 700 AUM, which does not meet the purpose and need for this project and therefore was not analyzed in further detail" and disclosed in Chapter 2 of the EA. Proposed numbers are independently based on capacity analysis.
1-08	Range	As we stated in our prior comments, there are scientific concerns about the use of the Rangeland Analysis Platform (RAP). In an article in Greenwire in May of 2023, PEER, “a government watchdog group that has been critical of the Bureau of Land Management's oversight of livestock grazing says the bureau has renewed dozens of grazing permits based on satellite data that does not reflect actual conditions on the ground…PEER, says in the report released [May 4, 2023] that the satellite and other remote sensing data do not ‘distinguish well between native grasses and exotic plants, treating increased vegetative cover as a sign of landscape health when it may be just the opposite.’ What's more, the satellite imagery cannot ‘identify riparian damage caused by livestock versus weather induced erosion,’ according to the report, which argues that BLM personnel should visit each site and assess each allotment for compliance with land-based health standards.” Greenwire, Scott Streater, 2023. Plan to use remote sensing (EA at 17) cannot be relied upon without on-the-ground verification.	See response to comment 1-4

Comment ID	Resource Area	Comment	KNF Response
1-09	Range	The Forest Service should fully explain the level of field verification data that accompanies the satellite imagery data, if used, to describe current conditions on the ground. Our concerns about the use of the RAP were not addressed in the EA.	See response to comment 1-4.
1-10	Soils, Hydrology	The impacts of this infrastructure have not been fully analyzed and disclosed. We cannot find any information about the impacts of changed hydrology of the area due to the water catchments and water movement.	In-channel water developments directly affect natural flow regimes by retaining water and sediment at those locations, disclosed in Chapter 3 of the EA. However, new water catchments are proposed in upland areas; the impacts to the surface hydrology from these new developments will be minimal.
1-11	Range	The area around each of the troughs will become a sacrifice zone devoid of vegetation and wildlife because livestock will trample the area.	Thank you for your comment. The effect analysis does indicate that hoof action of cattle can cause direct impacts by compacting soils. Compaction decreases water infiltration, restricts rooting depth, and increases the hazard of water erosion (NRCS, 1996). Soil compaction is expected to occur around livestock waters, trails, and valley bottoms, where livestock tend to congregate for longer periods of time. The risk for compaction is greatest when soils are wet (NRCS, 1996). The Proposed Action is for a grazing season from April 1 to October 31; soils are expected to be the wettest outside of the grazing season. This will mitigate effects from grazing to soil structure.
1-12	Wildlife	The new fencing will have impacts to ungulate and bird species and this analysis has not been conducted, or at least not disclosed to the public.	New and repaired fences will be wildlife friendly, "New construction and reconstruction of fences should have a barbless bottom wire that is at least 18 inches high." (Forest Plan in Guidelines for Livestock Grazing). This will allow ungulates to pass under the fence, where applicable a pvc jump site can be placed at high use elk sites if needed. Birds will typically perch on allotment fences, but do not get caught like they could on wire mesh fencing.
1-13	Range	Livestock grazing fees are at historic lows, resulting in a significant loss of revenue, and at the same time the costs of monitoring livestock grazing allotments, including the installation and maintenance of infrastructure, place a significant burden on the public. However, these costs are not analyzed or disclosed. Please disclose the costs of the proposed livestock infrastructure and the sources of funding for these costs. Please also disclose the economic impact of authorizing this permit and new infrastructure in light of the maximum amount of fees that can be	Thank you for your comment. Grazing fees are outside the scope of the environmental analysis as the fee rates are controlled and issued annually by the National Agricultural Statistics Service outside of the control of the Forest Service (FSH 2209.13 81.2 Exhibit 01). Proportionate costs of installing proposed infrastructure would be the responsibility of the permittee. Monitoring aids in effective management of the allotment and for quality assurance; the work may be shared by the Forest and the permit holder.

Comment ID	Resource Area	Comment	KNF Response
		collected with this authorization, just $4,725 per year at the full 3,500 AUM authorization.	
1-14	Range, Soils, Hydrology, Botany	We ask the Forest Service to recognize, in its forthcoming analysis, that the grazing infrastructure designed to "aid in better distribution of cattle" will result in increased and more widespread impacts to the project area. The impacts of livestock use will be increased and more widespread as more grazing infrastructure is installed. These impacts should be disclosed.	The watershed analysis determined that there would be short term effects during the construction of the newly proposed infrastructure as well as localized, long term impacts around new water infrastructure, and is disclosed in Chapter 3 of the EA. It is anticipated that increased animal activity near the new water catchments would result in increased bare ground, compaction, and an accelerated potential for soil erosion that would be limited within these high-use areas. Proposed water developments would increase distribution opportunities for livestock, ultimately decreasing overall utilization across the allotment. If additional waters are installed in a given pasture, the livestock would utilize forage in areas near those other waters within that pasture, rather than concentrating around a single water source. Grazeable acres were identified through a grazing distribution analysis that accounted for allotment water supply, locations, and topography. The calculated forage supply was then compared to forage demand to determine the total available Animal Unit Months (AUMs).
1-15	Range	This analysis fails to account for the fact that most fencing removal projects are conducted with the help of volunteers and organizations that financially support that removal, which would result in a significantly lower cost for fencing removal.	Thank you for your comment, while volunteers are an option, costs listed in Chapter 3 of the EA are estimates from conducting market research. We cannot base an analysis on the possibility of donations of time or money from an uncertain source.
1-16	Range, Wildlife	the EA fails to acknowledge that in-tact, maintained fencing poses a significant entanglement risk to wildlife. If the Forest Service is genuinely concerned about the impacts of neglected fencing materials, why did the Forest Service allow the fencing to remain in a degraded condition for the better part of the last 20 years?	New construction and reconstruction of fences will be wildlife friendly and have a barbless bottom wire that is at least 18 inches high. The proposed action seeks to remove and repair old fences to alleviate wildlife entanglements.
1-17	Recreation	The use of virtual fencing may violate the Monument Proclamation and will change the character of the recreational experience in the Monument. There is no analysis of this impact.	Due to the smaller footprint associated with virtual fencing, it would not have a significant effect on either Scenic Integrity Objectives or the Recreational Opportunity Spectrum.
1-18	Range, NEPA	The Range of Alternatives is Inadequate: a voluntary grazing permit retirement alternative must be included To ensure an	Thank you for your comment. The no grazing alternative is analyzed in Chapter 3 of the EA. In addition, a temporary livestock grazing permit was offered to the

Comment ID	Resource Area	Comment	KNF Response
		appropriate range of alternatives for this project, and to avoid a NEPA violation, we recommended the Forest Service include a "no grazing" alternative that includes a provision allowing for voluntary grazing retirement followed by permanent closure of the allotments. We suggest the following: To protect important wildlife, hydrology, soil, upland, riparian, and stream resources on the Rain Tank allotment, permittees should be allowed to voluntarily retire their grazing leases, followed by the Forest Service closure of the grazing allotment. This can make permittees eligible for compensation from a third-party conservation group. With this compensation ranchers could create more secure and certain financial opportunities while protecting and enhancing the resource values the Forest Service is required protect. Voluntary retirement of the permit could result in a permanent retirement of domestic livestock use on the allotment allowed by that permit. This would benefit livestock ranchers, the publicly managed lands, and the environment.	Havasupai Tribe in 2019 under Public Law 93-620, Grand Canyon National Park Enlargement Act of 1975. Further, 36 CFR §222.2(c) directs that forage producing NFS lands will be managed for livestock grazing and the allotment management plans will be prepared consistent with the Land and Resources Management Plan (Forest Plan). Removal of lands suitable and available for livestock use must be compliant with the Forest Plan. Even if a grazing allotment is vacated, it will be retained as vacant, not closed. "Allotment closures are not to be carried out at the request of any third party," (FSH 2209.16, Chapter 10).
1-19	NEPA	The Forest Service should also include an alternative that provides for a 10-year closure for resource reasons and to provide for a mosaic of ecological process on the landscape, rather than allowing all allotments to be grazed. The lack of such an alternative of permit retirement provision is a violation of NEPA.	The no grazing alternative was analyzed and under that alternative the term grazing permit would be cancelled, reducing permitted AUMs to zero in the allotment for a period of no less than 10 years.
1-20	Range	The EA still indicates past grazing, since 2019, has been managed as a rotational grazing system, with each pasture only grazed once per season and 280 cow/calf pairs authorized. EA at 1-2. However, the AOIs for the past two years indicate a different use. The 2022 AOI says 300 yearlings were authorized for use from April 1 through October 31st and the grazing schedule used just three of the five pastures (Wheat, O'Connell, and Curry). This 2022 AOI also allows for a second use of pastures within the grazing season. The 2023 AOI allowed just 100 yearlings from April 15 through October 31st and authorized use of just two	The language on the original scoping was an error, the original NEPA decision authorizes a deferred rotation grazing strategy and does not prohibit re-entry into pastures. Generally, re-entry into a pasture is discouraged but it is not a requirement and language on re-entry is sourced from the Allotment Management Plan "AMP". Language was updated to "Current management on the allotment occurs using a deferred rotation grazing system. Generally, each pasture is grazed only once during the grazing season. " Upon issuance the permit was issued in 2019, many existing structural improvements had been deteriorated and are no longer functional due to the allotment being vacant. Due to this, variations in permitted numbers of head and livestock distribution

