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Environmental Assessment

K Four Grazing Allotment Management

Chino Valley Ranger District, Prescott National Forest
Yavapai County, Arizona



Key Area in the Indian Pasture in TEUI 481; photo taken in October 2012

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1. Introduction

We are proposing to create an allotment management plan for the K Four grazing allotment on the Chino Valley Ranger District of the Prescott National Forest. We prepared this environmental assessment to determine whether effects of the proposed activities may be significant enough to prepare an environmental impact statement. By preparing this environmental assessment, we are fulfilling agency policy and direction to comply with the National Environmental Policy Act (NEPA)¹ and other relevant Federal and State laws and regulations.

1.1 About the Grazing Allotment

A grazing allotment is an area designated for livestock grazing. An individual allotment can have lands under several jurisdictions, including the Forest Service, other Federal or state agencies, or private lands. The K Four Allotment is comprised of National Forest System (NFS) lands with some inclusions of private land found within the borders of the allotment. Only the NFS lands will be considered in this analysis, an area of approximately 27,200 acres. The allotment is located in the northwestern portion of the Chino Valley District, approximately 10 miles northwest of Williamson Valley, Arizona.

The allotment is centered around lower Walnut Creek, though most of the creek is found on private land. Ranching began in this area in the late 1800s to provide commodities for Fort Hualapai. According to the census of 1870, nearly 100 people lived at Walnut Creek, many more than found today. Elevation ranges from about 4,900 feet on the east side of the allotment to nearly 7,000 feet in the Juniper Mesa Wilderness at the northwest corner. The topography of the allotment is varied from steep, rocky terrain around Juniper Mesa to rolling hills around Indian Spring. The variable terrain lends itself to cattle use being focused on the more flat and gentle slopes, with moderate to steep terrain receiving little to no cattle use.

The term grazing permit has authorized about 3600 Animal Unit Months (AUM²) of grazing use on this allotment since the 1960s, though the season of use has fluctuated from yearlong to winter seasonal. For example, 3600 AUMs is equal to 600 cattle for 6 months or 300 cattle for 12 months. The change to winter seasonal that has been implemented since 1983 was a voluntary change by the permittee, recognizing the need to improve forage condition on the allotment. The extensive amount of browse forage on the allotment also makes it a good choice to use in the winter season. There are 3 pastures on the allotment: North, Indian, and Round. The smaller Bald Mountain Pasture may be used for holding and gathering, but it lacks reliable water. The permitted season of use is shown as October 1st through April 1st, but often livestock come onto the allotment later in October or early November, and may stay longer into April.

The allotment has been managed recently by splitting the cattle herd between two pastures and resting one pasture. In some years the herd is evenly split, and in others the pastures may carry uneven amounts based on available forage. Since the 2007/2008 winter season, the Round Pasture has not been grazed, so the herd is split between the Indian and North Pastures for the winter season. The Juniper Wilderness area of the North Pasture is separated by steep

¹ Code of Federal Regulations 36 CFR Part 220, Forest Service Handbook 1909.15, and Council on Environmental Quality regulations (40 CFR 1500).

² AUM = animal unit month, which equates to the amount of forage consumed by one mature cow of approximately 1,000 pounds for one month; the forage consumed per day is about 26 pounds dry weight.

topography from the rest of the pasture. In times past, about 30 cattle would be hauled up to Pine Spring on the top of Juniper Mesa so that part of the pasture could be utilized. This has not been done in recent years because the pasture fence is down between the K Four and Yavapai Allotments. Reliable water sources are mainly well-fed storage tanks with pipelines and troughs dispersed in areas of need. There are several earthen stock tanks, but these often prove unreliable, especially in the past decade where drought conditions are often severe and have been recurrent. In the period from 1995 to 2013, the average stocking rate on the allotment was 393 cattle for 6 months.

Precipitation patterns in this area are bi-modal with monsoon events occurring during the summer and a second period of precipitation occurring within the winter season. Precipitation has been measured at Walnut Creek climate station from 1915 to 2010. For the period of record from 1981 to 2010, the mean annual precipitation was 15.2". Cool-season precipitation (October through May) for this timeframe had a mean of 9", and summer precipitation (June through September) accounted for 6.2". The average minimum temperature typically occurs in December, and is around 20 degrees F, and the average maximum temperature occurs in July at just over 90 degrees F.

1.2 How is Grazing Managed on the Prescott National Forest?

This Environmental Assessment (EA) is based upon background information about the allotment including current and past inventory and monitoring data, the desired condition of resources on the allotment derived from direction and guidelines in the Prescott NF Land and Resource Management Plan (1987), as amended (Forest Plan), as well as from resource specialists' knowledge of the allotment. You can find rangeland and resource management direction specific to the Prescott National Forest Land and Resource Management Plan; USDA Forest Service 1987; pages 11-14; 19-21; 27; 30-35; 39-40; 55-56). The Forest Plan can be viewed on the internet at: http://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5122089.pdf

The Forest Plan provides guidance for the management of multiple-use activities that occur within the Forest. There are standards, guidelines, and management area direction found within the plan, as well as statements related to the desired conditions for various resources such as rangelands, watersheds, riparian areas, soils, and wildlife. Grazing is one of the many uses allowed on the Forest. Forest Service policy is to make forage available to qualified livestock operators from lands suitable for grazing, provided it is consistent with land management plan and meets the terms of the administrative permit³. In 1987 the Forest Plan determined that the K Four Allotment was suitable for livestock grazing.

2. Purpose and Need for the Project

The purpose of this project is to create an allotment management plan (AMP) on the K Four Allotment. This allotment has been managed in the past by issuing operating instructions on an annual basis. There has not been an AMP in place that was in compliance with the National Environmental Policy Act (NEPA). The Rescission Act of 1995 (Public Law 104-19) requires each National Forest System unit to establish and adhere to a schedule for completing NEPA environmental analysis on all grazing allotments. The K Four Allotment is on this schedule for completion in the 2014-2016 planning period. There are a few areas on the allotment where soil and watershed conditions could be improved, and some areas where the vegetation is so dense

³ 36 CFR 222.2 (c); Forest Service Manual 2203.1

that changes in grazing management alone will not improve availability of herbaceous forage so some treatments involving cutting and/or prescribed burning of vegetation will be conducted.

2.1 What is the Purpose of this Proposal?

One of the purposes of this proposal is to allow for improvement in soil condition in certain pinyon-juniper woodland areas by incorporating regular rest into the rotation of the three main pastures used for grazing on a seasonal basis. Each main pasture (North, Indian, and Round) will be rested for 18-months in 1 out of 3 grazing seasons to provide cool-season grasses with springtime rest and allow for accumulation of vegetative cover to protect soils from erosion and improve soil structure and stability. Biomass on the soil surface that is not removed by grazing can break down into the soil surface to improve the organic matter content and thereby improve soil structure and function. Implementing this proposal would provide several new water developments to improve cattle distribution and provide reliable water every year so that the rest-rotation strategy can succeed. Another purpose of this proposal is to improve forage and wildlife habitat through vegetation manipulation including cutting juniper trees and conducting prescribed burning activities in a smaller subset of areas within the allotment.

2.2 Why Is There a Need for this Proposal?

A need was identified to improve the amount and distribution of soil organic matter in the soil map unit known as Terrestrial Ecosystem Inventory Unit (TEUI) 481. This soil map unit is found within the pinyon-juniper vegetation type in the North and Indian pastures. The proposal to give the North and Indian Pastures 18-months of rest in 1 out of every 3 grazing seasons should improve soil stability and structure because allowing for more rest from grazing enables plant material to accumulate on the soil surface and decay into the soil to enhance organic matter levels. In an effort that is separate from the monitoring for adaptive management, an area will be fenced from grazing adjacent to a long-term study plot to track the improvement of soil condition in the map unit of concern and document how quickly improvement can occur without any grazing as compared to the improvement that happens under the new rest-rotation grazing system. Information from this study plot will be used for future resource management decisions.

All of the representative key sites were found to be meeting desired conditions for vegetation. Although the perennial grass cover and composition are meeting desired conditions currently, it is recognized that the expansion of juniper and shrub cover over time can inhibit herbaceous plant growth and lead to declining vegetation condition independent of grazing management. When tree canopies become relatively dense (above about 30% cover) there is typically a reduction in the herbaceous plant cover from grasses and forbs due to the competition for water, nutrients, and sunlight. There is a need to maintain openings in pinyon-juniper types where the soils are productive and can sustain herbaceous vegetation. Creating a mix of vegetation structure such as grass-dominated openings, and a mosaic of openings in the shrub layer increases the habitat quality for wildlife, and provides more usable forage for wildlife and livestock. For this reason, some areas are in need of tree and brush removal to maintain forage production and habitat quality.

During the inventory of existing conditions on the allotment, it was recognized that some pasture areas within ½ to 1 mile from water sources were getting a moderate amount of cattle use, while some other areas of the pastures were receiving little to no use because of lack of a nearby water source. In order to distribute the use of forage more evenly across the pasture, we are proposing to develop several new water sources. There is also a need to re-establish the allotment boundary fence in a location that is on National Forest System lands. The old allotment boundary fence crossed private land, and has been removed by the landowner. There

is a need to have a new fence established on Forest Service land that will serve as the allotment boundary.

The Hitt Wash drainage in the Round Pasture on the allotment is known to have a population of lowland leopard frogs that are on the Regional Forester's list of Sensitive Species for the Southwestern Region. The sensitive species program is designed to assist the Forest Service in maintaining biodiversity on our Forests and Grasslands and to help maintain viable populations of existing native and desired non-native species⁴. The species on this list should be managed to prevent them from becoming a candidate for further protection under the Endangered Species Act. There is a need to protect an important breeding pool for the lowland leopard frog from trampling by livestock when eggs are laid in the early spring. A fenced enclosure is needed in the area of Round Valley Spring in Hitt Wash to keep livestock from accessing the breeding pools when they are using the Round Pasture.

In summary, the need for this project is:

- To improve soil and watershed conditions in some juniper-woodland plant communities (TEUI 481) through the implementation of a rest-rotation seasonal grazing system.
- To improve wildlife habitat by maintaining or creating openings in pinyon/juniper woodlands through tree cutting that will provide structural habitat diversity and increased herbaceous forage production for wildlife and livestock.
- To reintroduce controlled application of fire in some P/J chaparral areas to maintain shrub health and improve its palatability to wildlife and livestock.
- To improve cattle distribution by providing additional reliable water sources.
- To re-establish the allotment boundary on Forest Service land
- To protect important breeding habitat for lowland leopard frogs from trampling by livestock at Round Valley Spring

2.3 What Are We Proposing?

We propose to continue to authorize and permit livestock grazing on the K Four Allotment in the following manner:

Number of Livestock: A range of stocking from 2100 to 3600 Animal Unit Months on a dormant season basis (generally from October 15th through April 15th), annually. As an example, this stocking level would provide for livestock numbers to range from 350 to 600 head of cattle - cow/calf pairs and bulls - for 6 months. The number of cattle grazed in any one year will be determined by adaptive management and consideration of current resource conditions.

Grazing System: Dormant season grazing using a rest rotation grazing strategy whereby 2 out of 3 pastures are used every 6-month season, and one pasture is rested every season. Each pasture would receive 18-months of rest one grazing season out of three, and warm-growing season rest every year.

Term Permit: The term grazing permit will be issued for up to ten years. The permit will authorize livestock use within parameters identified in this proposal, and subsequent permits may be issued as long as resources continue to move further toward desired conditions or are being maintained in satisfactory condition, as appropriate.

⁴ 36 CFR 219.19

Adaptive Management: Adaptive management is designed to provide sufficient flexibility to allow management to address changes in climatic conditions, seasonal fluctuations in forage production, and other dynamic influences on the ecosystem in order to effectively make progress toward or maintain desired conditions. Regular/annual monitoring of resource health indicators may suggest the need for administrative changes in livestock management. Modifications may include adjustments in timing, intensity and duration of grazing. Timing is the time of year the livestock are present in a pasture. Intensity is the degree to which forage is removed through grazing and trampling by livestock. Duration is the length of time livestock are present in a given pasture. The need for adaptation would be based on the magnitude or repeated re-occurrence of deviations from guidelines provided, or due to indications of a lack of progress toward desired resource conditions. The timing of such management changes would reflect the urgency of the need for adaptation. If monitoring indicates that progress toward desired conditions is not being achieved on the allotment, management will be modified in coordination with the permittee. These modifications would be made through administrative decisions such as: the specific number of head stocked on the allotment seasonally; time spent in each pasture; livestock herd movement; and/or periods of rest, deferment or non-use of portions or all of the allotment for an appropriate period of time, as conditions warrant.

Utilization Levels: On those portions of the allotment where no specific resource concerns were identified by the Interdisciplinary (ID) Team, livestock will be managed with the objective of maintaining or improving the condition of rangeland resources through the use of grazing intensity guidelines. Grazing intensity is measured by determining the level of utilization on forage plants. Utilization is the proportion or degree of current year's forage production that is consumed or destroyed by animals (Interagency Technical Reference 1996). Allowable utilization levels are guidelines to be achieved as an average over the long term to maintain or improve rangeland vegetation and long-term soil productivity. Relative utilization may be measured before and during the growing season and can be utilized as a tool to manage livestock so that expectations of end of growing season utilization measurements can be achieved. In addition to using utilization levels as a tool to manage livestock grazing impacts, the critical stubble height necessary for key forage species to maintain plant health and watershed protection values will also be considered.

- A management guideline of 35-45% utilization of key forage plants in upland key areas as measured at the end of the seasonal use period;
- Up to 50-60% leaders browsed on key upland woody species;
- Minimum stubble height on key riparian herbaceous species: four to six inches where sedges and rushes are key and eight inches where deergrass is key;
- Up to 20% use by weight on key woody species within riparian areas; or less than 50% of terminal leaders browsed on woody species less than 6 feet tall.

Site-specific Resource Protection Measures: Soil conditions associated with TEUI 481 in the pinion-juniper vegetation type were determined to be in impaired condition due to low soil surface and subsurface organic matter and elevated soil loss. These areas are located within portions of the Indian and North Pastures. Site-specific measures are summarized as follows:

- North and Indian Pastures will be rested for 18-months in 1 out of 3 grazing seasons to provide cool-season grasses with rest and allow for accumulation of surface litter to protect soil from accelerated erosion.
- Fence portions of Hitt Wash near Round Valley Spring to protect breeding habitat for lowland leopard frogs that are on the Regional Forester's Sensitive Species list. Alternate water sources would be provided in the uplands for livestock, as needed.

In the event that the above resource protection measures do not accomplish site-specific resource objectives, additional management options may be implemented. These measures will be designed to address site-specific resource concerns and may include, but are not limited to, such things as temporary fencing, electric fencing, drift fences, additional livestock enclosures, water pipelines, storage and troughs; reconstruction of non-functional improvements and construction of new improvements such as spring boxes, drift fences, and water gaps.

Structural Range Improvements: This alternative includes construction of the following new structural improvements that have been developed to improve grazing management. If some of these improvements are not implemented over the life of the term grazing permit, the upper limit of permitted livestock numbers may not be achievable on a sustained basis, or seasonal use periods may be shortened. Different types of water developments may be employed depending on the location, and could include a catchment apron and storage tank (“trick tank”) with pipeline to water troughs, or pipelines to water troughs from existing spring developments or wells. The location of proposed range improvements are shown on the map in Appendix 1.

- Add approximately 2.5 miles of new pipeline, storage tanks, and troughs in the North Pasture as an extension of the existing Juniper Springs water system and Juniper horizontal well. Two separate lengths of pipeline will be added; one segment to the north in sections 1 and 6, and another segment heading south and west in sections 18, 19, and 24.
- Develop a new water source, likely a well with storage tank and troughs, in the Round Pasture, section 6.
- Develop a new water source in the Round Pasture east of Round Valley Spring.
- Add approximately 2 miles of pipeline and troughs to extend the Indian Springs water system in the Indian Pasture, sections 2 and 3.
- Relocate and reconstruct the allotment boundary fence in the North Pasture so that the fence is located on National Forest System lands bordering the private land on the north and west sides of section 3.

Maintenance of Range Improvements: The Term Grazing Permit includes a list of all improvements which the permittee will continue to maintain at a level that effectively provides for their intended uses and purposes. Existing improvements may be replaced when conditions warrant. Authorization for cross-country motorized travel is provided for the permittee to administer the livestock operation and maintain improvements under the terms and conditions of the Term Grazing Permit. All authorizations for cross-country motorized travel are subject to existing regulations intended to protect natural and/or heritage resources. Cross-country travel is not allowed when such travel would cause unacceptable resource damage. Approval is granted at annual authorization meetings or on a case by case basis.

Nonstructural Range Improvements: The following treatments are proposed:

- Juniper cutting without prescribed burning – 384 acres. Located in northeast corner of North Pasture.
- Juniper cutting and possible prescribed burning follow-up treatment – 1,658 acres. Located primarily on TEUI 481 in North and Indian Pastures. Cut to a residual basal area of 5-10 square feet per acre average over the treatment block, achieved by retaining “reserve island” clumps across the treatment block with multiple age classes, generally retaining pinyon and large (monarch) alligator junipers.

- Group selection juniper cutting with possible follow-up burning – 1,064 acres. Located in Round Pasture, primarily on TEUI 461. Cut junipers on up to 40% of the treatment block in more productive sites that are likely to be able to respond to canopy cover removal and have a low density of shrub oak in understory. Hand cutting with no lop and scatter (leave juniper skeletons to create microclimates for grass). Evaluate follow-up burning treatment based upon recovery of vegetation in openings; burning would only occur after herbaceous plants have established and when juniper skeletons have broken down to a point where burn severity will likely be low.
- Spot tree and brush cutting with prescribed burning – 3,382 acres. Located in Indian Pasture, primarily on TEUI 434. Mechanical or hand cutting of juniper trees and brush either leaving juniper skeletons in place to create microclimates for grass establishment, or removal of cut vegetation off-site. Apply to create openings on approximately 25% of the treatment block. Evaluate follow-up burning treatment based upon recovery of vegetation in openings; burning would only occur after herbaceous plants have established and when juniper skeletons have broken down to a point where burn severity will likely be low.
- Targeted prescribed burning – 7,380 acres. Located in all three pastures. On areas with productive soils supporting high levels of shrub cover and generally located on steeper slopes. Some burn blocks will be pretreated by hand or machine cutting of brush and juniper to provide an adequate fuel load to facilitate fire spread.

The vegetation treatment acreage shown above has areas of overlap and should not be added together to constitute total treatment acres. For example, most juniper treatments areas will be burned in 3-5 years after the juniper cutting, so the same acres are counted twice in the above description, in both “Juniper cutting and possible prescribed burning” and “Targeted prescribed burning”.

Long term study: The following action is proposed:

- An additional independent facet of the project will include extending the fencing of the enclosure range study plot in the North Pasture to determine the amount of soil recovery that can be expected by excluding grazing alone. The intent is that this study plot is not part of the monitoring for adaptive management but rather will provide information in the long term for future resource management decisions.

Monitoring: In order to evaluate whether grazing management is making progress towards meeting desired resource conditions, two types of monitoring would be conducted:

1. Implementation monitoring would be conducted by the Forest Service, with possible assistance from the permittee, and may include, but is not limited to the following: livestock actual use data, compliance with pasture rotation schedules, grazing intensity evaluations during the grazing season (within key and critical areas), utilization at the end of the growing season (within key areas⁵), and visual observation of vegetation and ground cover.

2. Effectiveness monitoring to evaluate the success of management in achieving the desired objectives would occur within key areas at an interval of ten (10) years or less. Effectiveness monitoring may also be conducted if data and observations from implementation

⁵ key area- relatively small portion of a range selected because of its location, use or grazing value as a monitoring point for wildlife and domestic livestock grazing use. It is assumed that key areas, if properly selected, will reflect the overall acceptability of current grazing management over the range.

monitoring (annual monitoring) indicate a need. This type of monitoring can include species composition, plant cover, frequency or density, and/or vegetative ground cover monitored at key areas and at areas identified with site-specific resource concerns. Both qualitative and quantitative monitoring methods can be used. Methods for monitoring and inventory that are standard, accepted protocols can be found in the following publications: Region 3 Rangeland Analysis and Management Training Guide (USDA 2013 revised), Interpreting Indicators of Rangeland Health (Technical Reference 1730-37, 2010), and the Guide to Rangeland Monitoring and Assessment (Smith et al. 2012).

Monitoring activities would be focused on those resources that need improvement or where there is a concern for an important habitat type. For this project, monitoring would be conducted in TEUI map unit 481 to make sure that the residual vegetative cover remaining after grazing is sufficient to allow for improvement of the soil resource. Riparian habitat at intermittent streams and springs is very important for wildlife. These areas would be visited to make sure they are properly managed during the grazing season, and to make sure unauthorized use does not occur after the scheduled season. Key grazing areas would be visited during and after the grazing season to monitor grazing intensity levels so that satisfactory vegetation conditions are maintained.

Monitoring of Vegetation Treatments: In two small sub watersheds of approximately 100 acres size each, vegetation monitoring may be conducted to show how well the treated watershed recovers and to provide information about the capacity to maintain treatment effectiveness through low-intensity fire. This monitoring could also be used to inform managers about the effectiveness of soil erosion mitigation measures. Sediment traps consisting of rock gabion structures may be installed along with a small collection reservoir. Stream flow out of the small watersheds may be evaluated by installing pressure transducers and data loggers in the channel. The effects of treatments on soil moisture may be studied with soil probes.

2.4 What Other Alternatives Were Considered?

Alternative 2 is the No Action/No Grazing Alternative required by Forest Service policy⁶.

Authorization: Under this alternative, livestock grazing would not be authorized.

Cancellation of the Grazing Permit: Livestock grazing on the K Four Allotment would be discontinued and the Term Grazing permit would be cancelled after a 2-year notification to the permit holder (FSM 2231.62d/FSH 2209.13-16.24). The cancellation of the term permit under this alternative does not represent an official administrative closing of the allotment; rather it would represent the suspension of grazing on this allotment for an undetermined amount of time, until or unless a different decision is made.

Structural Range Improvements: Under this alternative, no new range improvements would be constructed on the allotment.

Maintenance of Existing Range Improvements: Under this alternative, maintenance of range improvements normally assigned to the permit holder would no longer occur. After cancellation of the Term Grazing Permit, existing structural improvements that contribute to resource protection or that are important to other resources and functions, such as water sources for wildlife populations or fire control, would remain but would not be maintained unless this activity were funded under another resource area on the Prescott NF or by a cooperating partner. Removal of improvements losing their functionality would have to be authorized under a future NEPA decision if new ground disturbance were anticipated. Where allotment boundary fences

⁶ FSH 2209.13, Chapter 90, Section 92.31

are necessary, the maintenance of these fences could be reassigned to adjacent grazing permit holders in order to maintain the integrity of the boundaries of adjacent allotments.

Monitoring: The Forest Service would conduct periodic monitoring to verify that no cattle are present on the allotment once the permit is cancelled. If vegetation treatments occur in the absence of grazing, monitoring of effects as described for alternative 1 could still occur.

2.5 Who Will Make the Decision and What Will be Considered?

The Chino Valley District Ranger is the responsible official who will decide, based upon the Purpose and Need for this action, the information provided in this EA, the project record, and other considerations, whether to continue livestock grazing on the K Four Allotment; if so, under what conditions; and whether new improvements including water developments, fencing, and vegetation treatments will be implemented. The decision will also include a determination of consistency with the Forest Plan, National Forest Management Act, National Environmental Policy Act, and other applicable laws, regulations, and executive orders. The decision to implement the vegetation management activities can occur independently of the decision whether or not to continue livestock grazing on the allotment.

The purpose and need outlined earlier sets the scope of the project and analysis to be completed to help the responsible official make a decision. In making the decision, the responsible official will consider how well the alternatives lead to improving resource conditions affected by livestock grazing.

In addition to this decision, the Ranger will make a finding on the significance of the environmental effects anticipated from the implementation of the selected action and whether an environmental impact statement (EIS) will need to be prepared.

2.6 How Long is the Decision Valid?

Adaptive management, as described in this document, is based on the cycle of implementation of a course of action, monitoring of conditions and results, and adjustment of management as needed to continue to make progress towards project objectives. Monitoring of adaptive management is designed to answer the question “Is acceptable progress being made towards attainment of resource management objectives and thus desired conditions?” Changes in management actions are considered and implemented as appropriate when monitoring indicates that current actions are not being effective in reaching defined objectives. Through the implementation of a NEPA decision that includes adaptive management principles, the grazing permit, Allotment Management Plan (AMP), and/or Annual Operating Instructions (AOI) may be administratively modified or re-issued over time, based on monitoring, as long as the modified permit, AMP, and/or AOI are within the bounds of the original adaptive management decision and supporting NEPA analysis and documentation. (FSH 2209.13, Section 92.23b)

A project-level, NEPA-based decision, such as the decision to be made based upon this analysis, remains valid as long as the authorized activity continues to comply with laws, regulations, and the Forest Plan. Reviews of existing project-level decisions are made periodically to determine if the grazing activity, permit(s), AMP, and AOIs are consistent and within the bounds of the existing NEPA documentation; if that analysis and documentation continue to remain valid; or if new information exists that requires some further analysis and potential modification of the activity. If the responsible official determines that correction, supplementation, or revision is not necessary, implementation of existing decisions shall continue.

| Table 1: Comparison of Alternatives and Effects for K Four Allotment | | |
|---|--|---|
| K Four Allotment | Alternative 1 Proposed Action | Alternative 3 No Action/ No Grazing |
| Authorization (AUMs, Season of Use & Term) | A range of stocking from 2100 to 3600 Animal Units Months (AUMs) on a dormant season basis, generally from October 15 th through April 15 th . This equates to a range from 350-600 head of adult cattle for 6 months. | N/A |
| Grazing Intensity | In areas of satisfactory condition, a management guideline of 35-45% forage utilization of key forage plants in upland key areas as measured at the end of the grazing season, and up to 50-60% browse use on key upland woody species; | N/A |
| New Improvements | Construct up to 2 new water developments in the Round Pasture; increase pipeline length and water access points for 3 existing water systems; reconstruct allotment boundary fence in North Pasture on Forest Service land; Construct enclosure fence in Hitt Wash; vegetation management by juniper tree cutting, brush removal, and prescribed fire in selected areas. | No new range developments constructed, but vegetation management activities may be authorized with this alternative. |
| Maintenance of Improvements | Existing necessary improvements listed on the term grazing permit are maintained to standards by grazing permittee; new improvements will increase maintenance responsibility. | Maintenance of range improvements discontinued except for maintaining allotment boundary fences by adjacent permittees. Without a permittee, maintenance responsibility will default to the Forest Service for any infrastructure deemed essential. |
| Monitoring | Short and long-term monitoring of implementation and effectiveness of adaptive management during term of permit | Monitoring of non-use compliance. |

Table 1: Comparison of Alternatives and Effects for K Four Allotment

| K Four Allotment | Alternative 1 Proposed Action | Alternative 3 No Action/ No Grazing |
|----------------------------------|---|--|
| Upland Vegetation Effects | <p>Dormant season grazing will give full growing season rest to all warm season grasses, and rest during seed set for cool-season grasses; conservative use levels will lead to 55-65% of biomass being retained on site after grazing to improve litter cover, soil protection, and water infiltration. Improvement in vegetative cover and plant vigor expected given adequate precipitation. Areas of thick brush cover (over 50% canopy cover) will remain static unless subject to vegetation treatments. Juniper cutting will enhance herbaceous forage production. Prescribed burning will initially reduce shrub cover, but new growth that occurs will be more palatable and accessible to browsing by livestock and wildlife.</p> | <p>Livestock use discontinued. Improvement in herbaceous vegetation cover and species composition would occur, but it will be dependent on adequate precipitation and the degree of shrub cover. Those areas with extensive shrub cover are stable and would show little difference from alternative 1.</p> |
| Watershed/Soil Effects | <p>Soils in less than satisfactory condition would improve within their ecological capability through the application of resource protection measures designed to improve vegetation condition. Implementation of conservative use levels allows for 55-65% of biomass to be retained on site and 18 months rest once every three grazing seasons would also help retain biomass on site. Retention of biomass would allow organic matter to be incorporated into the soil for nutrient cycling and protection from accelerated soil loss. Juniper cutting treatments will improve herbaceous groundcover to reduce erosion and improve soil organic matter. Prescribed</p> | <p>Soils in less than satisfactory condition would improve within their ecological capability. More biomass is retained on site every year than under alternative 1. Retention of biomass would allow organic matter to be incorporated into the soil for nutrient cycling and ground cover for protection of the soil from accelerated soil loss. Improvement may occur at a slightly faster rate than alternative 1.</p> |

| Table 1: Comparison of Alternatives and Effects for K Four Allotment | | |
|---|---|--|
| K Four Allotment | Alternative 1 Proposed Action | Alternative 3 No Action/ No Grazing |
| | burning may initially expose soil but will improve shrub health and resiliency. Best Management Practices are employed to protect watersheds. | |
| Wildlife/Rare Plant/Aquatic Species Effects | <p>Since the allotment does not contain known populations of Threatened or Endangered species, and potential habitat is lacking, there will be no effects to Federally listed species or their designated Critical Habitats. Upland areas will improve towards desired conditions by implementing use guidelines. Competition for palatable browse species would occur during the fall and winter months. Some impacts on Management Indicator Species (MIS) habitat, but no effect to trend of MIS species forest-wide. Regional Forester sensitive species may occur or have habitat in the project area. Project actions may impact individuals or habitat of these species, but there would not be a trend toward Federal listing. Vegetation treatments are designed to improve wildlife habitat by increasing herbaceous forage production and improving habitat diversity. Prescribed burning will improve shrub palatability and accessibility. Additional water developments improve wildlife habitat quality.</p> | <p>Would provide more rapid movement toward desired habitat conditions, especially if the proposed vegetation management activities are implemented under this alternative. Important water sources that are currently maintained by the permittee would need to be maintained by other partners or the Forest Service in order to maintain benefits to wildlife habitat from additional water sources. Any potential impacts to Forest Service sensitive species and MIS from the presence of livestock will no longer occur.</p> |

| Table 1: Comparison of Alternatives and Effects for K Four Allotment | | |
|---|---|--|
| K Four Allotment | Alternative 1 Proposed Action | Alternative 3 No Action/ No Grazing |
| Archeological Effects | No adverse effects on heritage resources. Avoidance of impacts to cultural resources during construction of new range improvements and vegetation treatments. | No effects on heritage resources; avoidance of cultural sites with possible vegetation management activities. |
| Recreational Effects | No adverse effects on recreational opportunities | No effects on recreational opportunities |
| Compliance w/ Forest Plan and Federal Regulations 36 CFR 222.2 [c] | Yes, through application of grazing management, Forest Plan goals for resource management met over time. Consistent with policy to manage forage-producing federal lands for livestock grazing. | Yes, achieves Forest Plan resource management goals. Not consistent with direction to manage forage-producing lands for livestock grazing. |

3. What Are the Existing Resource Conditions and How Will the Proposal Affect these Resources?

A summary of the existing resource conditions and environmental effects of the alternatives (1 – Proposed Management; 2 – No Grazing) is provided in this chapter. Each resource specialist has considered the direct, indirect, and cumulative effects that would be expected to occur from implementation of the alternatives addressed in this EA. They have considered the past, present, and future activities listed in the table below that may be affecting resources in the cumulative effects analysis area as defined for each resource.

3.1 What Has Already Occurred in the Project Area?

Resource specialists reviewed the past, present, and reasonably foreseeable future activities to determine if the effects of the proposed activities, when added to the effects of other actions, would increase impacts to a level of significance. The resource specialist’s reports, included in the project record, contain details of these considerations.

The following table summarizes the past, present, and future activities within the K Four Allotment. For some resource areas, the primary 6th level watersheds that contain portions of the allotment were considered for the cumulative effects analysis. The map in Appendix 3 defines the 6th level watersheds in relation to the project area.

| Type of Activity | Past Activities/Events | Present Activities | Future Activities |
|--|--|---|--|
| Wildfire Suppression | From 1993 to 2013 there were 2,315 acres burned by wildfire in the 6 th code watersheds containing the project area; during the same span, there were 15 reported fire ignitions, some of which did not require suppression activities | None | unknown |
| Timber/Fuelwood Sales | Between 1992 and 2013 there have been 365 acres offered for fuelwood sales within the 6 th code HUC containing the project area; most recent was in 1996 | None | Some commercial sales may be used to implement proposed action |
| Veg Treatment Projects / Non-Structural Range Improvements / Rx Burns | Prescribed burning activities from 1992 to present account for 21,468 acres in the 6 th code HUCs; most Rx burning is off the allotment; 599 acres of mechanical juniper cutting at the “Sinks” on the K Four allotment in 1999, plus 189 acres of hand-cutting in 1999 | No prescribed burning has occurred in the watersheds since 2009, and no mechanical tree or brush removal since 1999 | Implementation of proposed action, as described |

Table 2: Past, Present, and Future Activities on the K Four Allotment

| Type of Activity | Past Activities/Events | Present Activities | Future Activities |
|---|--|--|---|
| Livestock Grazing | Project area has been grazed by domestic livestock since the late 1800s. Stocking levels were not in balance with forage supplies historically, resulting in some areas of overgrazing historically. | For the project area there will be dormant season grazing for 6 months with stocking in balance with forage supplies; 6 th level watersheds contain portions of 8 other allotments that are managed for proper stocking levels; allotments are managed with approved Allotment Management Plans or through annual instructions. | Stocking levels determined through adaptive management and in balance with forage supplies. |
| Recreational Activities & Fuelwood Cutting | Motorized and non-motorized trails; dispersed recreation (primarily OHV use, target shooting, hunting) | Same activities as past; 14.3 miles of existing designated trails; 7.9 miles motorized and 6.4 miles non-motorized within the K four Allotment | No anticipated change; no new trails planned |
| Roads, Utility ROWs, Land Development and Land Exchanges | 107 miles of roads on National Forest land within the 6 th level HUCs containing the project area; utility corridors | 107 miles of roads on National Forest land in watersheds; buried utility corridor along county road 5; utility corridors remain | No new roads or facilities planned; no land exchanges anticipated |

3.2 What are the Impacts to Rangeland Vegetation?

Existing Condition:

Vegetation on the allotment consists mainly of pinyon-juniper woodlands. The understory varies from dense chaparral, to mixed shrubs and grasses, to woodland/grassland mix. There are some ponderosa pine communities found on steeper slopes on Juniper Mesa and along shaded canyons. Canopy cover from shrub species is moderately to extremely thick in some locations to the extent that herbaceous forage is reduced or absent. A substantial portion of the forage base of the allotment is provided by desirable browse species such as mountain mahogany, deerbrush, Apache plume, and silktassel. Perennial grasses can be locally abundant, especially in juniper woodlands that have been previously treated to remove juniper overstory. Important forage grasses on the allotment include blue grama, sideoats grama, threeawn, sand dropseed, western wheatgrass, and squirreltail.

The Forest Plan directs us to manage rangelands as follows: “satisfactory management occurs on allotments where management actions are proceeding according to a schedule (allotment management plan), which leads to fair or better range condition with an upward trend.”(pg. 32) For this project, the ID team defined satisfactory range condition as: the maintenance of vegetation with mid- to high similarity to the Desired Vegetative Status (DVS) providing for ecological functionality and resiliency following disturbance while sustaining long-term productivity of the land. Mid to high similarity is defined as more than 34% similar to the

potential plant community. The DVS is the species composition and cover for the potential plant community as shown in the *Terrestrial Ecosystem Survey of the Prescott National Forest* (USDA 2000) and the associated *Ecological Classification of the Prescott National Forest* (USDA 2006 draft) for the key soil types found on the allotment. Table 3 shows the mix of Potential Natural Vegetation Types (PNVT) found on the K Four Allotment.

| PNVT | TEUI included Within | Acreage | Percent of Allotment |
|---|---|----------------|-----------------------------|
| Pinyon-Juniper (PJ)-Chaparral | 430, 434, 440 , 441, 452, 458, 459, 461 , 462, 477, 479, 480, 481 , 486, 499 | 25,405 | 79% |
| PJ-Woodland (persistent) | 419 , 420, 421, 422 | 2,249 | 7% |
| Ponderosa Pine Forest | 500, 501, 502, 55 | 1,910 | 6% |
| Mixed Broadleaf Deciduous Riparian Forest | 48 | 1,424 | 4% |
| PJ-Grassland | 413, 423, 463 | 476 | 2% |
| Ponderosa Pine – Mild | 530, 542 | 444 | 1% |
| Colorado Plateau Grassland | 417 | 159 | >1% |

The soil map unit numbers, or TEUI numbers, shown in bold type in Table 3 are the map units that were inventoried during this analysis. We surveyed key areas within the larger map units that would stand as representative of the map unit as a whole for that pasture. This was based on the judgment and collaboration of the ID team that included a range management specialist and soil scientist. The PNVT that were inventoried represent 90% of the vegetation types found on the allotment.

The ID team collected data on plant species composition and canopy cover at 9 key areas on the allotment and compared it to the potential composition and cover of the ecological type. The comparison was focused on the potential perennial grass community that should be present because it is known that cattle prefer to graze grasses when they are available, so that is the structural component most impacted by livestock grazing. There is a considerable browse component that provides livestock forage on the K Four allotment, so one representative brushy area in the Round Pasture was compared to the potential shrub community for the soil type. The 4 sampled sites in the North Pasture averaged 52% similarity of the existing perennial grass composition and cover to the potential composition and cover of perennial grasses. This is meeting the desired conditions developed for vegetation.