Comment ID	Resource Area	Comment	KNF Response
		pastures (Wheat and Curry), but also allowed for a second grazing of pastures during the grazing season. This means that instead of 62,967 acres used for livestock grazing, the use was concentrated in just 33,522 acres, approximately half of the acreage this analysis covers. Note that in 2023 the use was in just 24,299 acres, or less than 40 percent of the acreage covered in this analysis.	were able to be adjusted at the discretion of the Range Manager under the 1998* decision. Existing conditions included in the analysis for range condition. This analysis incorporates all 62,000 acres and resource conditions of all 5 pastures.
1-21	Range	Those acres that have not been grazed for two decades should be analyzed as if this is a new permit, not a permit renewal.	If Alternative A is selected, a new permit would be issued with new management conditions as analyzed in the EA.
1-22	Monument Resources	The Monument objects on those previously ungrazed pastures should be protected, not trampled by livestock. This is especially concerning because the EA states that the proposed action will result in damage and harm to native plants and a decreasing trend in native plant populations.	Thank you for your comment. The entire allotment was grazed in the past and was an existing valid use at the time of the Monument's designation. The areas where the proposed new improvements are planned have been surveyed for cultural resources and any resources there would be avoided. The range of potential effects to native plants is discussed in the Range and Botany effects analysis in Chapter 3 of the EA, which finds that responsible management choices under the proposed action are not expected to alter long-term trends in vegetation communities or endemic plant populations.
1-23	Soils, Hydrology	For the soils analysis, it is important to remember that this allotment was not grazed between 1998 and 2019, more than 20 years, and has only been grazed in some areas since 2019. The fact that only one monitoring site has a measured ground cover that is the same, or even close, to what is expected using the TEU reference ground cover, indicates this allotment is in a degraded condition.	Soil condition was assessed using USDA (2020a), Technical Guidance for Soil Quality Monitoring in the Southwestern Region (R3), which considers not only groundcover but also soil organic matter, functional group diversity, soil redistribution class, and surface soil structure. These five indicators inform a comprehensive soil condition rating that was used to determine soil condition compared to the TEU reference condition.
1-24	Invasive Weeds	The Forest Service fails to make the connection between livestock grazing, especially into areas that have been protected from grazing for decades, will increase the spread of invasive species, especially cheatgrass.	This issue is discussed in the Range effects analysis, including the potential for further spread of cheatgrass and its impact to fire regimes.
1-25	Soils, Hydrology	The expansion of grazing on this allotment is going to exacerbate watershed condition problems and will undo watershed restoration projects that have occurred in the allotment.	Watershed restoration work in the Coconino Wash Headwaters subwatershed focused on five essential projects: reintroducing fire to the landscape, forest thinning treatments, pile burning, controlling invasive weeds (cheatgrass and

Comment ID	Resource Area	Comment	KNF Response
			dalmatian toad flax), and resurfacing and closing forest roads. Grazing activity is unlikely to affect most of these treatments; effects to fire ecology and the spread of invasive plants are discussed in the relevant effects analysis sections.
1-26	Range	If grazing is authorized on this allotment, the Forest Service should install grazing exclosures in each pasture authorized for use to allow accurate monitoring of utilization.	Thank you for your comment, the use of grazing exclosures is an option that may be used as a part of utilization monitoring per the Guide to Rangeland Monitoring and Assessment with consideration of the Principles of Obtaining and Interpreting Utilization Data on Southwest Rangelands. Exclosures/cages could be used if determined to be necessary, however there are no existing exclosures currently in place on the Rain Tank Allotment.
1-27	Range	Livestock could have geolocators or GPS-trackers, which will allow for better understanding of where livestock actually graze in real time, and would facilitate the installation of virtual fencing which could help exclude livestock from areas with sensitive natural resources.	As a component of the proposed action, emerging technologies such as the use of virtual fencing may be implemented in order to meet resource management objectives. Virtual fencing technology is a system that enables livestock to be confined or moved without using fixed fences by relying on collars, sensors, GPS, and wireless technologies.
1-28	Range	The plan to collect monitoring data from transects “at least every 10 years” is woefully inadequate. The term of the entire permit is 10 years, by the time a trend is identified, this permit could be multiple decades old. Monitoring data should be collected annually.	The intent and purpose of effectiveness monitoring is to measure long-term trend and data associated with various attributes related to upland vegetation and implementation monitoring helps evaluate the uses, actions, and/or stressors that took place on the same benchmark sites and the surrounding areas. Effectiveness monitoring would occur every 5-10 years and implementation monitoring would continue on an annual basis and disclosed in Chapter 2 of the EA. Both effectiveness monitoring and implementation monitoring data will be used in annual range planning as well as permit-based decisions.
1-29	Range, Forest Plan	Instead of attempting to engineer the project area to suit livestock grazing, we strongly encourage the Forest Service to recognize and admit that livestock grazing is not sustainable in this area.	Per the analysis done at the time the Kaibab National Forest Land and Resource Management Plan, or forest plan, was revised in 2014, the entire allotment is suitable for grazing. The analysis assessed condition and trend monitoring data on all allotments, including Rain Tank, to ensure availability of forage for all species. While Terrestrial Condition Assessment data classified the allotment as experiencing moderate drought conditions and having poor climate exposure, grassland productivity remains high in the area where productivity data are available (81% of the allotment). In addition, periodic range condition monitoring that evaluates ground cover, canopy cover, species

Comment ID	Resource Area	Comment	KNF Response
			occurrence, species frequency, and relative species composition, shows that overall trends in vegetation condition are stable or improving at all monitoring clusters across the allotment.
1-30	Range, Line	Spending untold amounts of money to move water around thousands of acres of arid forested lands is a far less rational decision than significantly reducing the number of cows on the landscape or eliminating livestock grazing entirely – either from certain allotments, or on all allotments in the project area.	Annual authorized livestock numbers would vary within the proposed range based on existing conditions, available water and forage, and predicted forage production for the year and disclosed in Chapter 2. Under Adaptive management approach numbers may be reduced to the lower end of the proposed range in years with low water availability. New water facilities would provide permanent/semi-permanent water sources for both livestock and wildlife but will not contribute directly to increased numbers during drought years. See response to 6-16.
2-01	Range, Tribal Relations	As your EA explains, the grazing permittee for the Rain Tank grazing allotment is the Rain Tank Cattle Company, Inc., which belongs to the Havasupai Tribe... The allotment's recent annual operating instructions (AOI), however, were addressed to Dan Anthony... I assume this means Mr. Anthony is the ranch manager for the tribe.I mention this fact because it makes me wonder if the tribe's government is entirely familiar with the EA's proposed action, Alternative A, because it would facilitate increased cattle grazing on the allotment.	Thank you for your comment. Dan Anthony is a Tribal Employee/ Ranch Manager; the Havasupai Tribe was directly consulted with and disclosed in Chapter 4 of the EA.
2-02	Wildlife	As the EA explains, cattle would be able to consume up to 40% of the available forage across the entire allotment, which would inevitably mean less for the wildlife.	The Proposed Action would assist in keeping the current management standard, which is that at least 60 percent of forage would remain available for wildlife.
2-03	Range, NEPA	Table 3 on page 12 of the EA compares the proposed action to the allotment's current management. It shows that the allotment is currently permitted for 280 cow/calf pairs. It also implies that this would be for 12 months, because it indicates there's no official season of use. That would equate to about 3,360 of permitted animal unit months (AUMs). But permitted cattle numbers usually aren't real cattle numbers, and the EA lacks substantive information about the allotment's recent actual use. My review of the last five years of the allotment's annual operating instructions	Proposed permitted numbers would be 200 to 500 cow/calf pairs for a seven-month period (totaling 1,400 to 3,500 AUMs) (table 3). This is a change from the currently permitted 280 cow/calf pairs for a period of seven months (1970 AUMs). Pg 11-12. at an animal unit equivalent of 0.7, 400 yearlings can be ran as a substitution for 280 cow/calf). Upon issuance in 2019, many existing structural improvements had been deteriorated and are no longer functional due to the allotment being vacant. Due to this, lower numbers were initially authorized while the permittee worked on maintaining improvements (primarily stock tanks and fence lines) and bringing the allotment back to a fully operable

Comment ID	Resource Area	Comment	KNF Response
		(AOI) from 2020 through 2024 show the recent authorized use: AOI Authorization Season of Use AUMs 2020 350 yearlings April 7 – October 31 1,837 2021 200 cattle (cow/calf) April 1 – October 31 1,400 2022 300 yearlings April 1 – October 31 1,575 2023 100 yearlings April 15 – October 31 525 2024 300 yearlings April 1 – October 31 1,575 These AOIs show that the actual use has only averaged about 1,382 AUMs for the last five years. I presume that cattle numbers were reduced during this five-year period because of dry weather. But the drying trend will very likely persist and worsen. Your proposed action would authorize 1,400 to 3,500 AUMs, so your proposed lower limit would be about the same as the recent actual use, and the proposed upper limit is about the same as the existing permit. So, if the parameters aren't that different, why was the NEPA process engaged to produce this draft EA? The appropriate time to do it would have been before a new grazing permit was issued in 2019 after the allotment had been vacant for more than 10 years.	status. These numbers were based on management restrictions and not issued based on the capacity of the allotment. The proposed range in numbers was developed under the assumption that all infrastructure in the proposed action is completed, maintenance of existing infrastructure is completed, and water is available, allowing cattle access to the areas defined in the grazing distribution analysis and disclosed in the Range Specialist Report.
2-04	Range, NEPA	It's obvious that the primary objective of this EA is to complete the NEPA process for this allotment so that the permittee can access government subsidies to help build the ranching infrastructure needed to facilitate more cattle. According to the EA, that would include the construction of 1.2 miles of water pipeline, 2 new water catchments, two new water tanks, 4 new water troughs, and about 2.5 miles of new livestock fence. It's estimated on page 20 of the EA that the cost of these range "improvements" would be about $179,000. It's likely the taxpayers would have to pay for much of it through government subsidies, such as the USDA's Environmental Quality Incentives Program (EQIP)	FS policy requires that permittees make proportionate contributions towards the cost associated with cooperative rangeland improvements on NFS land. Contributions may be in the form of money, materials, and/or labor. (FS Manual 2245.21). The requirement that grazing permittees are to maintain all assigned rangeland improvements (as well as cost-share in the funding of new improvements) is one of the factors used in calculating the costs of grazing livestock on NFS land (FS Manual 2243).
2-05	Range	The EA compares this expense to the cost of a no grazing alternative. It estimates that the Forest Service might have to	Without a grazing permittee, the existing improvements would deteriorate, and the Forest Service or partner organizations would eventually incur the cost of

Comment ID	Resource Area	Comment	KNF Response
		spend $700,000 on perimeter fencing if there was no grazing permittee for the allotment. But that's obviously an exaggeration, as neighboring permittees and landowners have some responsibilities to maintain fences.	removing or repairing all the non-functioning infrastructure. Estimated cost for fence removal and disposal per mile based on NRCS practice scenarios is $7,000 per mile. With 104 miles of existing fence (both boundary and interior) on the allotment, the cost to the agency could be upwards of $700,000 and disclosed in Chapter 3 of the EA.
2-06	Range, NEPA	Moreover, this draft EA doesn't comply with NEPA because it lacks the legally required reasonable range of alternatives. The only grazing alternatives considered are your proposed alternative, and the current management alternative. But, as I pointed out above, the current management alternative is just a paper alternative, and it doesn't reflect the recent actual use of the allotment. The EA needs to also consider an alternative that reflects the current situation on the allotment, wherein the maximum permitted AUMs are close to the recent actual use.	See response to comment 1-2.
3-01	Range	To our point of concern for trespass livestock on NPS land, there isn't much detail as to who will be responsible for removing trespass livestock when they encroach on NPS land. Additionally, there isn't any language describing an approximate response time (i.e. urgency) and follow through from the permittee to promptly fix the problem causing the trespass to occur. Currently, the fences are in various states of disrepair along the boundary with Grand Canyon National Park and it would be helpful to understand what type of repairs are planned prior to placing cattle on the allotment.	Trespass livestock from the allotment would be the responsibility of the permittee to gather and remove any Forest Service permitted animals from the park. The Kaibab National Forest has partnered with the permittee to explore implementation of virtual fencing within the allotment to lessen stray incursions. The Grand Canyon National Park and the Kaibab National Forest will continue to have open dialogue concerning the physical fence boundary, but the Park should contact the Range Program Manager at the Supervisors office or the District Range Staff Officer at the Williams District office when incursions do occur.
4-01	Range	The new proposal for the authorization of 10 years and the number increase of up to 500 head seems a bit over the top.	10-year permits are standard issuance per Forest Service Handbook 2209.13 section 15.42. Proposed stocking levels are a range between would be 200 to 500 cow/calf pairs and annual authorized livestock numbers would vary within the proposed range based on existing conditions, available water and forage, and predicted forage production for the year. The maximum permitted number (500 cow/ calf pairs) was selected as a conservative estimate based on the analysis for forage production in an average year with a 40% utilization threshold. This analysis does assume that all infrastructure in the proposed action is completed and maintained, and water is available, allowing cattle

Comment ID	Resource Area	Comment	KNF Response
			access to the areas defined in the grazing distribution analysis. The intent of the 200-500 animal range in the proposed action is to use annual data and forecasts to manage as follows: 1. Drought year- authorize 200 head of cow/calf or animal unit equivalent (AUE)), 2 Average year- authorize 350 head of cow/ calf or animal unit equivalent (AUE) 3. High production year- authorize 500 head of cow/ calf or animal unit equivalent (AUE) and disclosed in the Range Specialist Report.
4-02	Range	As you know and we all aware of the conditions of this desert environment, Grazing of Cattle or Horses require lot more than sunshine! About 20 to 25 acres per head for grazing, not counting water needs. Forage quality and quantity. O'Connel Pasture and Rain Tank Pasture rocky ridges and draws, more trees than grasses (table 5) rangeland condition for Rain Tank Pasture Poor!!! Bright Angel Wash and Rain Tank Watershed functioning at risk! Water quality and quantity poor!! (Table 10)	Topography, vegetation types, water, and forage capacity were all accounted for in the production analysis. See Range specialist report and/or existing conditions. Proposed AUM range equates to 125-325 acres per animal.
4-03	Range	Water catchment x 2. Wheat Pasture and Rain Tank Pasture. 5 Acres for each, not very efficient! Rain tank proposal of FSR 328 will simply put alter the landscape. This area was called White Well Tank, it has recovered very well for the past 25 years and we are proposing to trash it! I am opposed to it!	The 5-acre footprint refers to total area accessed by equipment during construction phase; each catchment would have cleared access area of 2.5 acres. Actual catchment sizing will be much smaller and determined by calculating rainfall supply to water demands by livestock and wildlife. Sites were chosen for access, topography, soils, and vegetation.
4-04	Range, Transportatio n	Water transport to maintain 500 heads. To this date, on the O'Connel Pasture, daily, are 4 to 5 tanker trucks traveling on FSR 328, servicing some cattle. The impact of 500 heads seems to indicate a constant flow of trucks.	Proposed stocking levels are a range between would be 200 to 500 cow/calf pairs and annual authorized livestock numbers would vary within the proposed range based on existing conditions, available water and forage, and predicted forage production for the year. Upper limits (500 head) will only be authorized when there is adequate water on the landscape. Proposed water improvements (catchments and pipeline) are intended to add permanent water in pastures that have had a historic lack of available surface water. Once installed the need to haul water for consumption by livestock would be significantly reduced.
4-05	Range	500 heads = 2,000 hoofs traveling on a desert landscape; the initial numbers was set at 200, why the change?	Proposed stocking levels are a range between would be 200 to 500 cow/calf pairs and annual authorized livestock numbers would vary within the proposed range based on existing conditions, available water and forage, and predicted forage production for the year. The intent is to provide flexibility in management