The similarity index that is developed should be interpreted by a range management specialist to understand the complexity of what is occurring. For instance, the inventory site in the Indian Pasture for TEUI 440 had the lowest similarity index for the pasture at 36% similarity between

the existing cover of indicator grass species and the expected cover. The sampled site actually exhibited higher cover of desirable species than the potential vegetation description. The potential vegetation describes 15% cover of key indicator grass species, with sideoats grama accounting for 3% of that. The sampled area actually had 18% cover of perennial grasses, with 13% of that coming from sideoats grama, which is a very desirable forage grass. The inventory data will serve as a baseline measure that will be evaluated by the range management specialist when regular inspections are conducted. Table 4 shows the results of the key area inventories for each pasture and the average similarity for the forage component of the key areas. All 9 key areas had a similarity index above the threshold desired level of 34%.

Trend is the direction of change in an attribute as observed over time. There are nine long-term vegetation inventory sites (not the same ones as evaluated for similarity index) that have been evaluated beginning in the 1960s and again in 2007. The attribute that was evaluated for change at these long term monitoring sites is the composition and relative abundance of perennial grasses. It was noted that 5 out of the 9 sites had remained relatively stable in the composition and abundance of perennial grasses, while 4 had declined. The decline in perennial grass cover at the 4 sites was accompanied by an increase in either juniper or shrub cover by an average of 22% more abundance of woody plants. The 5 sites with stable trends saw an average increase of only 2% more woody plan abundance. The stable trend at those sites that remained more grass-dominated would seem to indicate that grazing has not caused significant changes in the plant community over 40 years, but the length of time between readings, the changes in grazing management over that time period, and the many fluctuations in precipitation over that time span make it difficult to determine cause and effect relationships with any certainty.

| Pasture | TEUI Map Units Inventoried | Average Similarity for Grasses (unless otherwise noted) | Vegetation Condition |
|----------------|--|--|-----------------------------|
| North | 419 (2 sites), 440, 481 | 52% | Satisfactory |
| Indian | 481 (2 sites) | 52% | Satisfactory |
| Round | 481 (shrub site) 461 (PJ-chaparral) | 48% shrubs 53% grasses in PJ | Satisfactory |
| Bald Mountain | 48 | 56% | Satisfactory |



Figure 1. Key area in the North Pasture in TEUI 481 in October 2012. Note the small junipers that are becoming established here. This area is proposed for juniper cutting.

Noxious weed surveys have not been conducted specifically on this allotment. Isolated populations of saltcedar are known to be present in some drainages. Treatment of noxious weeds is addressed in the Final Environmental Impact Statement for Integrated Treatment of Noxious or Invasive Weeds, Coconino, Kaibab, and Prescott National Forests within Coconino, Gila, Mohave, and Yavapai Counties, Arizona. Possible treatment of known weed populations will be managed under the PNF's noxious weeds program and will not be further addressed in this proposal.

Direct & Indirect Effects on Vegetation:

The K Four Allotment Range and Upland Vegetation Specialist Report addresses the direct, indirect, and cumulative effects of each alternative. A summary of the effects is provided here, with further details found in the complete report in the project record.

Grazing by cattle can directly affect upland plants by reducing plant height, total canopy cover, and ground cover. The degree of these effects is influenced by utilization guidelines and timing of use. Over time, if grazing intensity is too high, indirect effects can occur such as a loss of plant species and a resultant shift in composition to less-preferred forage plants, and total forage production can be reduced. Repeated grazing impacts without allowing plants adequate time for regrowth exposes the soil to potential erosive forces from water and wind. This grazing proposal adheres to conservative utilization guidelines that would not result in overall negative effects to individual plant health or indirect effects to plant communities.

Climate and rainfall will have the most significant impact on the cover and vigor of perennial grasses when grazing is properly managed. A study describing 30 years of weather influence on

ungrazed areas in New Mexico found that sideoats grama reduced in canopy cover by almost half in 2007 as compared to 1977 in response to decreased precipitation (Moir 2011). A similar response is shown in repeat photos from the K Four Allotment between 2011 (Figure 2, a dry summer) versus 2012 (Figure 3, average summer precipitation).



Figure 2. Key area in TEUI 48 in September 2011 following a dry summer. This area had not been grazed yet following the summer growth period.



Figure 3. Similar area in TEUI 48 in the Bald Mountain Pasture in October 2012 showing many-fold increase in forage production in response to average or better summer precipitation.

Precipitation driven changes in forage production require stocking levels to be adjusted from year to year, which is a foundational principle of adaptive livestock management. The actual use records for the allotment from 1995 through 2013 show a range of stocking levels from 833 Animal-Months (AMs) in 2004/2005 following a severe drought period up to 3,430 AMs in 2000/2001. This range is equivalent to 139-572 adult cattle for a 6-month period. The average stocking level for this time period is 2,357 AMs, or 393 cattle for 6 months. The proposed stocking rate was developed by considering the past level of stocking and the consequences to resources from stocking at those levels. The observed stocking rate over the past two decades has resulted in achieving desired conditions for vegetation, and some improvement in watershed and soil conditions over forest-wide averages for soil map units.

Using the methods outlined in Holecheck (1988), grazing capacity estimates were made on the allotment as a whole by calculating the total amount of forage production by TEUI map unit as shown in the Terrestrial Ecosystem Survey (TES) of the Prescott NF. Animal Units ranged from 443 Animal Units (~ 2658 AUM) when 45% of the available forage estimate is allocated to livestock, to 357 Animal Units (2165 AUM) when a reduction in capacity is taken into account for slopes greater than 10%. The forage production values given in the TES survey are overall average for TEUI units that exist forest-wide, and actual site specific production may vary considerably. Yearly fluctuations in forage production based on precipitation levels will be taken into account by adjusting yearly stocking through adaptive management. The proposed vegetation treatments to cut juniper and use prescribed fire to enhance shrub palatability and availability will serve to increase available forage over the long-term. Even without these treatments to enhance forage availability, stocking within the proposed levels has been sustainable.

The adaptive management approach to grazing management seeks to balance stocking levels with forage production on a yearly basis. This allows for stocking in response to changes in forage production that naturally occur as a result of fluctuations in precipitation levels and seasonality.

Alternative 1 – Dormant Season Grazing

The conservative utilization guidelines as prescribed for this project have been shown to maintain forage production on semiarid grassland ranges (Holechek et al. 1989). Holechek and Galt (2000, 2004) provide a comprehensive review of studies related to residual leaf lengths on Southwestern forage species and growth forms as indicators of grazing intensity. They concluded that grazing at moderate or conservative intensities will generally result in maintaining or improving rangeland conditions over time. The shrub-dominated sites such as TEUI 481 in the Round Pasture are expected to remain stable unless fire or mechanical treatments are undertaken.

The dormant season grazing proposed with Alternative 1 will allow for growing season rest every year for warm-season grasses such as blue grama, ring muhly, tobosa grass, and black grama grasses that are found on the allotment. Another common species, sideoats grama, is known to green up early in the spring and could be preferentially grazed in March before cattle are removed by April 1st. True cool-season grasses such as threeawns and squirreltail may also be preferentially selected in early spring. Compliance with allowable use levels should provide for maintaining and improving the cool-season grass species that are present. Yearlong rest for pastures 1 year out of 3 will also aid in the establishment and maintenance of productivity for cool-season grasses.

The prescribed use levels would allow for retaining 55-65% of the plant biomass on-site as residual biomass. This residual biomass, or mulch, provides beneficial functions by protecting the soil surface from erosion, enhancing water infiltration, and shading the soil surface from evaporation of soil water. The benefits of retaining sufficient residual mulch have been shown to translate into increased forage production in a number of studies discussed by Molinar et al. (2001).

Alternative 2 – No Action/No Grazing Alternative

Under the No-Action Alternative, all cattle grazing within the allotment would be phased out over a 2-year period. Livestock impacts on vegetation would be removed. Only incidental wildlife grazing would occur sporadically at light intensities. The removal of grazing may allow for slightly more rapid improvement than alternative 1 in vegetation cover, vigor, and composition in areas not influenced by woody plant canopy. Where shrub cover is currently greater than would be expected for the Potential Natural Community, there will likely be limited to no improvement in perennial grass cover unless the tree and/or shrub canopy is removed by fire or vegetation treatments. This stable state of shrub dominance is expected to persist even in the absence of grazing. Those areas currently considered in satisfactory condition would remain as such under the no grazing alternative. More residual biomass would be retained under this alternative, which has been demonstrated to improve water infiltration and enhance nutrient cycling, thus promoting vigorous plant growth.

The cancellation of the grazing permit would create an absence of maintenance of structural improvements. Water developments and fencing would no longer be maintained unless sufficient Forest Service or partnership funds allowed for such maintenance. Allotment boundary fence maintenance may have to be assigned to adjacent grazing permit holders, creating an

economic burden on them. The loss of water system improvements may have adverse impacts on wildlife habitat.

Range Improvement Effects

Alternative 1:

Structural Range Improvements: The Proposed Action calls for constructing two new water developments in the Round Pasture, adding pipeline and troughs on two existing water systems in the North and Indian Pastures, and constructing fence in Hitt Wash and in the northwest corner of the allotment. The construction of new water sources can result in the removal of vegetation in areas up to ¼-acre each. Water sources will draw livestock to use forage within proximity of the water source. Grazing impacts may be locally heavy within ¼-mile of a water source. Rest and rotation strategies for pastures will help forage plants to recover after use. The new water sources will provide for dispersion of the grazing herd into under-utilized areas. Fence construction should not impact existing vegetation other than in a limited, small area along the fence corridor. Woody vegetation or shrubs may be thinned along the fenceline. Access to existing improvements for maintenance and new improvements by overland travel with machinery will damage some herbaceous plants in a limited area. These plants should recover quickly once precipitation occurs. Employing Best Management Practices (BMPs) that limit travel to when soils are dry should mitigate long-term effects to soils and retain the productive potential for vegetation. Alternative 2 would not implement the construction of any range improvements, and as such would not disturb or damage any vegetation.

Nonstructural Range Improvements: Juniper cutting is proposed in the North and Indian Pastures in TEUI map units 481 and 417. In the Round Pasture, there is juniper cutting proposed in TEUI map units 461 and 477. The amount of cutting will be more extensive in TEUI map units 481 and 417. Juniper cutting treatment areas will be those areas that exhibit lower shrub cover so that the juniper cutting is most effective for restoring perennial grass cover. Juniper cutting may be implemented by machinery such as a hydraulic cutting head mounted on machinery, or trees may be hand cut. Machinery that drives overland to cut trees has the potential to damage some grass plants, but this should be negligible. If machinery is operated when soils are dry, there is less likelihood of soil compaction that can inhibit water infiltration. The short term effects to herbaceous vegetation from possible machinery damage will be small in comparison to the benefits to herbaceous vegetation from removal of the juniper overstory. Removing the juniper canopy will give herbaceous vegetation less competition for water, sunlight, and soil nutrients. Treatments may be designed to allow for juniper slash or whole trees to remain on site and protect newly established grasses from grazing and to provide a favorable microclimate for grasses to establish. Some juniper may be removed through personal use or commercial permits.

The group selection juniper cutting will be implemented in TEUI map unit 461 in the Round Pasture. This map unit can exhibit considerable variability in perennial grass cover. Field visits showed that more perennial grass cover was present in those areas with moderate protective rock cover, and low shrub cover. Juniper would be selectively cut only in those areas that have remnant perennial grasses and lower shrub cover. The intent of the treatment is to maintain the herbaceous productivity in this extensive soil map unit in the Round Pasture. The treatment acreage is just over 1,000 acres, but given the limitations of some areas to produce perennial grasses, juniper cutting will occur over only about 40% of the identified treatment block. The appropriate soils, watershed, wildlife, and range specialists will be consulted to identify the treatment blocks. This area has a lower priority for juniper cutting than TEUI 481 or 417. Juniper cutting would be accomplished using hand crews and not machinery due to the variable topography and poor access.

Prescribed fire has been identified as a follow-up treatment after juniper cutting, and as a treatment for reducing the shrub canopy. The burn blocks that have been identified will be implemented when the resource specialists determine that the conditions are correct for treatment. For instance, juniper slash or whole trees may be left on site to provide favorable conditions for grasses to establish. It would not be desirable to burn these areas until the juniper had decayed to a point where a prescribed burn would not be too hot and damage the newly established grasses. The establishment of new grasses will depend on climatic conditions. The conditions for burning should be such that a mosaic of openings in the brush canopy is created. It would be a treatment goal to retain sufficient amounts of protective litter cover under the shrubs so that soil losses are minimized. Most brush species present are of the type that sprouts quickly after fire. The sprouts are more tender and nutritious than the decadent brush plants, and provide higher quality forage for livestock and wildlife. After implementing a burn treatment, the vegetation will be allowed to recover so that browsing will not damage the resprouts. This will require good coordination between the implementers of the burn and the range personnel so that pasture rotations can be adjusted accordingly. The short term effects of the prescribed burning treatments will be to reduce the available forage for livestock. This effect may last until after the growing season, given there is adequate precipitation for regrowth. The long term effects of burning will be to provide more nutritious and available forage. The effects of the treatment are likely to persist 3-5 years, depending on the thickness of the brush prior to treatment. Some burn blocks will be pretreated by hand or machine cutting of brush and juniper to provide an adequate fuel load to facilitate carrying fire.

Alternative 2: No new structural range improvements would be constructed under this alternative. The nonstructural vegetation treatments could still be implemented under this alternative, and the effects would be as described under alternative 1, although there would not be a need to coordinate burning activities with pasture rotation schedules.

Cumulative Effects on Range Vegetation Resources

The cumulative effects analysis area considered for effects on range/vegetation resources consists of the K Four Allotment project area. The past and present activities and events that have affected the vegetation include livestock and wildlife grazing, past wildfires, prescribed fire, juniper cutting, and roads. These activities may affect vegetation in ways similar to livestock grazing through removal of herbaceous plant canopy cover. Indirectly these activities may affect vegetative productivity by causing soil compaction that leads to reduced water infiltration and then to reduced plant growth. Removal of vegetation can expose the soil to erosion and thereby reduce long-term productive potential for vegetation. Site visits have shown that the impacts of these past activities are no longer evident. The vegetation impacts created through livestock grazing, improvement construction, adaptive management, and vegetation management described for alternative 1, when added to the other past, present and future activities do not together accumulate to levels that are considered to be significant for the vegetative resources, nor are they expected to lead to irreversible effects to vegetation

3.3 How Will the Vegetation Treatments Affect Forest Health?

Existing Condition:

The Pinyon-Juniper/Chaparral, Pinyon-Juniper/Woodland and Pinyon-Juniper Grassland Potential Natural Vegetation Types (PNVTs) comprise a total of 88% (or 28,130 acres) of the vegetation on the K Four allotment. The dominant juniper species in the area is Utah juniper (*Juniperus osteosperma*) with alligator juniper (*Juniperus deppeana*) frequent across the allotment as well. According to the Prescott National Forest's midscale vegetation assessment

completed in 2007, canopy cover density distribution exists within the juniper vegetation types in the allotment as follows:

- 4% (1,125 acres) has canopy cover > 60%
- 80% (22,504 acres) has canopy cover ranging from 30 to 59.9%
- 16% (4,501 acres) has canopy cover ranging from 10 to 29.9%

Most juniper in the allotment are young to mid-aged and average between 5" to 20" DRC (diameter at root collar). Pinyon pine (*Pinus edulis*) is sub-dominant in Pinyon-Juniper stands in the project area and understory vegetation is comprised of native shrubs, forbs, and grasses. Historical fires in Pinyon-Juniper vegetation types tended to kill all or most of the trees within the places that burned regardless of tree size (Romme 2007).

Desired conditions for this project are a mix of seral stages and age classes in pinyon-juniper vegetation types that can provide structural habitat diversity through the creation of canopy openings that allow for improved forage production where soils are the most productive. It is desirable to maintain openings in pinyon-juniper types where the soils are productive and can sustain herbaceous vegetation.

Description of the Proposed Vegetation Treatments:

Juniper Cutting Without Prescribed Burning; 384 acres

- Cut juniper to maintain past treatments by means of powersaws or with mechanized equipment
 - Lop and scatter slash outside the drip line of cut trees
 - Residual trees should be in groups rather than evenly spaced
 - Maintain or create age class diversity by retaining trees across all age classes present

Spot Mechanical Treatment and Prescribed Burning; 3,382 acres

- Cut juniper to create openings in 25% of the area (approx. 845 acres of the 3,382 acres would be cut) to reduce continuity in pinyon-juniper canopy by means of hand cutting with powersaws (chainsaws) or with mechanized equipment (such as an agrax-axe).
 - slash would not be lopped or scattered
- Retain most pinyon and large (monarch) alligator junipers

Juniper Treatment with Possible Prescribed Burning; 1,658 acres

- Cut juniper to a target residual basal area of 5-10 square feet per acre; 20% of the area would contain residual tree groups and the remaining 80% of the area would be harvested by means of hand cutting with powersaws (chainsaws) or with mechanized equipment (such as an agrax-axe).
 - lop and scatter slash outside the drip line of cut trees
 - utilization of harvested juniper would be by personal use fuelwood collection or by commercial sales
 - residual trees should be in groups rather than evenly spaced
 - maintain or create age class diversity by retaining trees across all age classes present
- Retain most pinyon and large (monarch) alligator junipers

Juniper Treatment; Group Selection with Potential Prescribed Burning Follow-up; 1,064 acres

- Cut juniper to create openings in up to 40% of the area (approx. 426 of the 1,064 acres would be treated) to reduce continuity in pinyon-juniper canopy by means of hand cutting

with powersaws (chainsaws). Focus treatment efforts on more productive sites that are likely to be able to respond to canopy cover removal that have a low density of shrub oak in the understory

- during implementation, work with appropriate specialists to determine where the more productive sites are that should be treated
 - slash would not be lopped or scattered
 - retain most pinyon and large (monarch)alligator junipers
- Evaluate the need for follow-up burning treatment based upon recovery of vegetation in openings; burning would only occur after herbaceous plants have established and when juniper skeletons have broken down to a point where burn severity will likely be low

Prescribed Burning; 7,380 acres

Effects of the Proposed Action

Research has shown that thinning overstory juniper trees can enhance conditions for growth and reproduction of understory plants by increasing light availability, reducing interception of precipitation, and reducing competition for soil moisture and nutrients (Bates et al. 2000).When tree canopies become relatively dense (above about 30% cover) there is typically a reduction in herbaceous plant cover from grasses and forbs due to the competition for water, nutrients, and sunlight. Proposed actions would move approximately 48% of pinyon-juniper vegetation types within the allotment area towards the desired conditions for this project (a mix of seral stages and age classes in pinyon-juniper vegetation types that can provide structural habitat diversity through the creation of canopy openings). Twenty-two percent of the pinyon-juniper vegetation types within the project area would be mechanically treated and 26% of the vegetation types would be treated with prescribed burning. This leaves over 50% of the PJ vegetation type within the project area untreated.

Reduced stand density would result from juniper cutting and prescribed burning activities, which would facilitate movement towards more varied vegetation structure in which grass-dominated openings and a mix of tree age classes exists. Canopy cover would be reduced to less than 30% on 2,929 acres (or on 10% of the juniper vegetation types across the analysis area) if proposed actions are implemented. These changes in vegetation composition and structure would improve habitat quality for wildlife, and provides more usable forage for wildlife and livestock. Harvesting juniper to create small openings is beneficial for deer, elk, and livestock because large homogeneous landscapes are broken up, providing food and adjacent hiding-thermal cover (Gottfried 2004). More specifically, research has shown that perennial grasses can be expected to dominate the understory following thinning in juniper stands for a minimum of 13 years. Pretreatment plant composition can be used as an indicator of understory successional trajectory following juniper control. In other words, if native perennial grasses are depleted or not present prior to treatment, annual grass dominance can be expected after treatment (Bates et al. 2005).

Old Growth: The Prescott National Forest LRMP gives direction that no less than 20 percent of a forested ecosystem shall be managed to develop or retain old growth function (Appendix H, pg. 151-153). According to the Forest Plan, old-growth forest should be analyzed at multiple scales – one scale above and one scale below the ecosystem management area.

Small Scale (One Scale Below the Management Area): Of the 15,106 acres that meet the minimum criteria to be considered old growth, 827 (or 5%) are proposed for juniper cutting and the remaining 95% can be managed to develop or retain old growth functions.

Mid-Scale: Areas that meet minimum criteria to be considered old growth range from 42 to 8,676 acres within the seven 6th Code Hydrologic Units that the project area overlaps (Table 5). No more than a maximum of 5% of any of these watersheds is being proposed for treatment. The areas in each watershed that are not proposed for treatment can be managed to develop or retain old growth functions.

Table 5. Amount of Pinyon-Juniper Vegetation proposed for treatment by 6th Code HUC

| Name of 6th Code Hydrologic Unit | Total Acres In the Hydrologic Unit | Acres that Meet Minimum Criteria for Old Growth | Acres Proposed for Treatment | % |
|----------------------------------|------------------------------------|---|------------------------------|---|
| Stringtown Wash-Pine Creek | 12,545 | 4,624 | 0 | 0 |
| Hitt Wash | 22,838 | 8,248 | 393 | 5 |
| Mud Tank Wash | 23,158 | 5,479 | 23 | 1 |
| Antelope Wash | 9,541 | 42 | 0 | 0 |
| Upper Walnut Creek | 22,854 | 8,532 | 0 | 0 |
| Lower Walnut Creek | 29,494 | 8,676 | 331 | 4 |
| Pine Creek | 37,544 | 6,646 | 77 | 1 |

Large Scale (One Scale Above the Management Area): Areas that meet minimum criteria to be considered old growth within the two 5th Code Hydrologic Units that the project area overlaps are displayed in the Table 6. No more than a maximum of 1% of these watersheds is being proposed for treatment. The areas in each watershed that are not proposed for treatment can be managed to develop or retain old growth functions.

Table 6 Amount of Pinyon-Juniper Vegetation proposed for treatment by 5th Code HUC

| Name of 5th Code Hydrologic Unit | Total Acres In the Hydrologic Unit | Acres that Meet Minimum Criteria for Old Growth | Acres Proposed for Treatment | % |
|----------------------------------|------------------------------------|---|------------------------------|-----|
| Lower Big Chino Wash | 232,688 | 41,927 | 411 | 1 |
| Williamson Valley Wash | 205,367 | 47,476 | 416 | 0.8 |

Effects of No Grazing and No Vegetation Treatments

If the proposed actions regarding juniper treatment and prescribed burning were not implemented, vegetation in the K Four Allotment area would continue on its current successional path. Canopy cover of both tree and shrub vegetation would continue to increase and grass/forb cover would continue to decrease. Continuous closed canopy (>30%) states would persist and stands would be even aged due to the lack of openings created from treatment. As a result of these vegetation composition and structure characteristics, habitat

quality for wildlife and forage for both wildlife and livestock would be reduced when compared to the proposed action.

3.4 What are the Impacts to Soils?

Existing Condition:

Key area sampling sites were identified within each representative TEUI and were chosen based on their representation of environmental conditions of the selected map unit (USDI 1999). Since key areas were selected based on current managements actions, soil conditions may differ for the whole map unit versus the key area. For example, a majority of a TEUI's soil condition may be deteriorated in thick pinyon-juniper but livestock access is limited in these areas due to lack of forage, while a small portion of the same TEUI with minimal pinyon-juniper cover and ample forage production may be selected for a key area because this site represents current livestock management. The sampled TEUIs are 48, 434, 461, and 481 for this analysis.

Soil, vegetation, and water resource field data was collected by the Prescott National Forest Rangeland Core Team which consists of the Rangeland Management Specialist, Hydrologist, and Soil Scientist. This field data was summarized and used to determine existing conditions. Soil condition is an evaluation of soil quality or the capacity of the soil to function within ecosystem limitations to sustain biologic productivity, maintain environmental quality, and promote plant and animal health (USDA FS 1999). The soil condition rating procedure evaluates soil quality based on an interpretation of factors that affect three primary soil functions. The primary soil functions evaluated are soil stability, soil hydrology, and nutrient cycling (USDA FS 1999). These functions are interrelated. Field measurements were collected to determine ground cover, spatial distribution of bare spaces, soil bulk density (a measure that will influence water infiltration), as well as a checklist of qualitative soil attributes.

The Prescott National Forest Terrestrial Ecosystem Survey (USDA 2000) identifies landscape scale soil conditions across the Forest. This K Four analysis identifies specific TEUIs that reflect the overall impacts of current grazing management. There are some differences between the Forest wide landscape scale assessment of soil condition and the soil condition found on sampled representative areas within the K Four Allotment. For example TEUI 48 was rated as Unsatisfactory from a Forest wide perspective but was assessed as Satisfactory where sampled in the Bald Mountain Pasture. In some units there was a mixture of conditions, commonly associated with the type and density of tree or shrub canopy. TEUI 481, one of the major soil units in the allotment was rated as Unsatisfactory at a Forest wide level. However, field verification within the K Four Allotment found areas rated as Satisfactory, as Impaired, and as a complex of Impaired and Unsatisfactory. The map in Appendix 2 shows the spatial distribution of both the soil condition as rated by TES for the Forest, and the project-level assessment of soil condition on the K Four Allotment. The following is a discussion of the current conditions on the soil map units that were evaluated for this analysis.

TEUI 48

TEUI 48 is a prominent map unit within the Bald Mountain Pasture associated with terraces adjacent to Graver Wash. Soils are located on gently sloping gradients, are deep, and classified as coarse textured due to particle size class and texture. Soil strength is high due to coarse soil textures and generally more resistant to soil compaction. Erosion hazard is slight but soil parent material has a low coherence (detachability) which makes these soils susceptible to erosion. Maintenance of vegetation ground cover is necessary to maintain soil stability. These soils have a potential to be highly productive due to their higher available water holding capacity and non-limiting soil texture and pH levels.

TEUI 434

TEUI 434 is a representative unit of the prominent alluvium parent material from granite origins within the Round Pasture and a prominent map unit within the Indian Pasture. The PNVT is classified as Pinyon-Juniper Evergreen Shrub and the map unit is located on moderately steep slopes. Soils are deep, and surface texture is coarse while subsurface soils are clayey. Soil strength is high due to coarse textures and internal rock, making the soils less susceptible to compaction. However, the subsurface clayey textures are susceptible to damage when wet from load bearing stresses. Soils have a moderate erosion hazard. Maintenance of vegetation ground cover is necessary to maintain soil stability and productivity. The high level of sand in the soil surface limits its ability to retain moisture for grass growth. However, the coarse texture and deep soils allow precipitation to percolate deeply within the soil profile which favors broadleaf plant production. TEUI 434 in the Round Pasture exhibits impaired soil condition. Large continuous bare soil patches are common and are adjacent to gully erosion in some areas.

TEUI 461

TEUI 461 is the largest map unit within the Round Pasture. This PNVT is classified as Pinyon-Juniper Evergreen Shrub. A large potential vegetation component of this TEUI is Juniper and Pinyon trees with a canopy cover averaging 36%. Gentle slopes are associated with this soil type. Generally, there are two components representative of this map unit. Component .1, which is the representative component, supports a denser juniper tree community, has moderately deep soils, has moderately fine-textured soils with a high shrink-swell potential. TES has described this unit to be more conducive for juniper tree production. The high levels of clay and shrink-swell characteristics can limit herbaceous plant production. Soils have low soil strength and are susceptible to compaction from hoof action and damage when wet. The other component of this map unit is associated with extremely stony rock cover and has more potential to develop a perennial grass component. These soils have a shallow depth with a large volume of rocks within the soil profile, and have a moderately fine-texture due to the higher portion of sand. Soils are not susceptible to mechanical damage, compaction or soil loss due to the armoring of the surface from high levels of large stone rock cover.

The primary component (i.e. .1) of TEUI 461 is in unsatisfactory condition. This component has high juniper cover levels that are similar to potential and minimal vegetative ground cover. The lack of vegetative ground cover and organic matter has resulted in continuous widespread sheet erosion resulting in erosion pavement and a large portion of the surface A-horizon has been lost. All soil functions are non-functional i.e. nutrient cycling, hydrologic, and stability. The TEUI 461 component associated with the extremely stony soil surface is in satisfactory condition. The protective rock cover is dissipating rain impact upon the soil surface and decreasing overland flow which provides soil stability. The graminoid cover within this map component provides root biomass and soil organic matter for nutrient cycling and more favorable soil structure.

TEUI 481

TEUI 481 is the largest unit across the allotment and the prominent map units used by livestock. This is a representative map unit for Indian, North, and Round Pastures. The PNVT is classified as Pinyon-Juniper Evergreen Shrub with a variable mix of trees, shrubs, and grasses. The vegetation component most applicable to this analysis is composed of more open pinyon-junipers with a graminoid component dominated by blue grama since livestock tend to use these areas more extensively than shrub-dominated areas. Some of these open pinyon-juniper areas are associated with past juniper treatments. Other areas have a thick juniper density of sapling size. A dense chaparral component associated with some mature pinyon and juniper is also associated with this map unit.

Soils are located on gently sloping gradients, have a moderately-coarse to coarse texture, are deep, and have minimal rock content within the soil profile. Parent material is alluvium from Tertiary and Quaternary sediments. Soil erosion hazard is slight due to the flatter slopes. However, due to the less cohesive granitic material from which these soils are derived, they require sufficient soil organic matter and vegetation cover to maintain stability. These soils have a potential to be highly productive due to their higher available water holding capacity and non-limiting soil texture and pH levels.



The chaparral component of TEUI 481 is in satisfactory condition (photo at left). The dense shrub species associated with the chaparral plant community is producing ample amounts of litter for soil protection and nutrient cycling. Litter cover is providing soil stability and being incorporated into the soil as soil organic matter. Satisfactory soil structure within these areas promotes infiltration and water holding capacity. In addition, the soil stability is high which suggests the soils are more

resistant to erosion. Within the interspace of the shrub species there is some erosion pavement but the flow patterns associated with these interspace areas are disrupted and non-continuous due to the random obstruction of litter associated with shrub species.

Areas of TEUI 481 that have dense juniper frequency with measured canopy cover of approximately 30-35% are in unsatisfactory condition (photo below). These sampled sites were



predominantly comprised of juniper cover within the sapling and seedling class. The age classes of these juniper trees suggest an increased influx of juniper establishment that is not representative of historical conditions. The lack of vegetative ground cover indicates poor organic matter levels and the loss of soil functions. Infiltration has decreased, runoff has increased that has resulted in continuous widespread overland flow and accelerated soil loss

resulting in erosion pavement. Some trees and shrubs are hummocked and portions of the surface A-horizon have been lost.

TEUI 481 soil conditions associated with the North and Indian Pastures open pinyon-juniper grasslands are impaired. Vegetation spatial distribution is good and is similar to reference conditions and in some instances, more favorable. Existing vegetative ground cover levels are variable and in some instances litter levels are higher than reference and potential but reference condition has higher levels of basal cover. Existing bulk density measurements are significantly higher than reference conditions. This is indicative of other soil quality indicators. Litter is not distributed in the soil interspaces and there is minimal to no soil organic matter within the surface horizon, resulting in minimal nutrient cycling. This lack of organic matter has resulted in less than favorable soil structure, low vertical continuity of surface pores, and the development of vesicular crust up to 0.5 inch thick (type of physical soil crusts). The lack of soil organic matter and rain impact upon the soil surface has resulted in the formation of these physical soil crusts which restrict infiltration. In addition, the lower organic matter has resulted in soil aggregate instability which makes the soils less resistant to erosion. Other soil quality indicators suggest infiltration has decreased, overland flow has increased, and soil erosion has increased. Graminoid pedestaling is common. Portions of the surface A-horizon have been lost and when slope gradients increase minimally widespread erosion pavement is common. The hydrologic and stability function has been reduced but the random and well distributed graminoid cover is retarding overland flow and potentially higher erosion rates.

The photo below shows TEUI 481 in the Indian Pasture in an open juniper grassland that has not recently been thinned of juniper: This site shows impaired soil conditions with very similar soil quality attributes as described for TEUI 481 in the North Pasture. Interspaces are



developing thick physical crusts due to lack of litter and soil organic matter, resulting in a decrease of infiltration and elevated soil loss.

In contrast, the area previously treated to reduce juniper density in TEUI 481 in the Sinks area of the Indian Pasture is in satisfactory condition. Vegetative ground cover associated with juniper slash, high graminoid cover, and good vegetation spatial distribution has

resulted in functional soil conditions. Organic matter is being incorporated into the soil surface resulting in less physical soil crust formation and minimal thickness. Indicators suggest soils are stable with patches of minimal pedestalling.

Soil Desired Condition and Management Objectives

Soil desired conditions were developed by the interdisciplinary team. The soils desired condition for this project is identified as: Maintenance of soils in satisfactory condition over the long-term,

or shows improvement in areas departing from satisfactory condition where livestock grazing is contributing to the departure.

More specific objectives developed for soil, watershed, and wildlife are:

- Increase graminoid cover by decreasing juniper density.
- Promote a forage base for wildlife species.
- Provide immediate protective ground cover in the form of juniper slash for soil stabilization and protection and wildlife habitat.
- Attain and maintain coarse woody material standards for soil productivity, nutrient cycling, and wildlife habitat.
 - Juniper Grassland PNV 1-2 tons/acre coarse woody debris.
 - Pinyon-Juniper Woodland PNV 2-5 tons/acre coarse woody debris.
 - Pinyon-Juniper Evergreen Shrub PNV retain coarse woody debris; strive for 1-5 tons/acre.
- Improve wildlife habitat diversity through mosaic treatments, promoting vegetation age class and structure diversity.
- Improve vegetative vigor for wildlife nutritional value/palatability and biomass production for soil protection.

The following table displays TEUI soil condition by pasture. Site specific management objectives, grazing intensity guidelines, and physical adaptive management measures were identified as a means to achieve desired conditions. Improving and maintaining graminoid cover and achieving an upward trend would assist in achieving the following soil management objectives.

| Pasture | TEUI | Field Verified Soil Condition | Management Objectives | Physical Management Measures |
|----------|------|-------------------------------|--|---|
| North | 417 | Satisfactory (exclosure) | Improve and/or maintain satisfactory condition. | |
| North | 481 | Impaired: Open PJ grassland | In open PJ grassland improve litter distribution and obtain nutrient cycling to improve soil structure, reduce bulk density, reduce vesicular crust, increase infiltration, and reduce surface runoff. | Treat deeper, more productive soils with scattered or young age PJ and low shrub component to reduce canopy and increase vegetative ground cover. |
| | | Unsatisfactory: Dense juniper | In dense juniper of young age (seedlings/saplings) with deep soils reduce tree canopy and increase vegetative ground cover. | |
| Bald Mtn | 48 | Satisfactory | Improve and/or maintain satisfactory condition. | |
| Indian | 434 | Not assessed | Improve and/or maintain condition | |
| Indian | 481 | Impaired: Open PJ grassland | In open PJ grassland improve litter distribution and obtain nutrient cycling to improve soil structure, reduce bulk density, reduce vesicular crust, increase infiltration, and reduce surface runoff. | Treat deeper, more productive soils with scattered or young age PJ and low shrub component to reduce canopy and increase vegetative ground cover. |
| | | Satisfactory: | Maintain and/or improve existing | |

| Pasture | TEUI | Field Verified Soil Condition | Management Objectives | Physical Management Measures |
|---------|------|--|--|--|
| | | Previously treated juniper (Sinks) | satisfactory condition. | |
| Round | 434 | Impaired | Improve vegetative ground cover, reduce surface crust in interspaces. | |
| Round | 461 | Unsatisfactory: dense juniper | Increase vegetative ground cover and soil organic matter to improve soil structure, infiltration and nutrient cycling. | Treat more productive sites likely to respond to reduced canopy cover, having a low density of shrubs in understory. |
| | | Satisfactory: Components armored with stony surface. | Maintain existing satisfactory condition. | |

Direct & Indirect Effects on Soils:

The effects analysis predicts a soil condition trend but does not necessarily identify a change in soil condition class. There are many factors that influence soil condition processes and changes in soil function are very variable and could take up to 100 years on some soils associated with unsatisfactory condition. However, extraneous factors and TEUI potentials were considered when predicting soil condition classes associated with each alternative within a 10-year time frame.

Alternative 1 – Dormant Season Grazing

There are effects from both the modified grazing system, including additional waters, plus from the vegetative treatments applied. They are discussed for the sampled soils by pasture.

North Pasture, TEUI 481

Increased rest under the three pasture rotation system with 18-month rest periods every third year would provide for improvement of soil structure through freeze-thaw cycles and reduced localized compaction from livestock trampling. There would also be increased opportunity for litter and organic matter to be incorporated into the soil. Retention of additional vegetation biomass would improve soil organic matter and nutrient cycling, assist in alleviating localized soil compaction, contribute to favorable soil structure and infiltration, and promote soil stabilization.

Cutting pinyon-juniper to a basal area averaging 5-10 square feet/acre, while leaving trees in groups rather than uniformly distributed, should greatly reduce juniper competition for soil moisture and nutrients over the majority of the area treated. The response to juniper treatment on the nearby Sinks area of TEUI 481 is an indicator of this potential. Where treatment is done in areas of current very dense stands of younger juniper the proportionate increases would be expected to be the greatest -- whether slash is scattered (Hastings 2003) or the skeletons simply left (Pierson 2007). Increases in vegetative ground cover, both from vegetation and litter, would increase soil organic matter and aggregate stability, reduce bulk density, and improve soil hydrologic properties. Possible follow-up burning would be done implementing Best Management Practices, including maintaining coarse woody material guidelines for soil productivity, nutrient cycling, and wildlife habitat. Burning would result in releasing some nitrogen with some volatilized and the remainder available for vegetative uptake. It would also result in a brief window of time for potential wind movement of ash containing nutrients. However, creating a much more open canopy area is not expected to result in wind erosion as TEUI 481 is rated as having low wind erodibility. The more open areas currently rated as

impaired would be expected to move toward satisfactory condition during the 10-year period. The very dense young stands treated would move toward impaired from their current unsatisfactory condition.

Indian Pasture, TEUI 481

Effects of the grazing management system would be similar to those of TEUI 481 in the North Pasture. Vegetative treatment in the northeast portion would be similar to that of TEUI 481 in the North Pasture; however, the northeastern most portion (Sinks area) has previously been done but would receive follow-up maintenance.