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			wherein annual authorized numbers will be decided based on what the range can handle, as well as the addition of new range improvements. The current permit is set for 280 head of cow calf pairs or animal unit equivalent, the lower range (200 head of cow calf) will be a reduction of current numbers that would be applied in drought years.
4-06	Range	No mention of water source!	"This pipeline would be supplied from an existing water source off NFS lands and would be buried where possible" and disclosed in Chapter 2 of the EA. Water source for pipeline will come from and off forest surface water source, permittee is responsible for sourcing surface water (Rain Tank) under an agreement with water right holder or by hauling water to a storage on forest land in order to supply the line. The catchments will capture and store rainfall for se by livestock and wildlife.
4-07	Transportation	No mention of road maintenance!	The permittee holds road maintenance permits for the roads used to support the allotment, in addition, the FSR 328 is currently included in the annual road maintenance plan for the Tusayan Ranger District.
4-08	Range	Fence within all of the pasture are at best poor, so are the cattle guard, and this includes the NPS fences. Also the only water pipeline is the one from Rain Tank to Ranger Tank.	The maintenance of existing improvements would continue as needed. The responsibility for maintenance of range improvements is assigned to the permittee in the terms and conditions of each grazing permit (FSM 2244.03). Based on this, fence maintenance is ultimately the responsibility of the permittee. Progress has been made repairing fencing on the allotment but due to cost prohibitiveness of rebuilding all fence on the allotment, technologies such as virtual fencing are being explored as an option to replace physical fencing. On an annual basis, specific responsibilities for repair and maintenance of existing improvements (such as fence lines) would be identified in the annual operating instructions.
4-09	Recreation, Visual Quality	Line 63.64 Visual Quality?	Visual quality is addressed in the effects analysis in Chapter 3 of the EA.
4-10	NEPA	It seems to me and because no alternative is giving, little room is available to make a good decision to this subject.	The alternatives analyzed in the EA are described in Chapter 2 and include the proposed action (Alternative A) and the no grazing alternatives.

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4-11	Tribal Relations	The Monument has been set aside so that Native Peoples can thrive in some of the old ways, gathering plants, herbs, wild tobacco, Pine nuts and solitudes. This proposal seems to me to reflect the opposite effects desired for the Native ways of a Monument!	The Kaibab recognizes that the Monument, including the Rain Tank Grazing Allotment, is within the traditional territory of the Havasupai Tribe. The Tribe has been working diligently with the Kaibab for years to secure this grazing permit which is adjacent to their reservation boundary. Ensuring tribes regain access to lands they were previously dispossessed from meets the intent of the proclamation. The Monument proclamation specifically mentions livestock grazing as an existing allowable use. " Nothing in this proclamation shall be deemed to prohibit grazing pursuant to existing leases or permits within the monument, or the renewal or assignment of such leases or permits, which the BLM and Forest Service shall continue to manage pursuant to their respective laws, regulations, and policies." -A Proclamation on Establishment of the Baaj Nwaavjo I'tah Kukveni-Ancestral Footprints of the Grand Canyon National Monument
5-01	Range	We believe that livestock grazing on public lands degrades landscapes and causes deforestation.	The impact of grazing on public lands is analyzed in the Range section of the EA.
5-02	Botany	We believe that livestock grazing on public lands threatens native species	Thank you for your comment. The draft EA and supporting specialist reports discuss the effects of the proposed livestock grazing under Alternative A to Range resources, including potential effects to native species within the allotment in Chapter 3. Cumulative effects of the proposed livestock grazing with wildlife use are evaluated and a mitigation measure has been developed to ensure that forage and waters would remain available to for wildlife. "Livestock will be moved when a 40 percent utilization threshold has been reached in a given pasture. Monitor spread of invasive plants to inform noxious weeds management." Further, the range of potential effects to native plants is and disclosed in Chapter 3 of the EA, which finds that responsible management choices under the proposed action are not expected to alter long-term trends in vegetation communities or endemic plant populations.
5-03	Watershed	We believe that livestock grazing on public lands degrades water quality and quantity.	Managed livestock grazing can directly affect water quality when sediment and nutrient delivery to streams is increased due to impacts to uplands and streams. Project Design Features include Resource Protection Measures for Soil and Watershed to avoid these impacts. Additionally, Adaptive Management

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			Strategies include measures to mitigate impacts that may lead to increased sediment and nutrient delivery to streams.
5-04	Soils, Hydrology	We believe that livestock grazing on public lands destroys riparian habitat and tramples banks and springs.	No riparian habitat or springs exist within the allotment. Potential impacts to ephemeral drainages are discussed in the watershed effects analysis. Active Management Strategies on discuss actions that would be taken if stream channel morphology, such as bank stability, is affected.
5-05	Emissions	We believe that livestock grazing on public lands is the leading source of greenhouse gas emissions.	Emissions from cattle and the equipment and vehicles associated with their management were analyzed and the average annual emissions under the proposed action, assuming the maximum number of cattle would be authorized to graze each year, would decrease by 4.5% compared to the current management. Average annual emissions from the proposed action would be offset by the carbon uptake of 518 acres of average U.S. Forest in one year. Estimated annual emissions from cattle, vehicles, and equipment under the maximum potential annual emissions scenario would represent 0.006% of the total greenhouse gas emissions from the agricultural sector in the state of Arizona in 2021 and 0.0004% of all greenhouse gas emissions in Arizona in 2021 (AZ Governor's Office of Resiliency 2024). The expected decreases in emissions are the result of an expected decrease in the number of trips to haul water compared to the current management situation. Extension and repair of water pipelines and installation of water catchments on the allotment are expected to increase water availability on the allotment and therefore decrease the number of trips needed to haul water to the allotment. In addition, if virtual fencing were to be implemented, it would lead to an expected decrease in emissions from vehicles due to a reduced need for cattle management personnel to commute as often to and from the allotment. If virtual fencing were in place across the entire allotment, it would decrease miles of commuting by an estimated 1,632 miles per year, resulting in an expected decrease of 0.8 metric tons of CO_2 equivalent per year when compared to retaining traditional physical fencing.
5-06	Invasive Weeds	We believe that livestock grazing on public lands spreads invasive weeds.	This issue, and mitigations to reduce the spread of invasive plants built into the project, are discussed in the range effects analysis.

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5-07	Fire	We believe that livestock grazing on public lands skews natural fire regime.	Thank you for your comment. Effects of the proposed action and the no grazing alternatives to fire regimes in the project area are addressed in the Fire and Fuels section of Chapter 3 and also in the Fire and Fuels specialist report.
5-08	Soils	We believe that livestock grazing on public lands accelerates soil erosion, damaging riparian and upland ecosystems and forests.	Under the Proposed Action, direct effects to soil disturbance and resulting increased soil redistribution (erosion and sedimentation) from livestock grazing likely would occur. Given the generally low slopes across the allotment and limited utilization of 30-40 percent that would maintain vegetative ground cover, these effects are likely to be minimal. The largest expected instances of soil disturbance from grazing would be around water developments. However, these areas are fairly small compared to the overall allotment.
5-09	Soils	We believe that livestock grazing on public lands destroys biological soil.	Grazing authorization under the Proposed Action would likely have long-term effects to the extent of biological soil crusts within the allotment. These impacts are expected to be greatest around water developments. However, biological crusts on soils with high clay content are less susceptible to disturbance when crusts are dry. Under the Proposed Action, stocking would take place between April 1 and October 31, generally outside of the winter and early spring, when the wettest soil conditions are expected; stocking when crusts are dry and less susceptible to disturbance should mitigate impacts to biological soil crusts within the allotment. In addition, ground cover from biological soil crust is recorded in Table 19 of the EA.
5-10	Wildlife	We believe that livestock grazing on public lands leads to the killing of wildlife such as wolves, prairie dogs, grasshoppers, and beavers in favor of cows.	This mission of the Forest Service includes providing for wildlife species, grazing, and many other uses. The Proposed Action is to better distribute livestock across the project area while reducing harmful effects and increasing forage for livestock and wildlife on the allotment. Potential effects to wolves, prairie dogs, grasshoppers, and beavers are outside the scope of this analysis because there are no wolves or beavers known to be present on the allotment; in addition, there is no indication that the proposed action in combination with project design features would impact prairie dog populations or grasshoppers.
5-11	Range, Wildlife	We believe that livestock grazing on public lands forage consumed by domestic livestock is not available for native wildlife.	See response to comment 5-10. The Proposed Action is proposed to better distribute livestock across the project area while reducing harmful effects and increasing forage for livestock and wildlife on the allotment.