In the southwestern part of the pasture there is scheduled some targeted prescribed burning as well as in the adjacent portion of the Round Pasture. These are generally areas with a higher shrub component and burning will create more diversity of age classes and stimulate browse growth. Best Management Practices have been developed to stage burning over a period of years to allow recovery of the first areas from the disturbance before burning the adjacent downslope areas. In addition, guidelines for protecting drainages and providing filter strips would be employed, as well as protection for large and over mature individuals or groups. Initial impacts of burning the shrub component will include vulnerability to wind dispersal of ash, including some of the released nitrogen; however, sprouting will occur quickly and minimize that time period.

Indian Pasture, TEUI 434

Grazing management effects would be similar to those already described. Vegetation treatment would primarily be spot mechanical thinning and leaving juniper skeletons to create microclimates for grass establishment. It would create openings covering approximately 25 percent of the mapped area. Within these openings herbaceous and litter cover would increase and bare soil would be decreased. The increased organic matter and surface soil protection would improve aggregate stability, increase nutrient cycling, and improve soil hydrologic function. Infiltration capacity would be increased and soil detachment from rainfall would decrease. Follow-up burning would only occur after adequate establishment of herbaceous vegetation and under conditions to provide for low burn severity and meeting guidelines for coarse woody material. Although TEUI 434 is classified as having moderate wind erodibility, leaving the tree skeletons will help reduce wind velocity at the soil surface. The addition of new water points east of Indian Springs would help reduce the concentrated use impacts which have occurred in the area adjacent to and downstream from Indian Springs.

Round Pasture TEUI 461

The Round Pasture has not recently been grazed. Locations of reliable water have affected livestock distribution, especially during general periods of drought. Two additional waters are planned which will help obtain more even distribution. Livestock grazing impacts will be resumed but following the proposed action with Best Management Practices should not result in declining soil conditions. Its use in the three pasture rest rotation system will help alleviate problems with impaired soil conditions in portions of the other two pastures.

A treatment of group selection juniper cutting with possible follow-up burning will be applied to the more productive component which constitutes approximately 40 percent of the TEUI. Treatment would be done by hand with no lopping; skeletons would be left to create microclimates for herbaceous recruitment and establishment. Follow-up burning would only occur after adequate establishment of herbaceous vegetation and under conditions to provide for low burn severity and meeting guidelines for coarse woody material. Soil effects in the thinned portion would include increased vegetative ground cover, both from vegetation and

litter, and increased soil organic matter -- with resultant improvement in aggregate stability, reduced bulk density and improved soil hydrologic properties. This TEUI has very low wind erodibility. The treated areas would be expected to move from their current unsatisfactory conditions to a mixture of impaired and satisfactory during the ten year period. No vegetative treatments are scheduled for TEUI 434 in this unit.

Alternative 2 – No Action/No Grazing Alternative

All of the satisfactory soil conditions would be maintained because no grazing impacts would occur. More graminoid and vegetative ground cover would be retained on the site than under alternative 1. This would promote nutrient cycling, favorable soil structure and infiltration, and soil stability.

Impaired soil conditions would improve because more vegetation biomass and organic matter would be retained on the site and no localized trampling associated with livestock grazing would compact the soils. Vegetation spatial distribution would improve and subsequently improve the spatial distribution of soil organic matter, nutrient cycling, soil structure, and infiltration, and would assist in stabilizing the soils. Erosion pavement patch sizes and frequency would decrease because runoff would decrease which would promote soil stabilization and soil function recovery. Graminoid recruitment would not be influenced by livestock grazing. Improvement of vegetative ground cover spatial distribution would decrease the hydrologic runoff connectivity and would promote soil stabilization.

Range Improvement Effects:

Alternative 1, Dormant Season Grazing:

Range improvement construction would eventually impact approximately ¼ acre for water developments, and a thin, linear corridor for fencing. The direct effects of construction activities have the potential to decrease and damage protective vegetative ground cover, and cause soil displacement and compaction over a small, limited area. This has the potential to decrease infiltration, increase runoff, accelerate soil loss, disrupt nutrient cycling, and ultimately negatively impact productivity. Soil disturbance and excavation can also expose unfavorable subsurface soil properties that may reduce soil productivity. These potentially negative impacts would be largely mitigated by implementing range improvement soil and water conservation practices identified in Best Management Practices for project implementation. Range improvement soil and water conservation practices, identified in the BMPs, provide guidance on site evaluation, site preparation, and erosion control measures as a means to minimize soil damage to productivity.

Alternative 2, No Grazing:

There would be no impacts to the soil resources from range improvement installation and maintenance because livestock grazing would not occur. The vegetation treatments may still occur under this alternative, and effects would be as described for alternative 1.

Cumulative Effects on Soil Resources

See entry on pages 42-44: “Cumulative Effects on Soil, Watershed Condition, and Water Resources”.

3.5 What are the Impacts to the Watersheds and Water Resources?

Existing Condition:

Riparian areas have ecological importance well beyond their small percentage of land area. This percentage is even smaller in the arid southwestern United States, and inversely, their

importance more critical. With their high species diversity and structural complexity, they provide critical terrestrial and aquatic habitat to wildlife species from adjacent upland and riparian area environments. Riparian/wetland areas are properly functioning when adequate vegetation, physical channel features and debris is present to 1) develop root masses that stabilize streambanks against cutting action, 2) dissipate energies associated with stream flow, 3) filter sediment, capture bedload, and aid floodplain development; and 4) improve flood-water retention and ground water discharge.

The allotment is drained by Walnut Creek, Hyde Creek, Indian Springs Wash, Mud Tanks Wash, and Hitt Wash, all of which are tributaries of the upper Verde River. Most of these drainages are ephemeral or intermittent flow. Those with intermittent flow will have persistent water for part of the year, often around a spring source in the drainage. Groundwater drains toward the aquifer of the upper Big Chino along the western edge (Blasch et al. 2006). Riparian vegetation occurs along portions of Hitt Wash, Hyde Creek, and Indian Springs Wash. Walnut Creek has the most extensive riparian vegetation, but this occurs on private lands outside the area of this analysis. Hitt Wash has mainly herbaceous riparian vegetation such as sedges, rushes, horsetails, and other grass-like plants. There are localized areas of velvet ash and willow. Hyde Creek has more predominant woody riparian vegetation such as velvet ash, willow, and Fremont cottonwood. The riparian vegetation at Indian Springs Wash is mainly within a fenced enclosure at the spring source, consisting of a mix of cottonwood, willow, and ash.

Watershed condition consists of the upland area condition plus the streamcourse or riparian condition (including springs/seeps and wetlands). The upland condition is assessed via soil condition – hydrologic function, stability, and nutrient cycling. The Proper Functioning Condition (PFC) assessment method (USDI BLM 1998) is the minimum standard for assessment of riparian condition (Thomas 1996). These assessments were conducted by an interdisciplinary team including hydrology, soils, and range ecology skills. The descriptive notes recorded as a part of this assessment help to provide additional, more specific information beyond the classification. Representative and major springs/seeps were visited by the interdisciplinary team and described for this evaluation.

The K Four Allotment is within the Williamson Valley Wash and Lower Big Chino Watersheds (5th level HUC) nested within the Big Chino Wash sub basin (4th level unit). Portions of seven 6th level watersheds are within the allotment with three being in the Williamson Valley 5th code HUC and four within the Lower Big Chino (see map in Appendix 3 for names and locations of 6th level watersheds). Of note is the fact that the allotment constitutes 44 percent of the Lower Walnut Creek 6th level HUC, 31 percent of the Mud Tank Wash watershed and 30 percent of the Hitt Wash watershed. The allotment acreage within the other four 6th HUC watersheds ranges from 1 to 6 percent.

Water Quality:

Every two years, the Arizona Department of Environmental Quality (ADEQ) is required by the federal Clean Water Act to conduct a comprehensive analysis of water quality data associated with Arizona's surface waters to determine whether state surface water quality standards are being met and designated uses are being supported. This report is submitted to the U.S. Environmental Protection Agency (EPA) for approval. Once approved it is used to guide water resource management decisions.

Two stream segments below and adjacent to the project area were assessed by ADEQ in the 2010 Status of Water Quality Arizona's Integrated 305(b) Assessment and 303(d) Listing

Report, December 2011 to determine if Beneficial Uses were being met. A summary of this assessment for each of these segments is discussed below:

1. Walnut Creek

The sampling point was identified as just upstream from FR 95 or essentially at the point that Walnut Creek enters the allotment. At this point it is not affected by the allotment. Although no exceedances were found, it was assessed as inconclusive for all beneficial uses due to inadequate samples for coverage of all seasons (ADEQ, 2011). Two samples were taken between March and June of 2004.

2. Verde River, Granite Creek to Hell Canyon

Assessed as Attaining for Agriculture irrigation and livestock watering and for fish consumption but Inconclusive for Aquatic and Wildlife Warmwater and for Full Body Contact due to inadequate sampling. Additional sampling is required in order to obtain adequate coverage of all seasons. This reach is located approximately 20 miles downstream from the allotment, via primarily ephemeral channels.

Streamcourses and Riparian

In evaluating riparian conditions the recent climatic and hydrologic history must be considered, as well as site specific variation within an individual streamcourse. Spatial and temporal availability of soil moisture within the rooting zone plus the periodic occurrence of scouring floods strongly affect the abundance, composition, and age of riparian vegetation. Discussions of overall stream conditions, including Proper Function and Condition assessments, are discussed by 6th code watershed.

Lower Walnut Creek Watershed - The inventoried riparian area within the Lower Walnut Creek watershed is primarily associated with TEUI 48 which is classified as an Arizona walnut plant community by the Regional Riparian Mapping Project (U.S. Forest Service, Southwestern Region). The largest portion is in the Bald Mountain Pasture along the Graver Wash drainage, with lesser amounts in the North and Indian Pastures. A PFC assessment of Proper Functioning Condition was determined for a 0.7 mile reach of Graver Wash. Woody species in addition to Arizona walnut included ash, arroyo willow, and Arizona oak. Deergrass is a common herbaceous species. Bald Mountain Spring is located in the northwest corner of the Round Pasture and was once developed with a cement trough that is no longer functional. It appears that the spring has dried up since it was developed because little presence of riparian vegetation or surface water is now present.



Hitt Wash Watershed - Riparian areas evaluated included Hitt Wash, Hyde Creek, Hyde Spring, and Parker Spring. All are in the Round Pasture, with no recent authorized grazing.

Hitt Wash – The portion of Hitt Wash from the dam in the vicinity of Round Valley Spring downstream to its confluence with Hyde Creek was assessed as Functional-At-Risk. This

reach of approximately 0.9 mile has two distinct sections.

A dam was constructed at the approximate location of Round Valley Spring about 1992 and quickly filled with sediment, primarily sand and other coarse materials. The upper approximately 0.4 mile reach immediately below the dam is in a relatively narrow and confined valley bottom. A number of pools, and some segments, appear to be perennial or very close to perennial as evidenced by aquatic vegetation including bulrush, cattail, sedges and rushes. Recommended guidelines for grazing management include leaving 4-6 inches of stubble height for sedges and rushes when the streambank is in satisfactory condition and one-year streambank alteration maximums of less than 20 percent when trying to obtain recovery. The photo above shows the area above the dam with thick herbaceous cover in September 2012.



The lower segment of Hitt Wash shown in the photo at left has a wider valley bottom and the stream gradient slightly less than the upper reach. Flow is intermittent and interrupted, with some pools being present much longer than the reaches between pools. A heavy sediment load is present. Woody vegetation consists of ash with some cottonwood and willow. There is also good herbaceous plant presence in parts of the lower reach, including deergrass and sedges.

Hyde Creek – A reach of approximately 1.5 miles of Hyde Creek was examined between Forest Road 95 and its intersection with Hitt Wash. Flow is intermittent with longer term flow in the upper portion. Although not assessed, the upper section gave the visual appearance of being in Proper Functioning Condition with both woody and herbaceous riparian species. Ash is a common tree species, along with some cottonwood. Deergrass is a common herbaceous



species. A portion of Hyde Creek was protected from livestock grazing with an exclosure at one time, but subsequent floods have damaged the fenced portions across the channel. However, the sides and corners appear to still be functional and reinstallation of water gaps could be done if determined to be needed following reintroduction of use in the Round Pasture. Hyde Spring is an area of approximately $\frac{1}{4}$ acre of seeps supporting herbaceous vegetation located

on a south-facing bench above the upper section of Hyde Creek.

The lower approximately 0.5 miles of Hyde Creek was assessed as Functional-At-Risk. This segment is in a wider valley bottom with some channel braiding, especially as it nears the confluence with Hitt Wash. Approximately 0.5 mile upstream from confluence with Hitt Wash is shown in the photo at left. Much of channel bed here is of cobble and boulder size material. There is recruitment of ash trees in this segment, but little contiguous herbaceous vegetation.

Parker Spring –Parker Spring is located in a tributary of Hyde Creek just below the crossing of FR 95. A springbox is present as is a concrete drinker. Woody riparian vegetation includes ash plus willow. Herbaceous includes deergrass plus some sedges along the wetted edge. Flow is for a short distance before percolating into the channel.

Mud Tank Wash Watershed – Indian Springs is the only riparian area evaluated in this watershed. Water emerges as seeps along a portion of channel supporting sedges and rushes. Approximately ¼ mile of channel is within a fenced enclosure, with the surface seep area near the lower end. Water is piped to a drinker downstream from the enclosure. This appears to be one of the few waters in this portion of the pasture. Channel erosion in ephemeral channels downstream as well as several tributaries. As in other locations within the pinyon-juniper on this allotment, channel erosion appears to have been ongoing for decades with periodic episodic activity.

Water Resources and Watershed Desired Condition and Management Objectives

Desired conditions for the K Four Allotment can be briefly summarized as:

- Maintain satisfactory watershed conditions meeting State water quality objectives.
- Maintain fully functional riparian systems, including water quality and both hydrogeomorphic and biological attributes and processes. Riparian systems are supported by vegetation, both herbaceous and multiple woody age classes, within site potential, providing for geomorphically stable stream channels with bank stability and providing habitat for riparian-dependent plants and animals.

Management Objectives for Riparian Areas:

- Maintain riparian vegetation cover and density in those areas that are meeting desired conditions by applying utilization and stubble height guidelines.
- Improve stream bank and channel stability in Hitt Wash.
- Improve regeneration of woody riparian species in the lower reach of Hitt Wash and in lower Hyde Creek, dependent upon site potential and periodic episodes of regeneration.
- Maintain riparian vegetation and groundwater resources at springs that serve as water supplies for livestock.

Proposed monitoring may vary in method and intensity from narrative inspections with repeat photography to quantitative methods such as the Multiple Indicator Monitoring (MIM) system (Burton 2011).

Design Features for Prescribed Burning Treatments to Protect Watershed Values:

Implementing features would include:

- A streamside management zone adjacent to National Hydrologic Drainages (NHD) will be established to create a filter strip adjacent to riparian ecosystems to alleviate high sediment delivery to drainages and maintain riparian integrity.

- Establish a streamside management zone (SMZ) alongside perennial, interrupted, and intermittent drainages where there is a need to manage the riparian corridor⁷ independently of upland vegetation. An SMZ is a designated zone that consists of the stream and an adjacent area of varying width where management practices that might affect water quality, fish, or other aquatic resources are modified. An SMZ is not a zone of exclusion, but a zone of closely managed activity. It is a zone which acts as an effective filter and absorptive zone for sediment; maintains shade; protects aquatic and terrestrial riparian habitats; protects channel and streambanks; and promotes floodplain stability. The SMZ may be wider than the riparian area. Evaluations will be done to determine if there is a need for special soil and water conservation prescriptions along drainages within the prescribed burning and mechanical treatment areas and, if so, they will be developed prior to implementation by the appropriate resource specialists in consultation with those implementing the activity.
- Hillslope burning would be conducted over multiple years to minimize accelerated soil loss and promote vegetative response and recovery. Mosaic burn patterns would also be employed.
 - Targeted initial burn entry would strive to burn from “mid-slope to top-slope”.
 - When vegetation growth and soil stabilization occurs within the initial burn entry the “toe-slope to mid-slope” will be burnt.
- To maintain and protect monarch pinyon and juniper species, mechanical mastication may occur near these species to minimize fire intensity.

Direct & Indirect Effects on Water Resources and Watersheds:

Alternative 1 – Dormant Season Grazing

The environmental effects discussion is organized by 6th HUC watersheds, and within those by Pasture. Effects of structural improvements on water use and of vegetative treatments on water yield are discussed in general as they are distributed among the watersheds. The Upper Walnut Creek Watershed represents less than 1% of the allotment and is found on the private land portions of the allotment that are not considered in this analysis. This analysis considers the combined effects of the grazing management, including structural improvements, plus vegetative treatments with distinctions between the separate components as necessary. Those soils currently in satisfactory condition would be maintained in satisfactory condition. The alternative incorporates Best Management Practices specified as resource protection guidelines which should result in vegetative improvement in both the uplands and riparian areas. New water developments in all three major pastures and contained within the Lower Walnut, Hitt Wash, and Mud Tanks Wash watersheds will result in slightly more surface area for evaporation but will not, of themselves, result in greater consumption of water by livestock. It is possible that improving livestock distribution through additional waters may result in the ability to graze more livestock in some seasons due to forage availability. However, the water consumed will be well within the historical range of use.

Vegetative treatments are located in the Lower Walnut Creek, Hitt Wash, and Mud Tanks Wash watersheds, and to a very limited degree in the Pine creek watershed. Previous studies have not found significant water yield increases from similar treatments as measured as surface flow in channels. However, there is a current proposal for a small paired watershed study in the

⁷ A riparian corridor consists of the stream and an adjacent area of varying width where management practices that might affect water quality, fish, or other aquatic resources are modified. It is an area that acts as an effective filter and absorptive zone for sediment; protects aquatic and terrestrial riparian habitats; protects a channel and streambanks; and promotes flood plain stability.

Indian Pasture, Mud Tanks Wash watershed, which would attempt to determine if treatments affect soil moisture that might percolate below the rooting zone toward an aquifer or downslope toward a riparian zone.

Pine Creek Watershed – The majority of National Forest land in the allotment within this watershed is in the Juniper Mesa Wilderness. The one range structural improvement is moving the allotment boundary in the northwest corner so that it is on the section line bordering private and National Forest land, located on the north and west sides of Section 3. This area is accessible via Forest Road 7. Some portions of the line will need material transport via ATV or UTV and is not within the wilderness. Following Best Management Practices should confine soil and water environmental effects to temporary and localized. Juniper treatment is scheduled for approximately 325 acres in the northeast corner of the allotment on TEUI units 417 and 422 that are both outside the wilderness. Much of this acreage was previously treated for juniper control and maintenance treatment will remove juniper regrowth. Low gradient and slight erosion hazard, plus application of Best Management Practices, will limit soil and watershed impacts to temporary and localized. In the long term there should be a positive benefit by limiting the potential for canopy expansion to the point of reducing ground cover.