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5-12	Recreation	We believe that livestock grazing on public lands detracts from the wilderness experience of camping, hiking, picicking, swimming, wildlife viewing, and other uses.	The Forest Services manages multiple uses, including livestock grazing. There are no Congressionally designated Wilderness Areas within the project area, nor are there designated swimming areas.
5-13	Soils, Climate	We believe that livestock grazing on public lands accelerates climate change. Loss of vegetation combined with increased bare soil has led to loss in carbon and nitrogen storage leading to a rise in temperatures which threaten the ecosystems over the longer term.	Under the proposed action, utilization would be limited to 30-40 %, this threshold would allow enough litter and ground cover to remain on the forest floor to mitigate loss of ground cover and reduced soil nutrient cycling, including carbon and nitrogen cycling and disclosed in Chapter 3 of the EA. In addition, Active Management Strategies of the EA discuss situations in which vegetative ground cover is reduced.
5-14	Range	How would increasing the number of AUMS to as many as 3,500 allow for "increased flexibility for livestock management on the allotment in a manner that provides for resource protection."	Proposed stocking levels are a range between would be 200 to 500 cow/calf pairs and annual authorized livestock numbers would vary within the proposed range based on existing conditions, available water and forage, and forage production for the year. From the Rain Tank assessment 40 years of data were used to derive three scenarios (drought year, average year, and high precipitation year) and incorporated a 40 percent forage utilization threshold. Additionally, grazeable acres were identified through a grazing distribution analysis that accounted for allotment water supply locations, and topography. Finally, provisions for the use of shrubs was also considered. The calculated forage supply was then compared to forage demand to determine the total available AUMs. The model indicated a capacity of 500 cow/calf pairs (equivalent to 3,500 AUMs) in an average year, which serves as the upper limit for the proposed action. The management intent of the 200-500 animal range in the proposed action is use annual data and forecasts to manage as follows: 1. Drought year- authorize 200 head of cow/ calf or animal unit equivalent (AUE), 2. Average year- authorize 350 head of cow/ calf or animal unit equivalent (AUE) 3. High production year- authorize 500 head of cow/ calf or animal unit equivalent (AUE) and disclosed in the Range Specialist Report.
5-15	Economics	Is there a significant economic benefit to the American taxpayer by increasing the number of cows?	Grazing fees are outside the scope of the environmental analysis as the fee rates are controlled and issued annually by the National Agricultural Statistics Service outside of the control of the Forest Service (FSH 2209.13 81.2 Exhibit 01). However, the purpose of changing the number of permitted livestock from a fixed number to a range is to address resource conditions based on variability in

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			precipitation and other climatic factors. Permitted numbers are the upper limit of livestock that may graze on an allotment. Annual authorized numbers often fluctuate and may be below permitted numbers for various reasons. Commonly it is to respond to reduced forage production in certain years due to drought.
5-16	Range	You state: "Change from the currently permitted 1,970 AUMs to a range in permitted AUMs to add flexibility on an annual basis based on resource conditions, such as precipitation, vegetative growth and other rangeland condition indicators determined by monitoring." Obviously, you are increasing grazing numbers because you believe there are resources to support the increase in cows. On June 7, 2025, Broads drove the roads through the Rain Tank pastures and found minimum amounts of grass.	Proposed stocking levels are a range between would be 200 to 500 cow/calf pairs and annual authorized livestock numbers would vary within the proposed range based on existing conditions, available water and forage, and forage production for the year. This range was decided on using biomass data collected from the rangeland production monitoring service (RPMS) that was ground-truthed by field-collected production data. A 40-year dataset was analyzed using RPMS data to derive three scenarios (drought year, average year, and high precipitation year) and incorporated a 40 percent forage utilization threshold. Additionally, grazeable acres were identified through a grazing distribution analysis that accounted for allotment water supply locations, and topography. Finally, provisions for the use of shrubs were also considered. The calculated forage supply was then compared to forage demand to determine the total available AUMs. The model indicated a capacity of 500 cow/calf pairs (equivalent to 3,500 AUMs) in an average year, which serves as the upper limit for the proposed action. The biomass data collected from RPMS was ground-truthed by production data collected from 17 Key areas across the allotment. The EA and supporting reports provide analysis, rationale, adaptive management, and monitoring standards will be used to make decisions on grazing management in the project area. Drought conditions are represented in the lower range of the proposed action (i.e. the lower range of 200 cow calf pairs). As a part of implementation monitoring and adaptive management, annual forage production is collected throughout the year across key areas on the allotment year and is used to influence decisions on what numbers to authorize on an annual basis (Data available upon request). Under the proposed action numbers will be authorized at the appropriate level in the proposed range (200-500 cow/calf pairs), the max range will only be authorized on high precipitation and forage production years.

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5-17	Range	For you to achieve your objectives, the number of AUMs must be reduced, not increased. We suggest removing as many cows from our wildlands as possible and onto private land where it is available to avoid this environmental damage.	The Rain Tank Allotment has been deemed suitable for grazing based on the KNF forest plan, is an existing use specifically included and allowed for in the Monument declaration, and the use of the Rain Tank Allotment by the Havasupai Tribe is provided for by the Grand Canyon National Park Enlargement Act. The flexibility provided for in the proposed range of AUM's allows for management flexibility to match authorized AUM's to annual resource conditions.
5-18	Range, Economics	The American taxpayers are paying for the devastation of the environment with grazing subsidies and the addition of water diversions and buildings.	Thank you for your comment; however, grazing subsidies are outside of the scope of this analysis. Federal, State, nonprofit, and private programs may help provide funding for range improvements but there usage is entirely optional.
5-19	Range, Economics, Forest Plan	The Forest Plan (USDA Forest Service 2014) provides a framework to promote ecological integrity and guide management on the Kaibab NF so that it is environmentally sustainable. Unless there is benefit to the land itself, increasing the number of cows only benefits the permittee. Or, we would not like to imagine, increasing beef production over the protection of the land itself. Beef can be raised on private land. Instead of grazing on private land, ranchers here in the southwest graze our public lands at the expense of the land and subsidized by taxpayers.	The forest plan includes the following desired conditions (p. 68) for livestock grazing that address the need to provide opportunities for livestock grazing while managing grazing sustainably: -There are opportunities to engage in ranching activities and graze livestock on NFS lands. These activities contribute to the stability and social, economic, and cultural aspects of rural communities. -Grasses and forbs provide adequate forage for permitted livestock. -Livestock use is consistent with other desired conditions. -Allotment fencing allows for passage of animals susceptible to movement restrictions such as pronghorn. The plan also includes this guideline: -The term permit for the Rain Tank grazing allotment should be first offered to the Havasupai Tribe if one becomes available. The prospective permittee, the Rain Tank Cattle Company, is an entity of the Havasupai Tribe. Additional information about how the forest manages grazing for sustainability and in balance with desired conditions for other resources, can be found in the Forest Plan.
5-20	Range	However, we believe that cattle grazing is detrimental to the forest for the reasons we state above, and that increasing the number of cows does not allow for sustainability, but the opposite by increasing these hazards	See response to comment 5-20. The Rain Tank allotment has been deemed suitable for grazing based on the KNF forest plan, Monument declaration, and Grand Canyon National Park Enlargement Act.

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5-21	Range	We agree that that the current status of grazing continue, but Instead of increasing the number of cows, we ask that you concentrate your efforts on at least maintaining, but hopefully taking action to improving the condition of the grazing pastures.	The intent of the range of AUMs in the proposed action is to allow for management flexibility to match AUM's to resource conditions. The maximum permitted number (500 cow/ calf pairs) was selected as a conservative estimate based on the analysis for forage production in an average year with a 40% utilization threshold. This analysis does assume that all infrastructure in the proposed action is completed and maintained, and water is available, allowing cattle access to the areas defined in the grazing distribution analysis. The intent of the 200-500 animal range in the proposed action is use annual data and forecasts to manage as follows: 1. Drought year- authorize 200 head of cow/ calf or animal unit equivalent (AUE), 2. Average year- authorize 350 head of cow/ calf or animal unit equivalent (AUE), 3. High production year- authorize 500 head of cow/ calf or animal unit equivalent (AUE) (specialist report). When resource conditions require it, annual authorized numbers may be lower than currently permitted numbers, i.e. authorizing 200 head as opposed to the current 280.
5-22	Range	Only repairing and even making structural range improvements when absolutely necessary to maintain the status quo with the current number of AUMs	See response to comment 5-21.
5-23	Range	We ask you to work towards an end goal of retiring grazing permits on public lands before irreputable damage occurs.	The Rain Tank allotment has been deemed suitable for grazing based on the Forest Plan, the Baaj Nwaavjo I'tah Kukveni- Ancestral Footprints of the Grand Canyon National Monument Proclamation, and Grand Canyon National Park Enlargement Act.
6-01	Range, NEPA	Based on the scope and scale of what is being proposed, we believe this is not a simple re-authorization, but rather a new allocation.	The proposed action includes authorizing a new term grazing permit under the conditions described in Chapter 2 of the environmental analysis.
6-02	Range, NEPA	The significant additions, such as expanded herd numbers, increased reliance on hauled water, and the need for major infrastructure upgrades represent a substantial departure from the original permit and require a full review under new terms.	Thank you for your comment, see response to comment 6-1.
6-03	Range	Specifically, we are concerned about the proposed increase in permitted cow/calf pairs from 280 to as many as 500, and the	See response to comments 6-19 and 6-20.

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		corresponding need to transport large volumes of water to sustain this expanded herd.	
6-04	Range	We do not support the re-authorization as currently presented, and we believe additional information and analysis are required. It is not possible to fairly evaluate or support the proposal without first reviewing the original permit terms, which have not been made available.	Thank you for your comment, previously issued annual operating instructions and permits are available upon request under the Freedom of Information Act.
6-05	Emissions, Safety, Traffic, Road Degradation	The project documentation states that livestock on the Rain Tank Allotment rely heavily on supplemental water sources. Currently, all water is trucked in from Valle, 30 miles away, via Highway 64 and Forest Service Road 328, a process that comes with significant environmental costs, including increased traffic, emissions, and road degradation. If cattle numbers are increased, so too will the demand for water. This will lead to more frequent and larger-scale water hauling, amplifying these environmental impacts.	Thank you for your comment; see response to 5-5 regarding emissions. The purpose of the proposed improvements is to reduce reliance on hauled water. Water availability is a determining factor when issuing authorized livestock numbers for any given year. Lastly, National Forest System (NFSR) Road 328 is an open public road, used for a number of reasons by many user groups including recreation, permittees, private landowners, Tribal members and so on. Hauling of water incidental to livestock grazing on the allotment does not require a permit from the Forest Service or any further regulation as the ranching operation is considered to be of public service (Forest Service Handbook 7709.59, chapter 30).
6-06	Range	While the document mentions plans for two water catchments and improvements to an existing water line, it does not provide a clear timeline for when these will be built. In the meantime, trucking remains the only available method for water delivery. Additionally, the document does not specify the source of the water that would supply the new water line, leaving key questions about feasibility and sustainability unanswered.	Implementation of the proposed structural improvements are anticipated to occur within two years of the issuance of a decision. The proposed structural improvements would reduce reliance on hauled water to the allotment. The pipeline would be supplied from a water storage tank that will be installed on the Forest that can be supplied by two sources; rain tank, or by hauling water to the storage. Since Rain Tank is not on Forest lands it is the responsibility of the permittee to obtain a formal agreement from ADOT for the use of the water.
6-07	Range	We urge the Forest Service to provide clear timelines, identify water sources, and assess the environmental tradeoffs before approving any increase in livestock numbers.	Thank you for your comment. Environmental effects of the proposed action and alternative are analyzed and disclosed in chapter 3 of the EA. Proposed structural range improvements, including the water pipeline repair, new water catchments, fence lines and virtual fencing, are expected to be implemented within the first two years following a final decision. Properly functioning water catchments would be fed by rainfall and surface runoff. The source of any hauled water cannot be controlled or determined by the Forest Service and is therefore outside of the scope of this analysis and the new pipeline. The

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			pipeline can be supplied by two sources: Rain tank (the stock tank south of the Tusayan airport), or by hauling water to a storage tank at the start of the pipeline on NFS land. Since Rain Tank stock tank is not on NFS lands it is the responsibility of the permittee to obtain a formal agreement from ADOT for the use of the water. Lastly, grazing numbers are determined on an annual basis in direct response to on the ground conditions, including available water.
6-08	Road Degradation, Soils	These issues raise a number of environmental and logistical concerns that must be addressed before any increase in cattle numbers is approved: • Road Degradation: Increased heavy truck traffic will place significant strain on forest roads, particularly in remote and ecologically sensitive areas. Repeated water hauling can lead to dust, erosion, rutting, and washouts—damaging both the roads and the surrounding habitat.	The purpose of the additional water catchments is to decrease reliance on hauled water. The number of permitted animal units would be determined in the Annual Operating Instructions based on resource conditions such as available forage and precipitation. Further, installation of proposed improvements would take place when roads are dry such that rutting or damage to the roads would be minimized. Any damage to the roads as a direct result of the installation of proposed improvements would be repaired by the permittee at the time of installation.
6-09	Wildlife, Cultural Resources	These issues raise a number of environmental and logistical concerns that must be addressed before any increase in cattle numbers is approved: Environmental Disturbance: More frequent truck use poses serious risks to wildlife and can increase noise pollution. It also threatens culturally sensitive areas within the Baaj Nwaavjo I'tah Kukveni – Ancestral Footprints of the Grand Canyon National Monument.	The intent of additional water catchments is to provide a more reliable water source fed by rain that will enhance livestock distribution and decrease the need for water hauling. The Forest Service does not regulate water hauling on an open public road. If current conditions remain, we are not anticipating an increase in the number of trucks needed to haul water to the allotment. Should the permittee need to maintain the road for water hauling, a road use permit would be issued, with restrictions in place to protect cultural resources. Effects to culturally sensitive areas within the Monument are analyzed in the Cultural Resources section of this EA.
6-10	Emissions	These issues raise a number of environmental and logistical concerns that must be addressed before any increase in cattle numbers is approved: Carbon and Resource Footprint: The diesel emissions, fuel consumption, and noise associated with water hauling run counter to the Forest Service's goals around land stewardship, sustainability, and climate resilience.	See response to 5-5.
6-11	Road Maintenance, Range	Who is responsible for maintaining the roads used for water hauling?	The primary responsibility for maintenance of the roads is with the Forest Service and there are many road use permits available. Roads under Forest Service jurisdiction will be maintained based on Forest and District prioritization

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			and in alignment with appropriate maintenance level criteria. Road Use Permits are available to applicants who wish to maintain the roads commensurate with their needs.
6-12	Road Maintenance, Economics, Range	Will the permittee be required to help fund road maintenance, or will the burden fall solely on the Forest Service—and, by extension, the public?	The permittee currently has a road use permit for several roads in the allotment and actively participates in road maintenance.
6-13	Road Maintenance, Economics, Range	Is there a road maintenance and mitigation plan to address the impact of increased truck traffic?	Roads that are listed on the Motor Vehicle Use Map for the Kaibab National Forest include the level of maintenance for those roads. A majority of the roads on the allotment are maintenance level 2 or 3. A maintenance level 3 road is defined as a road open and maintained for travel by prudent drivers in a standard passenger vehicle. A maintenance level 2 road is defined as a road open for use by high-clearance vehicles and passenger car traffic is not a consideration. A level 3 road has the highest level of maintenance and can be traversed by a passenger car. The Kaibab National Forest performs road maintenance every year, and the level 3 roads on the allotment are currently included in the annual maintenance plan. The permittee has a road use permit and may perform road maintenance on roads that require blading commensurate to their hauling of livestock.
6-14	Road Maintenance	Will road use be monitored, and will repairs be triggered based on usage thresholds?	Thank you for your comment. Road condition is monitored, and the roads are maintained based on Forest and District prioritization and available resource capacity.
6-15	Road Degradation, Travel Management	What thresholds exist for environmental degradation due to truck traffic, and what corrective actions will be taken if they're exceeded?	Monitoring would identify if the road conditions meet the maintenance level criteria and if not, corrective actions would be taken.
6-16	NEPA, Range	Has a lifecycle or cost-benefit analysis been conducted to compare long-term water hauling with investments in infrastructure (like pipelines or catchments)?	A lifecycle or cost-benefit analysis of incidental water hauling to the allotment is not required for an Environmental Assessment, per the National Environmental Policy Act of 1970, economic costs are required for an Environmental Impact Statement (EIS). At this time, there are no significant impacts identified that would require the preparation of an EIS. The effects of water hauling under the