Lower Walnut Creek Watershed – This watershed comprises the biggest portion of the allotment, making up most of the North Pasture, nearly all of the Bald Mountain Pasture, and a significant part of the Indian Pasture. The schedule of programmed rest for 18 months once every three grazing seasons will increase the rest periods in the North and Indian Pastures above that of recent years. Adding additional waters from the Juniper Springs system will aid in distribution and reduce impacts from concentrations and trailing for water at earthen tanks located in drainages, e.g., Spur Tank. The overall effect would be to increase on-site infiltration, reduce storm surface runoff, and reduce sediment reaching channels. Primary vegetative treatment within this watershed includes juniper treatment with possible prescribed burns and targeted prescribed burns. Implementation with Best Management Practices including timing of entries, use of streamside guidelines along drainages, and coarse woody debris guidance should result in watershed effects being temporary and localized.

Hitt Wash Watershed – The allotment portion of this watershed is almost entirely in the Round Pasture with a very small percentage in the southwest corner of the Indian Pasture. Reintroducing grazing on a three pasture rotation into the Round Pasture will be accompanied by two new water developments to reduce dependence on springs and riparian areas. Livestock grazing impacts will be resumed but following the proposed action with Best Management Practices should not result in declining soil and watershed conditions. Hitt Wash below the Round Valley Spring dam is one of the most important riparian areas in the allotment from an aquatic habitat standpoint. It is a natural attractant for livestock, especially during the warm season. The Proposed Action calls for fencing portions of Hitt Wash to protect habitat for the lowland leopard frog, a Regional Forester's sensitive species. Protection from ungulate trampling and forage removal will allow movement toward the site's potential with the current hydrologic regime. Retention of adequate herbaceous vegetation stubble would help to hold sediment in place and stabilize streambanks, thereby moving the channel towards Proper Functioning Condition. In portions of Hitt Wash not fenced for protection, removing livestock from the pasture by no later than April 15 would allow some stubble height regrowth prior to summer monsoon season.

Mud Tank Wash Watershed - The majority of the Indian Pasture is within this watershed plus a narrow strip along the east boundary of the Round Pasture. The schedule of programmed rest for 18 months once every three grazing seasons will increase the rest periods above that of

recent years. Adding additional waters from the Indian Springs system will aid in distribution and reduce impacts from concentrations and trailing for water near the spring development. Proposed vegetation treatments include spot mechanical thinning and prescribed burning, target prescribed burning, and juniper treatment with possible prescribed burning, in descending order of acreage encompassed. Implementation with Best Management Practices including timing of entries, use of streamside guidelines along drainages, and coarse woody debris guidance should result in watershed effects being temporary and localized. The spot mechanical thinning with prescribed burning constitutes the greatest acreage; however, only about 25 percent of its mapped and displayed area is planned for treatment. As described in more detail in the Soil Specialist report, application of Best Management Practices should keep soil and watershed effects temporary and localized.

Antelope Wash Watershed – Although there are only about 350 acres of this watershed within the allotment it is the primary portion of the previously juniper treated area known as the “Sinks”. It is on TEUI 481 and was assessed as currently being in satisfactory condition. It is planned for maintenance and some additional treatment to bring it to the condition described as “juniper treatment with possible prescribed burning”. Gradients are low and erosion hazard slight. Implementation with Best Management Practices including timing of entries, use of streamside guidelines along drainages, and coarse woody debris guidance should result in watershed effects being temporary and localized, with long-term beneficial effects to maintaining adequate vegetative groundcover.

Stringtown Wash-Pine Creek Watershed – Located in a relatively narrow strip along the southwest corner of the Round Pasture, this watershed constitutes about 400 acres within the allotment. No vegetative treatments or range structural improvements are planned.

Alternative 2 – No Action/No Grazing Alternative

Impacts due to livestock grazing would not occur and new water developments would not be constructed. In the watershed uplands existing satisfactory soil conditions would be continued. Impaired soil conditions would improve with more vegetation and organic matter improving soil structure and infiltration and reducing surface runoff and improving soil stability.

Riparian areas would not be affected by permitted livestock. Hitt Wash would not receive livestock use; however, some wildlife use would still occur. Effects on the upper segment would be similar to that described in Alternative 1 with construction of a fence to protect the area of lowland leopard frog breeding pools. On the lower segments of both Hitt Wash and Hyde Creek woody regeneration would be expected to more rapidly become established and move from seedlings to saplings and pole size. Impacts on the streambanks of the lower segment of Hitt Wash would be limited to that from wildlife and streambank stability would be expected to improve more rapidly. Water withdrawals from the aquifers feeding Juniper and Indian Springs would not increase.

Cumulative Effects on Soil, Watershed Condition, and Water Resources

In this analysis, watersheds are used as the basis to evaluate the cumulative effects of projects on soil, riparian ecosystems, and water quality/quantity. The cumulative effects analysis area for the K Four Allotment includes the 6th Level HUC watersheds listed in the following table. For additional information, and to correspond to the level at which water quality data is available from ADEQ, the 5th level HUC within which they are nested is also displayed in the table. Management activities, inherent properties, aquatic conditions, and natural disturbances affect vegetation, soils, riparian, water quantity/quality, and ultimately watershed condition. Water

quality data within each identified watershed coupled with the current conditions were used as a barometer to evaluate the cumulative effects of this project upon soil and watershed resources when added to other past, present, and foreseeable future action(s), regardless of what entity is responsible for the action(s). Acreage and percentage of the project area within each watershed are as follows:

| Table 8. Watersheds that Contain the Project Area by 5th and 6th Code | |
|--|---|
| Watershed Cumulative Effects Analysis Area | |
| 6th Level HUC Watershed | Allotment Acres within Watershed/ Allotment Percent of Watershed |
| Pine Creek – Lower Big Chino | 2276/ 6% |
| Upper Walnut Creek | 138/ <1% |
| Lower Walnut Creek | 12935/ 44% |
| Antelope Wash | 350/ 4% |
| Lower Big Chino 5th Level | 15699/ 7% |
| Mud Tank Wash | 7098/ 31% |
| Hitt Wash | 6833/ 30% |
| Stringtown Wash-Pine Creek | 398/ 3% |
| Williamson Valley Wash 5th Level | 14329/ 7% |

Source: NRCS HUC and Arizona State Land Department.

Watershed Condition. All 6th HUC watersheds on the Prescott National Forest have received an initial condition classification using the National Forest Service protocol (USDA Forest Service 2011a and 2011b). The system is used to classify and prioritize watersheds for investments in restoration activities, and to track changes over time. Based on categories of aquatic physical, aquatic biological, terrestrial physical, and terrestrial biological, ratings are assigned to 12 watershed condition indicators, compiling the results of 24 specific attributes. Ratings of 1, 2, and 3 (expressed as Functioning Properly, Functioning at Risk, and Impaired Function) are assigned based on a combination of quantitative and qualitative criteria. Relative weights are assigned to the attributes and categories and a weighted total watershed score is obtained for use in prioritization and tracking over time. Forest wide GIS databases, supplemented with available existing data and information, varying with location, were used for the initial ratings. The following briefly summarizes the initial classification and expected effects of this project for the 4 watersheds that have at least 5% of their acreage represented by the project area.

Pine Creek. Classified as Functioning Properly, however soil productivity is rated as departed from functioning properly. The small area in the northeast corner of the allotment will see improvement in soil productivity; though it is not enough acreage to reach the watershed threshold for functioning properly.

Lower Walnut Creek – Classified as Functioning at Risk. Indicators rating lowest included soil productivity and soil erosion, road maintenance and proximity to streamcourses, and water quantity (upstream diversions and groundwater pumping on private land reducing flow on segment on National Forest). The combination of improved grazing management with longer periods of rest, along with the vegetative treatments, will reduce the acres in impaired and

unsatisfactory condition and move the watershed towards properly functioning soil productivity and soil erosion attributes.

Mud Tank Wash – Classified as Functioning at Risk. Indicators rating lowest included soil productivity and soil erosion, plus road maintenance and proximity to streamcourses. Effects of this project on watershed rating similar to that for Lower Walnut Creek; however, a much higher percentage of this watershed is departed from properly functioning soil productivity and soil erosion.

Hitt Wash – Classified as Functioning at Risk. Similar to Mud Tank Wash, with indicators rating lowest included soil productivity and soil erosion, plus road maintenance and proximity to streamcourses. Effects on watershed similar to that described above for soil productivity and erosion attributes. Protection of the upper portion of Hitt Wash and application of Best Management Practices will move the indicators of riparian vegetation and aquatic habitat closer to Functioning Properly.

3.6 What are the Impacts to Wildlife, Aquatic Species, and Rare Plants?

The Wildlife, Fish, and Rare Plant Specialist Report (project record) serves as the Biological Assessment and Evaluation that documents the effects of the action alternative and the no action alternative on plant and animal species and habitat that have the following status: federally listed under ESA (Endangered Species Act), any designated or proposed critical habitat under ESA, and USDA Forest Service Region 3 sensitive species. This report also documents the effects of the alternatives on Prescott National Forest Management Indicator Species (MIS), and species under the Bald and Golden Eagle Protection Act and Migratory Bird Treaty Act.

The best available science was used in the completion of this report. Upon review of PNF habitat data, it was determined that federally listed species under the ESA do not occur in the project area.

Existing Condition: The allotment contains habitat for a variety of wildlife species including big game mammals such as deer, elk, javelina, and bear. The habitat types within the allotment include:

Chaparral Habitat

Interior chaparral habitat covers approximately 3,938 acres or 37% of the allotment. Chaparral communities include shrub oak, mimosa, ceonothus, catclaw, snakeweed and prickly pear cactus. Shrub density is variable across this type, and perennial grasses are often found inter-mixed, especially on south-facing slopes.

Pinyon-Juniper Habitat

Pinyon-juniper covers approximately 28,130 acres or 90% of the allotment. Pinyon-juniper with chaparral includes a tree over story with Utah and/or alligator juniper, with shrubs in the understory. The dominant juniper species in the area is Utah juniper (*Juniperus osteosperma*) with alligator juniper (*Juniperus deppeana*) frequent across the allotment as well. Grasses may be common, especially on the south-facing slopes. Most juniper in the allotment are young to mid-aged and average between 5” to 20” DRC (diameter at root collar). Pinyon pine (*Pinus edulis*) is sub-dominant in Pinyon-Juniper stands in the project area and understory vegetation is comprised of native shrubs, forbs, and grasses (See Silvicultural Report in PR).

Aquatic & Riparian Habitat

The allotment is drained by Walnut Creek, Hyde Creek, Indian Springs Wash, Mud Springs Wash, and Hitt Wash, all of which are tributaries of the upper Verde River. The only perennial stream identified on National Forest land within the allotment is the approximately 0.6 mile

segment of Walnut Creek, primarily within the small Walnut Creek Pasture (and 0.15 miles of that in the old Walnut Creek Ranger Station site). Most of the other drainages are ephemeral or intermittent flow. Those with intermittent flow will have persistent water for part of the year, often around a spring source in the drainage. One location with persistent water is found at Round Valley Spring within the Round Pasture. Recent riparian-wetland area assessments rated 0.9 miles of Round Valley Wash as Functional-at-Risk (Hydrologist Specialist Report).

Riparian vegetation occurs along portions of Walnut Creek, Hitt Wash, Hyde Creek, and Indian Springs Wash. Walnut Creek has the most extensive riparian vegetation, but the majority of this occurs on private lands outside the area of this analysis. Hitt Wash has mainly herbaceous riparian vegetation such as sedges, rushes, horsetails, and other grass-like plants. There are localized areas of velvet ash and willow. Hyde Creek has more predominant woody riparian vegetation such as velvet ash, willow, and Fremont cottonwood. The riparian vegetation at Indian Springs Wash is mainly within a fenced enclosure at the spring source, consisting of a mix of cottonwood, willow, and ash.

Direct and Indirect Effects to Wildlife Habitat

Alternative 1 – Dormant Season Grazing

This alternative would have minimal effects to wildlife because livestock grazing would occur during the late fall and winter months when the vegetation is dormant. During this time big game species will usually make a seasonal movement down to lower elevations to avoid inclement weather. With dormant season grazing, there would be no competition on the allotment with livestock for palatable browse species during the spring and summer months when it becomes nutritionally important for lactating deer and elk with young fawns and calves. Other proposed activities such as mechanical treatment of juniper and prescribed burning would promote recruitment and increase of the understory vegetation and rejuvenation of the palatable browse species within those treatment areas. Providing additional water sources would be beneficial to wildlife habitat.

With the exception of some resident species, most of the bird species present during the spring and summer months will also migrate south for the winter and will not be present during the time livestock are grazing the K Four Allotment. Both resident and neotropical migrants would benefit from the proposed mechanical treatments and prescribed burning.

Recovery of understory and shrub species within the Round Valley spring riparian area would improve in time with continued recruitment of deer grass, shoreline vegetation, sedges, etc. benefitting and improving lowland leopard frog habitat. Under Alternative 1, with the proposed water developments, livestock should have better distribution especially along the south facing slopes of the uplands within the allotment.

Alternative 2 – No Action/No Grazing Alternative

There would be a benefit to wildlife habitat under this alternative in sensitive habitats where livestock concentrations have occurred in the past, such as the Round Valley spring riparian area. Over time the understory habitat component of forbs grasses and sedges, etc. in the riparian corridor will continue to respond. Livestock impacts on vegetation would be removed with only wildlife grazing occurring at light intensities. The riparian areas have greater potential for recovery under the no action alternative. Riparian tree species reproduction (seedlings, saplings) such as cottonwoods and willows would still be browsed by wildlife, but would be less impacted with the absence of domestic livestock grazing.

Regional Forester Sensitive Animal & Plant Species:

| Table 9. Summary of effects for Region 3 Forest Service Sensitive Species that may occur within or near the K-4 Allotment. | | | |
|---|---------------|--|------------------------------------|
| Species Name | Status | Alternative 1 Proposed Action | Alternative 2 No Action |
| Pale Townsend’s big-eared bat | Sensitive | No Impact | No Impact |
| Western red bat | Sensitive | No Impact | No Impact |
| Lowland leopard frog | Sensitive | MIIH | No Impact |
| Arizona phlox | Sensitive | No Impact | No Impact |
| Flagstaff beardtongue | Sensitive | No Impact | No Impact |
| Broad-leafed Lupine | Sensitive | No Impact | No Impact |

MIIH – May impact individual or habitat

The lowland leopard frog was determined to be the only species that may be affected by project actions. The effects to this species are presented in further detail.

Lowland leopard frog:

Affected Environment: Lowland leopard frog occurs in perennial aquatic systems in grassland to pinyon-juniper woodlands from central to southeastern Arizona below the Mogollon Rim, generally below elevations of 6,200 feet (AGFD 2006). They are habitat generalist and can be found in rivers, streams, springs, and earthen cattle tanks. Adults breed primarily from January to May. Egg masses are attached to submerged vegetation, bedrock, or gravel in perennial water. Eggs hatch in 15-18 days. Larvae can metamorphose in 3-4 months or as long as 9 months. Dense streamside vegetation is important escape cover (Zwartjes et al. 2005). Other important streamside vegetation structures include tree root wads, debris piles, and logs. This species is known to occur in Walnut Creek and at Round Valley Spring in the project area (NAU 2000; Emmons and Nowak 2012). Suitable habitat within the allotment is limited to 0.6 miles of Walnut Creek and about 0.5 miles at Round Valley Spring. Recent riparian-wetland area assessments rated 0.9 miles of Round Valley Wash as Functional-at-Risk (Hydrologist Specialist Report).

Direct and Indirect Effects:

Alternative 1: Dormant season grazing of riparian herbaceous vegetation would result in species disturbance and short-term decrease in hiding cover used by juvenile and adult amphibians with the potential for increased predation. Utilization levels would prescribe minimum stubble height on key riparian herbaceous vegetation of 4-6 inches which would maintain adequate hiding cover. Forage use of 20% on riparian woody species would maintain tree structure and root masses to protect streambanks and provide for vegetation structures used by the species as habitat. Livestock grazing and trailing along streams could impact water quality from animal waste causing nutrient loading. Within the Round Pasture, Round Valley Spring would be fenced to exclude livestock grazing which would eliminate direct livestock grazing impacts to aquatic species and their habitat. Implementation of the proposed enclosure within Round Valley spring is key in managing for quality lowland leopard frog foraging and breeding habitat. The deep pools found just below the Round Valley impoundment provide

reliable water with overhanging banks covered with shoreline vegetation. These are important habitat components for lowland leopard frog that provide them protection from predators.

There would be livestock grazing impacts to vegetation and soil conditions in the uplands of the project area. Appropriate grazing intensity and forage use guidelines and water developments to improve livestock distribution would maintain or improve rangeland conditions towards satisfactory levels during the 10-year term grazing permit.

Vegetation treatments of juniper cutting with or without follow-up burning would occur within the Lower Walnut Creek and Hitt Wash subwatersheds. Treatments would have short-term effects of ash and sediment flow off burned areas to species habitat which would be mitigated by use of streamside management zones and implementation of Best Management Practices. Overall, properly managed livestock grazing and vegetation treatments would maintain or improve aquatic/riparian habitats and soil/vegetation conditions in the subwatersheds.

Alternative 2: No livestock grazing activities, new range structural improvements, or vegetation treatments occurring in the project area: There would be no direct effects to the species or their habitat from livestock grazing after the 2-year phase out period for livestock grazing. Aquatic and riparian habitat conditions would be maintained through natural processes. With no vegetation treatments in the subwatersheds, soil and vegetation conditions would remain similar to existing. Uplands areas in satisfactory conditions would remain in similar conditions. Uplands areas in unsatisfactory or impaired conditions have altered hydrologic function that contribute to increased runoff and sediments to species habitat. Implementing the vegetation treatments would improve impaired and unsatisfactory watershed conditions by providing protective cover from woody slash materials and by enhancing herbaceous ground cover by removing the juniper overstory.

Cumulative Effects on Regional Forester Sensitive Species

The cumulative effects area is the three 6th level HUC subwatersheds that flow into LLF habitat on the allotment: Upper Walnut Creek, Lower Walnut Creek, and Hitt Wash (Appendix 3). Past, present and future activities that may impact the Lowland leopard frog include the following: Livestock grazing occurs throughout the watersheds. The majority of the lands in these watersheds are in Forest Service ownership. All lands administered by the Forest Service have Grazing Management Plans that provide for satisfactory vegetation and soil conditions, and for water quality. Improved watershed conditions on the PNF would provide for long-term benefits to aquatic/riparian habitats. Road densities in the Upper Walnut, Lower Walnut, and Hitt Wash subwatersheds are at low to moderate (<1.5) road miles per square mile. Road conditions and proximity to stream drainages are likely impacting hydrological conditions such as channeling runoff and sediments to these stream systems. Riparian vegetation management along the perennial water reaches help to maintain stream structure and reduce sediment input into aquatic habitats. Recreational activities are primarily dispersed uses such as motorized and non-motorized road and trail use, camping, hunting, and horseback riding. These uses are having localized impacts to stream systems in the analysis area.