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			maximum proposed permitted number of livestock has been conducted, see response to comment 5-5.
6-17	Transportation, Safety	Who holds liability if there is an accident involving water-hauling trucks? We've experienced firsthand the danger of these trucks, having been forced off Forest Service Road 328 multiple times by drivers speeding or not paying attention.	Traffic accidents on the FSR 328 would be handled the same for an accident on any other public road, for which law enforcement makes a determination for whom would be at fault.
6-18	Range	Relying on increased water hauling to support more cattle raises serious concerns. Without clear timelines for alternative water infrastructure, such as catchments or pipelines, the environmental and logistical impacts of continued truck traffic will only grow. A long-term, sustainable water solution must be prioritized before approving any increase in livestock numbers.	Proposed water improvements (catchments and pipeline) are intended to increase permanent water on the landscape by adding reliable water to pastures that are historically dry and when installed will limit if not eliminate the need to haul water during dry conditions, decreasing truck traffic related to the grazing operation. Upper limits of the permit will only be authorized when there is adequate water on the landscape.
6-19	Range	Availability of Feed for the Proposed Increase in Stock Numbers Issue for analysis: Drought Concerns, Wildlife (food availability) Given the ongoing drought conditions, we are concerned that there may not be enough forage to support an increase in the number of cattle.	Thank you for your comment, see response to 5-16.
6-20	Range	On page 13, the document states: "The calculated forage supply was then compared to forage demand to determine the total available AUMs. The model indicated a capacity of 500 cow/calf pairs (equivalent to 3,500 AUMs) in an average year, which serves as the upper limit for the proposed action." What is the modeled carrying capacity during a drought year, rather than an average year?	The intent of the 200-500 animal range in the proposed action is to use annual data and forecasts to manage as follows: 1. Drought year- authorize 200 head of cow/ calf or animal unit equivalent (AUE), 2. Average year- authorize 350 head of cow/ calf or animal unit equivalent (AUE) 3. High production year- authorize 500 head of cow/ calf or animal unit equivalent (AUE) (see Range specialist report).
6-21	Range	On page 13, the document states: "The calculated forage supply was then compared to forage demand to determine the total available AUMs. The model indicated a capacity of 500 cow/calf pairs (equivalent to 3,500 AUMs) in an average year, which serves as the upper limit for the proposed action." At what point in the year is it determined whether the current year is classified as a drought year?	The Forest Service meets annually with the permit holder or their representative in the spring (usually within 30 days prior to the permit on date) to develop annual operating instructions (AOI). At this time initial numbers to be authorized through the year are collectively decided upon based on forage production, climate trends and forecasts, prior actual use, and the permittees request. Numbers and rotations can be altered throughout the year as conditions change, based on results of implementation monitoring.

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6-22	Range	On page 13, the document states: "The calculated forage supply was then compared to forage demand to determine the total available AUMs. The model indicated a capacity of 500 cow/calf pairs (equivalent to 3,500 AUMs) in an average year, which serves as the upper limit for the proposed action." Does that determination typically occur before or after the cattle are delivered to the range?	The upper limit of 500 head cow/calf pairs (equivalent to 3,500 AUMs) is derived from a carrying capacity analysis of what the entire allotment can handle (see response to comment 6-20). The determination of what to authorize on an annual basis will occur at the AOI meeting (See comment 6-21). This number can be anywhere within the 200-500 animal range depending on range condition.
6-23	Range	Page 14 states that maintenance responsibilities for range improvements are typically assigned to the permittee through the grazing permit terms, and that specific responsibilities will be outlined annually in the AOI. Is the permittee responsible for all maintenance and improvements under this specific permit?	The permittee is responsible for the maintenance of most but not all range improvements. Per FS policy (FS Manual 2243) permittees are required to maintain all assigned rangeland improvements related to livestock grazing on NFS lands or other lands under Forest Service control and keep them in operable condition throughout their normal life expectancy, except as specifically provided. On the Rain Tank allotment this mostly equates to cross fencing, livestock handling facilities, and water developments. These maintenance responsibilities will be documented within the issued grazing permit.
6-24	Range	Page 14 states that maintenance responsibilities for range improvements are typically assigned to the permittee through the grazing permit terms, and that specific responsibilities will be outlined annually in the AOI. What percentage of the maintenance costs or labor will the permittee be responsible for?	FS policy requires that that permittees make proportionate contributions towards the cost associated with cooperative rangeland improvements on NFS land. Contributions may be in the form of money, materials, and/or labor. (FS Manual 2245.21). The requirement that grazing permittees are to maintain all assigned rangeland improvements (as well as cost-share in the funding of new improvements) is one of the factors used in calculating the costs of grazing livestock on NFS land (FS Manual 2243).
6-25	Range	Page 14 states that maintenance responsibilities for range improvements are typically assigned to the permittee through the grazing permit terms, and that specific responsibilities will be outlined annually in the AOI. Will this arrangement establish a precedent for future grazing permits in the area? If so, we request further discussion to understand how these standards will be applied moving forward.	See responses for comments 6-23 and 6-24. Costs and maintenance for range improvements are outlined in policy and apply to all grazing permits.
6-26	Range	Page 14 notes that the Forest Service and the permittee will meet annually to jointly prepare the written AOI (as outlined in Forest	See response to comment 6-27.

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		Service Handbook 2209.13). While we support this coordination, we believe that these meetings should be expanded to include community stakeholders.	
6-27	NEPA, Range	Given the broader impacts of grazing decisions on local ecosystems, water availability, and other land uses, we request that these annual meetings be held as public or community meetings. This would promote greater transparency, allow for community input, and help build trust among all affected parties.	The Tusayan Ranger District appreciates feedback from the public regarding all of our projects, however, the development of Annual Operating Instructions and meetings held with the permittees are not open to the public, as it is a communication tool between the agency and the permittee to express management expectations and needs of the allotment including but not limited to rangeland improvements, vegetation management activities, partnership opportunities and so forth. The District invites public feedback at any time and the allotment management plans and annual operating instructions are available upon request under the Freedom of Information Act.
6-28	Range, NEPA	In light of the ongoing drought conditions, the increased infrastructure demands, and the potential costs to taxpayers, we believe the proposed changes go far beyond a simple re-authorization and should instead be treated as a new permit.	See response to 6-1
6-29	NEPA	The scale of added responsibilities including water infrastructure, road maintenance, environmental oversight, and increased herd capacity requires a comprehensive review and public accountability.	The purpose of the EA is to analyze the effects of the proposed action and no grazing alternatives, which are disclosed in Chapter 3.
6-30	NEPA	We urge the Forest Service to approach this process with transparency, caution, and a full recognition of the long-term impacts on both the landscape and the communities that rely on it.	The effects of the proposed action and the no grazing alternatives are disclosed in Chapter 3, with consideration to short and long-term impacts to the project area and how they relate to the human environment.
7-01	Range, NEPA, Transportation	Page 7 - The issues discussed say nothing of the current condition of 3-5 trucks a day of fresh water hauling from Valle, AZ anywhere from approx. 20-40 miles from the various hauling locations that could be and that some are being delivered to today. Being largely delivered down FS Road 328. A very busy road for our area. Especially when lines are long at the gate to Grand Canyon that the locals know and the tourist find, or when the tourists get lost because mapping ships them down that road, or bad actors trying	Base property is Bucklar Ranch (Parcel Number: 50206001). Proposed water improvements (catchments and pipeline) are intended to increase permanent water on the landscape, and when installed will limit if not eliminate the need to haul water for livestock use during dry conditions, decreasing truck traffic related to the livestock operation. Proposed stocking levels are a range between would be 200 to 500 cow/calf pairs and annual authorized livestock numbers would vary within the proposed range based on existing conditions, available water and forage, and predicted forage production for the year.