Alternative 1: The effects of the Proposed Action on these species when added to the above cumulative effects would maintain or improve suitable habitat for the lowland leopard frog. For other Regional Forester sensitive species there were no impacts from alternative 1, so there would be no additive impacts to other activities.

Alternative 2: With no direct or indirect effects, there would be no cumulative impacts to the species.

Effects Determination:

Alternative 1: May impact individuals of lowland leopard frog but is not likely to result in a trend towards federal listing or loss of viability for the species.

Alternative 2: No impact to the lowland leopard frog.

Management Indicator Species:

The Forest Service is required to address MIS in compliance with various regulations and Agency policy (36 CFR 219, Forest Service Manual (FSM) 2621 and 1920), which are, themselves, tiered to the Forest and Rangeland Renewable Resources Planning Act of 1974, as amended by the NFMA. The Prescott National Forest Plan was prepared under planning regulations issued in 1982. Effects to MIS were considered for this project and are documented in this report.

| Table 10. Summary of effects on management indicator species (MIS) analyzed on the K-4 Allotment. | | | | |
|--|--|--|---|--|
| Species – Indicator habitat | Alternatives 1 Proposed Action | | Alternative 2 No Action | |
| | Project Level Effects | Forest-wide Trends | Project Level Effects | Forest-wide Trends |
| Mule Deer – early seral pinyon juniper & chaparral vegetation types. | <p><i>Grazing:</i> No change to habitat quantity of early seral stage of pinyon-juniper and chaparral vegetation.</p> <p>May increase habitat quality slightly due to construction and maintenance of water developments.</p> <p>No impacts to early seral PJ with dormant seasonal grazing by livestock.</p> <p><i>Prescribed Burning & Mechanical Treatments:</i> Prescribed burning would increase early seral vegetation by stimulating growth of understory vegetation in both PJ and chaparral. Mechanical treatments would remove encroaching juniper and reduce competition of nutrients while increasing sunlight to understory growth of shrubs and forbs.</p> | No effect to forest-wide habitat or population trends. | <p>No change to habitat quantity of early seral stage of pinyon-juniper and chaparral vegetation.</p> <p>Habitat quality would improve in areas where livestock grazing pressure has previously occurred.</p> | No effect to forest-wide habitat or population trends. |

| Table 10. Summary of effects on management indicator species (MIS) analyzed on the K-4 Allotment. | | | | |
|--|--|--|---|--|
| Species – Indicator habitat | Alternatives 1 Proposed Action | | Alternative 2 No Action | |
| | Project Level Effects | Forest-wide Trends | Project Level Effects | Forest-wide Trends |
| Spotted Towhee – late seral chaparral vegetation type. | <p><i>Grazing:</i> No change in habitat quantity of late-seral chaparral. Habitat quality for this MIS should not be impacted from dormant season grazing system. No impacts to nesting spotted towhees with dormant seasonal grazing occurring outside of the nesting season.</p> <p><i>Prescribed Burning & Mechanical Treatments:</i> Prescribed burning would decrease late seral vegetation on acres where it burns the hottest. But light to moderate burns would only rejuvenate the decadence of late seral chaparral. With the exception of pre-burn fireline prep treatments utilizing the masticator, there is no mechanical treatment scheduled in late seral chaparral habitat.</p> | No effect to forest-wide habitat or population trends. | <p>No change in habitat quantity of late-seral chaparral. Habitat quality may improve with an increase of insect species diversity and additional vegetative cover for nests.</p> | No effect to forest-wide habitat or population trends. |

| Table 10. Summary of effects on management indicator species (MIS) analyzed on the K-4 Allotment. | | | | |
|--|---|---|---|---|
| Species – Indicator habitat | Alternatives 1 Proposed Action | | Alternative 2 No Action | |
| | Project Level Effects | Forest-wide Trends | Project Level Effects | Forest-wide Trends |
| <p>Juniper (Plain) Titmouse - for late seral pinyon juniper and for the snag component in pinyon juniper.</p> | <p><i>Grazing:</i> No change in habitat quantity of late-seral pinyon juniper and its snag component with seasonal dormant season grazing.</p> <p>With the resource protection measures, habitat quality for these MIS would be maintained or improved.</p> <p>No change in habitat quantity of late-seral pinyon juniper and the snag component quantity.</p> <p>Therefore cavity nesters and secondary cavity nesters such as the Juniper Titmouse will not be impacted by dormant season grazing.</p> <p><i>Prescribed Burning & Mechanical Treatments:</i> Prescribed burning would not occur in late seral pinyon juniper. Mechanical treatments would decrease late seral PJ where treatment occurs. But impacts if any would be minimal since snags would remain in the treatment area and would still be readily available for primary cavity excavators outside of the treatment area.</p> | <p>No effect to forest-wide habitat or population trends.</p> | <p>No change in habitat quantity of late-seral pinyon juniper.</p> <p>Habitat quality may improve with an increase of insect species diversity and additional vegetative cover in the understory and snags will increase over time.</p> | <p>No effect to forest-wide habitat or population trends.</p> |

Macroinvertebrates

| | | |
|--|---|---|
| <p>Affected Environment: This is the MIS for aquatic habitat and late seral riparian habitat (Forest Service 2010). Current population and habitat trends on the forest are considered stable. There are 79 miles of perennial and intermittent streams on the forest and 17,160 acres of riparian habitat. The only perennial stream within and adjacent the allotment is Walnut Creek, the majority of which is located on private land inside the allotment. The majority of the other streams in the project area have intermittent or ephemeral stream flows. Suitable MIS habitat with perennial water and late seral riparian habitat within the allotment is limited to 0.6 miles of Walnut Creek within the Walnut Pasture that is not grazed by livestock.</p> <p>Water quality assessments for Walnut Creek that includes the project area showed no exceedances in water quality parameters (ADEQ 2011). Water quality ratings, including the warmwater aquatic community (i.e. macroinvertebrates) were listed as inconclusive due to inadequate sampling.</p> | | |
| | Action Alternative | No Action |
| Project Level Effects on MIS Habitat Quantity | With dormant season grazing (generally from October 15 th through April 15 th) in the project area: The Action Alternative would not alter the quantity of aquatic habitat or late seral riparian habitat. | With no grazing in the project area: The No Action alternative would not alter the quantity of aquatic habitat or late-seral riparian habitat. |
| Project Level Effects on MIS Habitat Quality | Dormant season use of riparian areas is expected to maintain or improve riparian vegetation. There would be short-term impacts from livestock grazing and trailing along streams to streambanks and to water quality from animal waste entering the aquatic system. | There would be no impacts from livestock grazing activities to habitat quality of aquatic habitat and late seral riparian habitat. Aquatic/riparian habitat quality would be improved at a higher rate than under the Action Alternative. |
| Effects to MIS Habitat/ Population/ Forest-wide Trends | This alternative would not alter habitat quantity and would maintain or improve habitat quality. The project area is <1% of forest-wide aquatic and riparian habitat. No effect to forest-wide trends. | This alternative would not alter habitat quantity and would improve habitat quality. The project area is <1% of forest-wide habitat. No effect to forest-wide trends. |

Migratory Birds: The Forest Service is required to address the effects of agency actions and plans on migratory birds and identify where unintentional take reasonably attributable to agency action is having, or is likely to have, a measurable negative effect on migratory bird populations. Effects to migratory birds were considered for this project and are documented in this report. Based on the vegetation types within the project area and the proposed grazing in the various vegetation types, 10 species might be expected to occur within the project area. Impacts to migratory birds include loss of nesting, foraging and cover habitat. Snag retention would be compliant with the forest plan direction in this project and snags would only be removed as they pertain to safety. Removal and/or destruction of vegetation used by migratory birds may not always result in a taking under the MBTA.

Alternative 1 – Dormant Season Grazing

This alternative would be beneficial to migratory birds because livestock grazing would occur during the late fall and winter months. Cattle would not be grazing during the nesting season and the vegetation would provide cover for ground nesting and low shrub nesting species. With the exception of some resident species, most of the migratory bird species present during the spring and summer months will also migrate south for the winter and will not be present during the time livestock are grazing. The new water developments will improve overall habitat quality. Vegetation treatments would improve wildlife habitat by improving herbaceous productivity.

Prescribed burning treatments would decrease vegetative cover in the short term, but browse forage quality would improve with the reintroduction of fire. No take is expected under Alternative 1.

Alternative 2 – No Action/No Grazing Alternative

Herbaceous and browse forage would not be utilized by livestock under this alternative. The additional water sources would not be developed, which would limit habitat quality. The riparian areas utilized by bird species would improve at the fastest rate under this alternative.

Important Bird Areas and Overwintering Areas:

The nearest IBA to the K Four Allotment is located approximately 15 miles away in the Upper Verde IBA; therefore no IBAs are affected by the implementation of the proposed action and its associated activities. Many overwintering areas are large wetlands; none of this habitat is present in the analysis area. Since significant concentrations of birds are not known to occur here nor do unique or a high diversity of birds winter here, there will be no effects to important overwintering areas by implementing the proposed action.

Bald & Golden Eagle Protection Act of 1942: The Forest Service is required to address the effects of agency actions and plans on eagles protected under this law. Effects to eagles were considered for this project and are documented in the wildlife specialist’s report. There will be no take to bald or golden eagles anticipated with either alternative 1 or 2.

3.7 What are the Impacts to Recreational Activities?

Existing Condition:

Recreation activity on the allotment is primarily associated with hunting, wood-gathering, and off-highway vehicle use. There are no developed recreation sites on the allotment, though several trails pass through it. Access to the Juniper Mesa Wilderness is mainly from trailheads off the allotment, but trails can also be accessed from remote roads on the allotment. Within the allotment there are six trails. Trails #9124 Pine Creek, and #2 Juniper Springs, access the Juniper Mesa Wilderness. Trail #20 Juniper Mesa, is all within Juniper Mesa Wilderness. These are wilderness trails and are designed for use only by hikers and horseback riders. Three other trails are designed for motorized use. The area is visited by hunters driving motorized vehicles during hunting season. The project area is located within the Arizona Game and Fish Management Unit 19B. Hunting is heaviest during the fall, with big game hunting opportunities for deer, elk, bear, and javelina. Wood cutters and people riding ATVs utilize the project area. Recreational opportunities such as dispersed camping, hiking, biking, horseback riding, and driving are more prevalent in the spring and fall season than in the hot summer months. The miles of trails within the allotment are shown in Table 11. Juniper Mesa Wilderness, an area of about 7,406 acres, was congressionally designated in 1984. Approximately 2,434 acres of the wilderness are in the K Four Allotment. A review of the Prescott NF records did not reveal the presence of any research natural areas within the project area. There are no Wild and Scenic Rivers within or by the K Four Allotment.

| Trail No. | Trail Name | Authorized Use | Length (miles) |
|------------------|-------------------|-----------------------|-----------------------|
| 1 | Old Military | Motorized (M) | 5.4 |
| 2 | Juniper Springs | Non-motorized (NM) | 2.4 |
| 20 | Juniper Mesa | NM | 2.5 |
| 9124 | Pine Creek | NM | 1.5 |
| 9807 | Cottonwood Wash | M | 1.2 |
| 9942 | Spur Gulch | N | 1.3 |

The Prescott National Forest in this area is open (unless posted “closed”) for dispersed recreation activities such as: camping, hiking, trail use, horseback riding, hunting, mountain biking, target shooting and motorized recreation. Motorized travel must be on roads and trails designated for motorized use (CFR 261.13). Vehicles used for scenic driving vary with the terrain and range from passenger cars and 4x4 trucks to OHVs, dirt bikes, and mountain bikes. County Road 05 is a well maintained dirt road within the allotment. This road is popular for pleasure driving as people enjoy viewing the scenery from their vehicles while traveling this road. The road traverses pine-oak ecosystems and the scenery ranges from distant and near mountains to open fields. There are no Inventoried Roadless Areas (IRA) within the K Four Allotment. The closest IRA is in the Williamson Valley Allotment about 3 miles southwest of the K Four Allotment.

Direct & Indirect Effects on Recreation:

Alternative 1 – Dormant Season Grazing

Recreationists, woodcutters, and hunters may encounter cattle but the presence of cattle and livestock grazing does not preclude or prevent recreational opportunities within the project area. Public perceptions of cattle grazing may affect an individual’s recreational experience within the project area, but this is difficult to assess due to the wide range of public opinion on grazing on public lands. Continuation of livestock grazing within the project area will have minimal effect on the recreational experience of Forest users.

Some of the new range water developments proposed would be in proximity to existing trails. The intention of the permittee is to make the new improvements not visible to the public. The new water sources may provide benefits to horseback riders on the allotment. The tree cutting treatments and prescribed burning activities intersect some existing trails. For public safety, trails would be closed when implementing a prescribed burn. This would have some short term impacts to the trail users. The use of machinery or chainsaws to cut trees may affect the recreational experience of trail users, but this is a short term effect that is not likely to impact many forest users.

Alternative 2 – No Action/No Grazing Alternative

Under this alternative grazing on the K Four Allotment would not occur. 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. The tree cutting and prescribed burning may still occur under this alternative, and effects would be the same as described for alternative 1. Livestock would no longer be encountered when recreating within this allotment.

Cumulative Effects on Recreation Resources

There would be no negative impacts or changes to recreation resources by choosing either Alternative 1 or 2, so there are no cumulative impacts to this resource from this project.

3.8 What are the Impacts to Heritage Resources?

Existing Condition: Based on the PNF heritage resource atlas and files from 1988 to the present, heritage specialists and para-archaeologists have conducted 33 heritage resource inventories within the allotment. Projects varied in size from 638 acres to 0.1 acres. Surveys were conducted prior to the implementation of activities such as special use authorizations (12), road maintenance or closures (8), range projects (4), heritage projects (4), trail maintenance (2), a juniper treatment (1), an erosion control project (1), and a heritage damage assessment (1).

Prior to 1988, para-archaeologists conducted 36 inventories but those inventories do not meet the current heritage inventory standards and the acreage will not be included in this analysis. Based on the 33 inventories, only 960 acres have been intensively inventoried for heritage resources. The heritage reports are on file in the Forest Heritage Resource Section at the PNF Supervisor's Office.

Direct & Indirect Effects on Heritage Resources:

Alternative 1

It has been documented in the PNF range files that this area of the Chino Valley Ranger District has been grazed by livestock for over 70 years. Prior to the establishment of the PNF, Euro American settlers had established homesteads and ranches along Walnut Creek and were grazing livestock throughout the area. The current K Four Allotment is permitted as winter seasonal grazing with variable numbers up to 600 head of cattle. Alternative 1, dormant season grazing, would provide for livestock numbers to range from 350 to 600 head of cattle - cow/calf pairs and bulls for 6 months - contingent upon adequate available forage and water. This alternative doesn't propose grazing at a higher intensity than previous years.

The following range projects are proposed to be implemented within the next 2 years and heritage surveys will be completed prior to the signing of the EA. Access for these projects will be along existing dirt roads and/or trails. No road or trail maintenance has been requested.

1. Round Pasture Well #1, T 17N, R 5W, Section 6
2. Round Pasture Well #2, T 17N, R 5W, Section 8
3. Round Valley Spring Enclosure, T 17N, R 5W, Section 17

If heritage resource sites are located in the above projects, project activities will avoid the sites. In the future, when additional range improvements or other ground disturbing management practices are needed, the Forest Service will complete the appropriate heritage surveys and/or reports as outlined in our Region 3 Programmatic Agreement Regarding Historic Property Protection and Responsibilities between the USDA Forest Service Region 3, the State Historic Preservation Officers of AZ, NM, TX, and OK, and the Advisory Council on Historic Preservation, signed 12/24/2003, and specifically, Appendix H: the Standard Consultation Protocol for Rangeland Management, signed 05/17/2007 and be in compliance with all applicable provisions of Section 106 of the National Historic Preservation Act.

The Forest Service's proposal to continue livestock management as proposed under the action alternative is considered to have a no adverse effect on the heritage resource sites located within the allotment.

Cumulative Effects of Alternative 1

Past, present, and reasonably foreseeable future actions on the allotment have been considered as part of this cumulative impacts analysis. Authorization of livestock grazing along with the past, present, and reasonably foreseeable future actions, would have minimal cumulative effects on heritage resource sites.

Alternative 2 – No Action/No Grazing Alternative

If livestock grazing is not authorized then there would be no direct or indirect effects on heritage resource sites. Since no direct or indirect effects are anticipated, there would be no cumulative effects.

3.9 What Are the Costs Associated with the Vegetation Treatments and the New Range Developments, and Who Will Pay for This?

The cost of constructing new range developments on a Forest Service grazing allotment is typically shared between the Agency and the grazing permit holder according to policy (Forest Service Manual 2200, Chapter 2240). Financing range improvements can be accomplished using Range Betterment Funds (RBF). The RBF consists of one-half the grazing fees collected that are returned to fund range improvement work on the forest where the fees are collected. On the Prescott National Forest, the RBF is typically in the range of \$50,000-\$60,000 per year to fund all the range development construction and reconstruction work across the forest. The grazing permittee can provide either labor or materials to construct range improvements, but the ownership of the improvement remains with the Forest Service. By proposing the new range improvements analyzed under alternative 1, there is no commitment made that funding will be available from RBF to implement the project. Which projects are funded each year is dependent on a forest-wide prioritization process for RBF expenditures.

For alternative 1, several new range improvements are the most critical and are planned for construction within two years of issuing the new term grazing permit. The most critical new range improvements are located in the Round Pasture and include: the new well east of Round Valley Spring; the enclosure at Round Valley Spring in Hitt Wash; and the new well in section 6 in the western part of the pasture. The other proposed range improvements, if implemented, would enhance the livestock distribution and allow for higher sustained grazing capacity. The cost of these high priority range improvements are estimated to be about \$15,000 each for the wells and watering facilities, and the fenced enclosure cost for an area about 400 feet long would range from \$7,500-\$10,000 depending on construction materials used. The enclosure fencing has benefits for wildlife habitat, so funding from external partners could be pursued.

The vegetation treatments will have benefit for wildlife habitat as well as for increasing forage availability for livestock. Groups that collect private donations to fund wildlife habitat improvement projects may be partners in funding some treatments, or other government agencies such as the Natural Resource Conservation Service or the Arizona Game and Fish Department. The average cost for prescribed burning treatments on the Prescott National Forest in chaparral communities is about \$65 per acre, while brush-crushing can cost about \$350-\$400 per acre. Juniper cutting treatment costs will depend on the method employed. Using machinery such as a hydraulic cutting blade mounted on a rubber-tire tractor can cost about \$200-\$250 per acre, while hand-cutting with chainsaws can cost about \$175-\$250 per acre depending on the density of the juniper. If machinery is used to cut vegetation, then an archeological clearance will need to be completed prior to treatment. The average cost of an archeological survey is about \$25 per acre.

3.10 What are the Effects to Air Quality?

The K Four Allotment is within the Verde River Airshed with its boundary following surface watershed boundaries. The nearest communities to the allotment are Paulden, located approximately 12 miles to the east; Chino Valley located approximately 18 miles to the southeast, and Ash Fork approximately 20 miles to the northeast. There are several ranches along and near Walnut Creek.