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		to get into the park for free or just the vast variety of accidents and things we have seen on that road over the years. If up to 500 cattle are allowed this could be double what we have seen in trucks hauling water and again it is not mentioned in the current document. Road maintenance should be considered if these hauling conditions continue and a time frame for improvements to be done. The current fresh water hauling by trucks and the safety and air quality impacts of those conditions need to be put forth as they are occurring today by the KNF in this Draft EA.	
7-02	NEPA	Page 7 - Public involvement says that the Forest met with permittee and other local parties. We are requesting to know what local parties? We ask because, on pg. 66 under consulted agencies, it says local again. But, the only local agency listed is GCNP there is no Town of Tusayan, other Tusayan District and no other land owners within or adjacent to the allotment area. It appears that no local land owner within or adjacent to the allotments area were included in this analysis. There aren't many to contact, and I bet even less that have commented, asked to be contacted/consulted or simply shown care. That contact should happen in this process for many reasons.	The Kaibab National Forest initiated public scoping from February 1, 2024, to March 4, 2024. 13 comment letters were received during this scoping period, including letters from individuals whom identified as living near the project area, official correspondence from the Grand Canyon National Park, Tusayan Land and Cattle Co. and the Tusayan Sanitary District. In addition, the draft EA was made available for a 30-day public comment period that ran from May 16 - June 16, 2025.
7-03	Range, NEPA	Page 14 - Under improvements, first bullet point. On the map it shows a reconstructed line, and that must be where the existing line is? Who actually built or owns that current improvement? What is the other water source? Rain tank itself, by agreement with Arizona Department of Transportation (Aviation Division) (ADOT) that owns that land or another fresh water source? Since we don't see, on pg. 66, any ADOT consultation it seems a logical question to ask. This line is to connect legally to what water source and for how long?	The EA considers the reconstruction and extension of the existing pipeline to Ranger Tank. The pipeline is an existing improvement owned by the USFS with maintenance responsibilities assigned to the grazing permit holder under the terms of their term grazing permit. The pipeline can be supplied by two sources; Rain Tank (the stock tank south of the Tusayan airport), or by hauling water to a storage tank at the start of the pipeline on NFS land. Since Rain Tank is not on NFS lands it is the responsibility of the permittee to obtain a formal agreement from ADOT for the use of the water. Water will remain in the line during the grazing season.
7-04	Range, Lands, NEPA	Page 14- 2 1/2 miles of new fence around the boundary of rain tank pasture in the Town of Tusayan. The legal description goes right along with where the private property ends. This is something	The majority of the existing fence line follows and crosses multiple private property boundaries. Many of these sections are non-functional or fencing is not in place. The proposed boundary fence is entirely set in from the legal boundary

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		that must be discussed with going up against private property of both residential and commercial properties, possible set back fences issues, The Greenway Trail and other local heavily used trails that may have to be gated or cattle guarded. This is a very large issue with much impact to local walking and travel patterns, other hauling reclaimed from Tusayan to other KNF allotments along North Long Jim Loop and many other serious considerations. (Again on pg. 66 it says consulted local agencies. But, the only local agency listed is GCNP, there is no Town of Tusayan or other Tusayan Districts and no land owners within or adjacent to the allotment area. There aren't many to contact, and I bet even less that have commented, asked to be contacted/consulted or simply shown care.) That contact should happen in this process for many reasons and this fence line is a HUGE reason to do that.	and will be built exclusively on Forest Service Land with the intent to prevent livestock from entering the town of Tusayan when the Rain Tank Pasture is used. The proposed alignment has been mapped and gates and cattleguards can be installed where required to maintain access. The Kaibab National Forest initiated public scoping from February 1, 2024, to March 4, 2024. 13 comment letters were received during this scoping period, including letters from individuals who identified as living near the project area, official correspondence from the Grand Canyon National Park, Tusayan Land and Cattle Co. and the Tusayan Sanitary District. In addition, the draft EA was made available for a 30-day public comment period that ran from May 16 - June 16, 2025.
7-05	NEPA	Page 15 -Last paragraph, before bullets, and in the last sentence, "In the case that changing circumstances require structural improvements or management actions not disclosed or analyzed herein, further inner disciplinary review would occur." That needs to happen now before you can pick an alternative as this alternative is lacking the CURRENT conditions going on in the allotment today and for an unforeseeable amount of time into the 10 years. As nothing in this document addresses the current freshwater hauling that is going on and has for the past 6-7 seasons. You must amend this EA, as the current conditions are not disclosed in this document.	Existing conditions are disclosed in Chapter 3. Water hauling was considered in an emissions analysis that is in the project record. The draft version of the EA was made available for public comment and a final EA and Draft Decision Notice and Finding of No Significant Impact will be made available for public to review. If additional improvements are needed in the future, appropriate environmental analysis would occur in accordance with applicable laws.
7-06	Range, Lands	Page 19- Says permittee will be encouraged to participate in monitoring activities. This seems the KNF should require the permittee to participate. (We do feel strongly that more involved oversight from the KNF is needed, and we know it would be appreciated by the other few landowners of the allotment area. Improvements have been put on our property, then removed after	Range monitoring (both effectiveness and implementation) is the responsibility of the Forest Service since it is used to determine whether management is being properly implemented and whether the actions are effective at achieving or moving toward desired conditions. Issues arising from improvements being placed on private land occurred under a previous permit and ranch

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		we noticed. Improvements including fence lines, that the Kaibab did not own were removed, and gates have both been removed and added to on areas of our private land without permission.) We would like to know what is considered the base property now for the Rain Tank Allotment?	management. The base property associated with the current permit is Bucklar Ranch (Parcel Number: 50206001).
7-07	Range	Page 20- Under Cost- Alternative A- Second Sentence- "While the permittee is responsible for a portion of the cost associated with the new improvements," then lists other programs that can fund. This is concerning to be in a current document when we have seen all the cuts that have been made to many grant programs and it says that they will be responsible for a PORTION of the costs. So if the funds aren't there? The current water hauling conditions can go on for the 10 years of the permit? Time frames should be established for the funding and improvements.	FS policy requires that permittees make proportionate contributions towards the cost associated with cooperative rangeland improvements on NFS land. Contributions may be in the form of money, materials, and/or labor (FS Manual 2245.21). If outside funding (via grants, programs, Forest Service funding etc.) isn't available costs would fall to the permittee. Improvements listed in the proposed action are planned for installation within two years of the decision.
7-08	Range, Soils	Page 44- Map- With the rain tank pasture showing a substantial amount of impaired or unsatisfactory area how does that calculate into the various annual instruction, operating and management plans for expected use of that pasture?	Overall, only 13.82% of Rain Tank Pasture has soils in impaired or unsatisfactory condition. Continued monitoring of all pastures would occur under the proposed action, and adaptive management strategies would be implemented and addressed in the AOI as described in Table 23 of the EA.
7-09	Recreation, Wilderness and Scenery	Page 64- Camping with the fence line in the place that the map calls for could be a great impact to camping, recreation, wilderness, scenery and visual impact for Tusayan residents and tourists alike.	The proposed new fence line would be placed on the National Forest System lands and would not impact recreational camping availability because there are existing fences on the private properties. In addition, there is no Congressionally designated Wilderness or proposed Wilderness in those areas.
7-10	Range, Lands	Same as from above- 2 1/2 miles of new fence around the boundary of rain tank pasture in the Town of Tusayan. The legal description goes right along with where the private property ends. This is something that must be discussed with going up against private property of both residential and commercial properties, possible set back fences issues.	The majority of the existing fence line follows and crosses multiple private property boundaries. Many of these sections are non-functional or fencing is not in place. The proposed boundary fence is entirely set in from the legal boundary and will be built exclusively on Forest Service Land with the intent to prevent livestock from entering the town of Tusayan when the Rain Tank Pasture is used. The proposed alignment has been mapped at and gates and cattleguards can be installed where required to maintain access.
7-11	Recreation	The Greenway Trail and other local heavily used trails that may have to be gated or cattle guarded. This is a very large issue with	Pedestrian access would be maintained for trail systems within the project area.

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		much impact to local walking and travel patterns, other hauling reclaimed from Tusayan to other KNF allotments along North Long Jim Loop and many other serious considerations.	
7-12	NEPA	Again on pg. 66 it says consulted local agencies. But, the only local agency listed is GCNP, there is no Town of Tusayan or other Tusayan Districts and no land owners in/by the allotment. There aren't many to contact, and I bet even less that have commented, asked to be contacted/consulted or simply shown care.) That contact should happen in this process for many reasons. This fence line is a HUGE reason to do that.	See response to comment 7-2.
7-13	NEPA, Soils, Hydrology	Page 75- Top of page. Mitigation bullet point- Mentions a possible decommission of a tank in Coconino Wash, but do not see on any of the maps where that is being considered? If it's in any FEMA floodplain area that should be communicated with Coconino County Flood Control as a possibility for any future flood planning.	The location of the proposed tank decommission in Coconino Wast is downstream of the Town of Tusayan. The purpose is not related to flood control and the tank is not currently functioning.