Existing Condition: The Environmental Protection Agency (EPA) administers the Clean Air Act. The Arizona Department of Environmental Quality has been delegated authority within Arizona. The EPA has established National Ambient Air Quality Standards (NAAQS) for pollutants considered harmful to public health and the environment. The six principal pollutants

which are called "criteria" pollutants include: Carbon Monoxide (CO), Lead (Pb), Nitrogen Dioxide (NO₂), Ozone (O₃), Particulate Matter (PM_{2.5} and PM₁₀), and Sulfur Dioxide (SO₂).

There are no 'non-attainment' or 'maintenance' areas for counties occupied by the Prescott National Forest. Current conditions are below the national standards established for all six criteria pollutants related to public health and the environment. This means that there is no departure in air quality related to this airshed (Prescott National Forest 2009).

Sycamore Canyon Wilderness, located approximately 35 miles to the east, and within the Verde River airshed, is the nearest Class 1 area, having been designated by the 1977 Clean Air Act. The Forest Service has the responsibility to affirmatively protect the Air Quality Related Values within designated Class 1 areas. Sycamore Canyon Wilderness is one of the 12 Class 1 areas in Arizona.

Environmental Effects

Alternative 1: Livestock grazing would have minimal to no impacts to air quality. The eco-types' vegetative structure reduces the wind speed at the soil surface and minimizes the potential of creating PM₁₀ or PM_{2.5} emissions. A limited amount of dust and vehicular emissions would occur during construction of structural range improvements but it would be very temporary and not expected to extend beyond the project area.

Windblown dust resulting from mechanical treatment of pinyon-juniper would be localized and temporary. The areas of juniper treatment with possible prescribed burn are predominantly on TEUI 481 which has a low susceptibility to wind erosion. The group selection with potential prescribed burn follow-up is on TEUI 461 which is also in the low wind erodibility class. In addition, it would be hand treated with chain saws. The area of high susceptibility to wind erosion is TEUI 48 which includes riparian, flood plains and adjacent recent alluvial soils. A small acreage of juniper treatment only (without prescribed burning) is scheduled in alluvial soils above the floodplain near the south allotment boundary. The topographic location and leaving slash on site will minimize wind erosion.

The spot mechanical thinning and prescribed burn treatment is predominantly on TEUI 434 which has moderate wind erodibility. It has a major shrub component (PNVT potential canopy cover of 20-25 percent) which sprouts rapidly following a prescribed burn. In addition, the mosaic pattern of burn, split burn entries, streamcourse protection areas, and 25 percent proportion of area to be burned will limit exposure to wind erosion following burn treatments.

Smoke from prescribed burning is the primary effect that is of concern. Smoke from wildland vegetation burning includes carbon monoxide, carbon dioxide, water vapor, particulates, nitrogen oxides and other pollutants. Due to the type and quantity of pollutants emitted from burning, the most applicable National Ambient Air Quality Standards (NAAQS) are listed below:

PM-10, 24-hour and annual standard of 150 micrograms per cubic meter

PM-2.5, 24-hour standard of 35 micrograms per cubic meter

PM-2.5, annual standard of 15 micrograms per cubic meter

The main air quality concern associated with this project is the quantity, concentration and duration of PM 2.5 produced by proposed prescribed burning. Up to 70% of smoke particulate is PM 2.5 or smaller. Particulate matter is comprised of a mixture of solid particles and liquid droplets. Particle size is measured in microns (one micron equals one millionth of a meter). Particles can be up to 50 microns. Fine particles, 2.5 microns and smaller (PM-2.5), are of the

highest concern because they may be inhaled deep into the lungs and they pose a greater threat to public health. PM 2.5 is generally emitted from activities such as industrial and residential combustion, wildland fire, agricultural burning, and vehicle exhaust. (Ottmar 2001).

Currently all prescribed fires are subject to prior approval from Arizona Department of Environmental Quality (ADEQ) to ensure burns are:

- conducted under optimum conditions for smoke dispersal,
- burns within a given airshed are being coordinated by all federal and state agencies,
- That NAAQS's are not violated and visibility objectives are met per Arizona Revised Statutes R18-2-152.

Fuel consumption goes through four phases: 1) pre-ignition (heating), 2) flaming, 3) smoldering, and 4) glowing. The greatest amount of smoke per mass of fuel burned is during the smoldering phase (Ottmar 2001). During the flaming phase the convective heat creates greater vertical dispersion of smoke, while in the smoldering phase smoke tends to stay near the ground and move down slope and down drainage. Smoldering is also less prevalent in fuels with high surface to volume ratios, e.g., grasses, shrubs, small diameter woody material (Ottmar 2001).

The precise acreage to be prescribed burned each year is yet to be determined; however, the maximum estimated acreage for prescribed burning is approximately 4200 acres which would occur over multiple years. Burning prescriptions would be developed to achieve resource management objectives, with fuel reduction not being the primary driver. Maintaining the prescribed volumes of coarse woody material would call for conditions with less likelihood of smoldering and thus less smoke. The tons per acre consumed would be less than that which would normally occur if the objective was slash treatment for fuel load reduction.

Smoke may be present for brief periods during burning operations in portions of Walnut Creek and be visible from portions of Yavapai County Highway 5, the road from Williamson Valley to Seligman. It may also occasionally be visible from portions of Paulden, Chino Valley, or scattered rural subdivisions paralleling Yavapai County Highway 5.

The prescribed burning would not create violations of the NAAQ's. For a contextual comparison the City of Flagstaff is located amidst ponderosa pine and is surrounded by the Coconino National Forest. For a number of years both the Forest and the City of Flagstaff Fire Department have had aggressive fuel management programs in the wildland-urban interface with prescribed burning as a major component. Thousands of acres of prescribed burning, both of piles and by broadcast, have been done in the portion of the airsheds which potentially affect the city. However for the period of 2001 through 2011 there was only one day at one monitoring station that exceeded the PM 2.5 standard (Lata 2012). The prescribed burning on the K Four allotment would create smoke emissions generally to the north and northeast based on prevailing winds (Western Regional Climate Center 2012, Lata 2012). Any periods of inversions would send smoke down drainage to the south.

No effects to the Class 1 Airshed in the Sycamore Canyon Wilderness are expected. Although there might be occasional times when smoke from the project could be seen in the distance from high points along the rim of Sycamore Canyon, it should not affect visibility within the wilderness.

Alternative 2, No Grazing: No livestock grazing would have minimal to no impacts to air quality. There would be no construction of structural range improvements. Vegetative treatments, if conducted would have the same effects as discussed in Alternative 1.

Cumulative Effects

There are a number of sources of particulate matter in the Verde River airshed, with wildfires and prescribed fires being a major component. Coordination with the Smoke Management Group and complying with the guidelines and approval procedure for prescribed fires has resulted in maintaining the airshed air quality including baseline visibility in Class 1 areas.

The distance of the K Four Allotment from sensitive areas, the relatively limited amount of particulate matter to be produced in an individual year, and the fact that the air in this portion of the airsheds is not close to the threshold for impairment, lead to the conclusion that it will not contribute to significant cumulative effects on the air resource.

4. Coordination and Agencies Consulted

Notice of the intention to initiate the present analysis of the proposed action for this allotment was provided in the Schedule of Proposed Actions (SOPA) at <http://www.fs.fed.us/sopa/>. A scoping letter dated 5/28/2013 describing the proposal for grazing management of this allotment was sent to the permit holder of the allotment, and to members of the public, non-profit groups, and other entities who have expressed interest in livestock grazing activities. It was also sent to State and Federal government entities and to six Native American Tribes interested in activities in the area inviting them to provide information regarding concerns or opportunities related to the proposal.

The purpose of scoping is to provide an opportunity for the public to share concerns or provide feedback regarding an action being proposed by the Forest Service. Issues are defined as concerns about the effects of a proposed action that are not addressed by the project design or alternatives to the proposed action. The subject of an issue must be within the scope of the proposed action and relevant to the decision to be made, and not already decided by law, regulation, or higher-level decisions; and must be supported by scientific or factual evidence. Concerns or issues brought forth from scoping that meet these criteria may be determined to be key issues and may drive the development of alternative actions for analysis if they have not been resolved or already addressed in an alternative. Entities that file specific comments as defined in 36 CFR 218.2 also provide the commenter with standing to file an objection.

No responses received during the public scoping period raised concerns that will not be addressed through project design, including resource protection measures and incorporating Best Management Practices, and following the standards and guidelines of the Prescott Forest Plan.

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

Individuals/Groups

Adjacent permittees – Hitt Wash,
Juniper, Quartz Wash, Walnut
Creek, Williamson Valley, Yavapai

Back Country Horsemen
Center for Biological Diversity
Erik Ryberg
Friends of Anderson Mesa
Jeff Burgess

John Kieckhefer
Sierra Club – Yavapai Group
The Nature Conservancy
The Wilderness Society
WildEarth Guardians

Federal and State Agencies

AZ Department of Environmental
Quality
AZ Game and Fish Department
AZ State Historic Preservation Office
AZ State Land Offices
USDA Natural Resource
Conservation Service
US Fish and Wildlife Service, AZ
Ecological Services Office

Tribes

The Fort McDowell Yavapai Nation
The Hopi Tribe
The Hualapai Tribe
The Tonto Apache Tribe
The Yavapai-Apache Nation
The Yavapai Prescott Tribe

Core Interdisciplinary Team Members

Christine Thiel, ID Team Leader/
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Dave Moore, Forest Soil Scientist
Loyd Barnett, Contract Hydrologist

Extended Team Members

Albert Sillas, Aquatic Biologist
Dan Garcia de la Cadena, Wildlife
Biologist
Dorothy Baxter, Recreation Planner
Elaine Zamora, Archeologist
Jim Gilsdorf, Chino Valley District
Ranger
Nancy Walls, Forest Natural
Resources Staff Officer
Thomas Potter, GIS Coordinator

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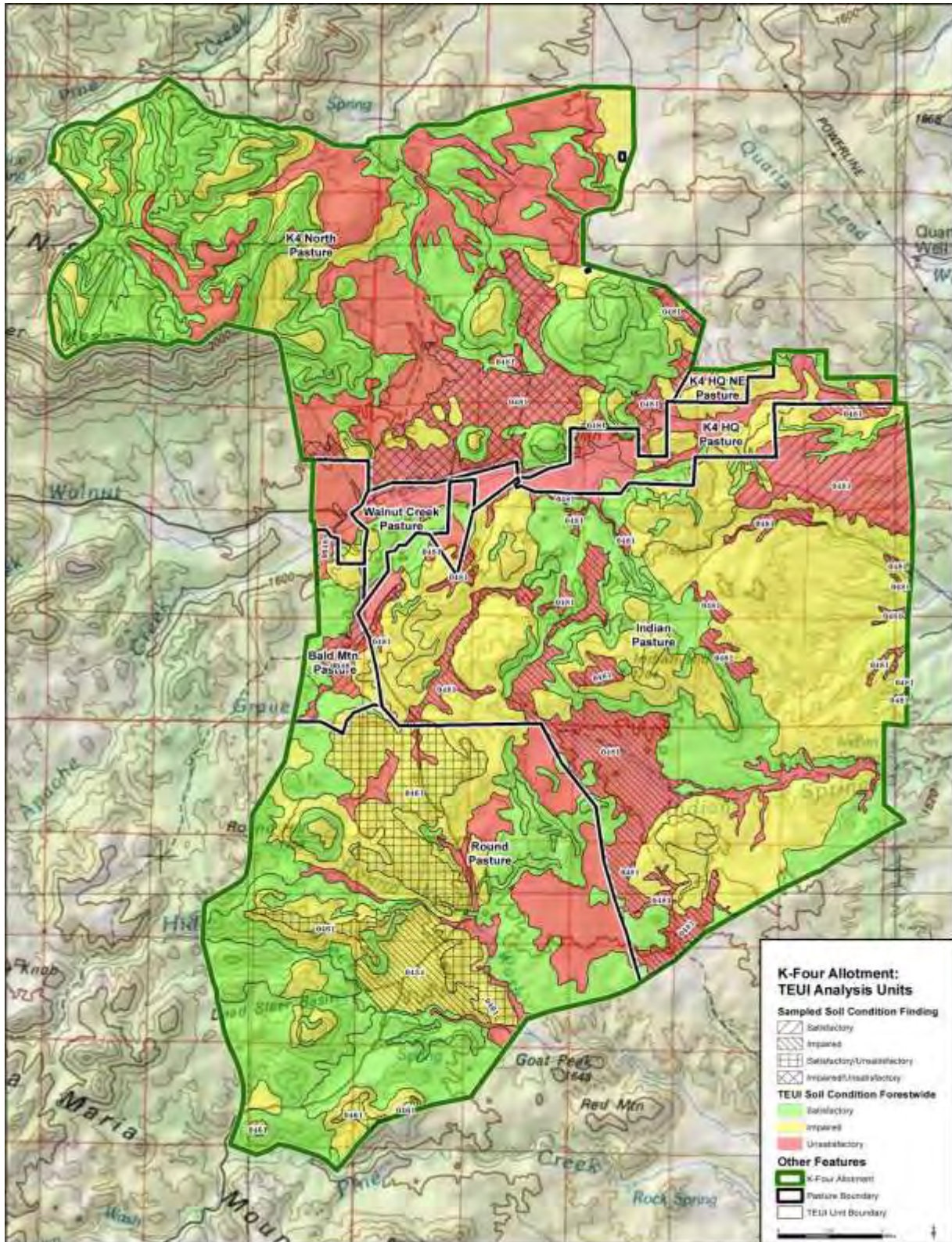
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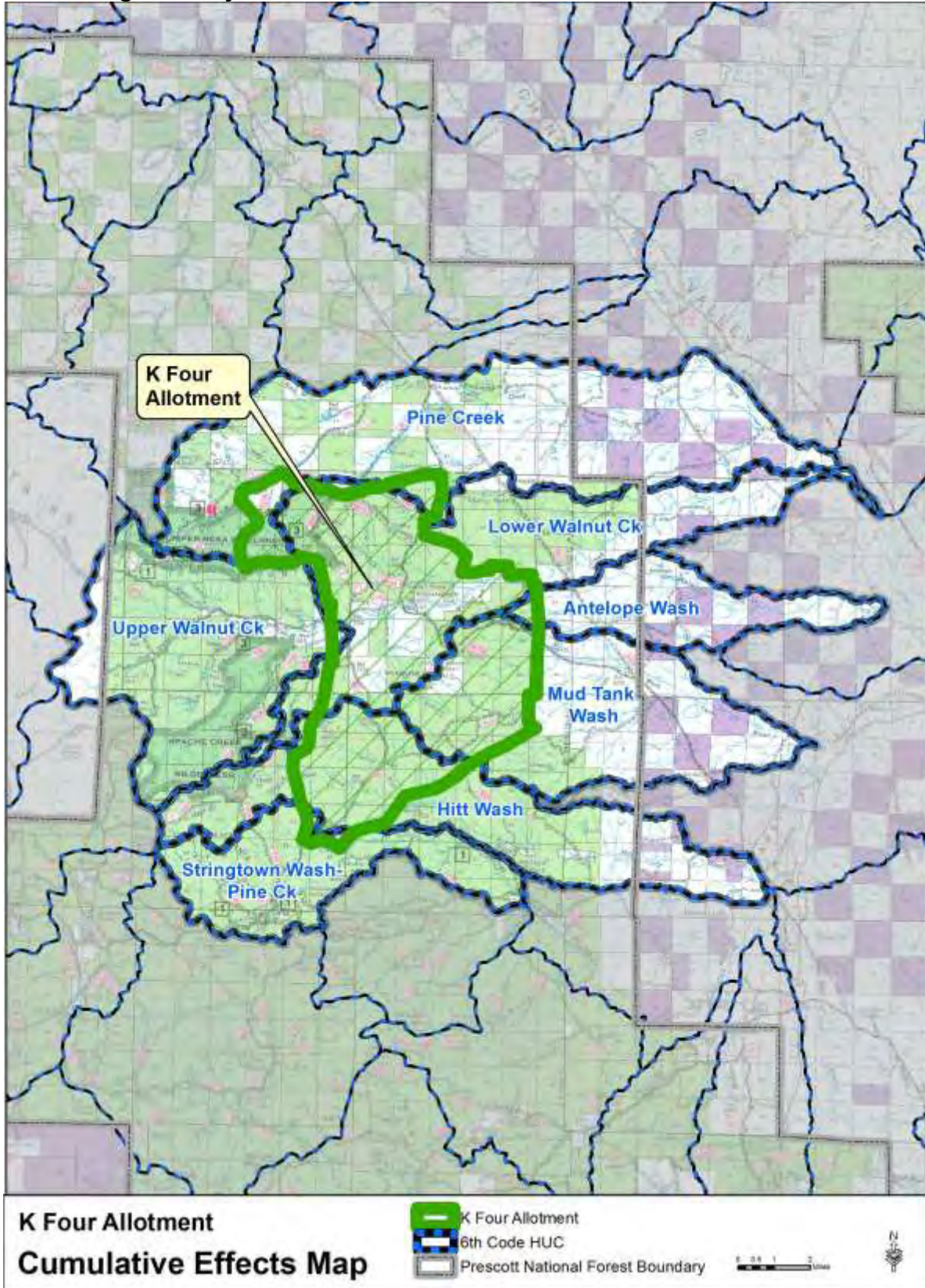
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Appendix 1 – Alternative 1 Map (following page)

Appendix 2 – Soil Condition Map



Appendix 3 - Cumulative Effects Area Map for the 6th Code Watersheds Containing the Project Area



Appendix 4 – Glossary of Terms

Adaptive Management- A formal, systematic, and rigorous approach to learning from the outcomes of management actions, accommodating change, and improving management. It involves synthesizing existing knowledge, exploring alternative actions and making explicit forecasts about their outcomes.

Allotment Management Plan (AMP) - An Allotment Management Plan (AMP) is unique, and is based on the individual landscape and ranch operation and will be modified with modification or issuance of a new permit following a NEPA decision to ensure consistency with the NEPA decision.

Animal Month (AM) - A month's use and occupancy of rangeland by a single animal or equivalent.

Animal Unit Month (AUM) – The quantity of forage required by one mature cow (1,000 pounds) or the equivalent for 1 month; approximately 26 lbs of dry forage per day is required by one mature cow or equivalent.

Annual Operating Instructions (AOI) - Instructions developed a guideline for grazing management by the agency and livestock permittee for implementing grazing management activities on a specific allotment for a specific grazing season.

Aquatic – Pertaining to standing and running water in streams, rivers, lakes and reservoirs.

Browse – Young twigs and leaves of woody plants consumed by wild and domestic animals.

Candidate Species- Plants and animals for which the U.S. Fish and Wildlife Service (FWS) has sufficient information on their biological status and threats to propose them as endangered or threatened under the Endangered Species Act (ESA), but for which development of a proposed listing regulation is precluded by other higher priority listing activities.

Community Type – Community types represent existing vegetation communities that do not currently reflect potential due either to disturbance or natural processes related the development of the community. Vegetation may be disturbed by a number of factors including: grazing, fire, and other activities.

Critical Habitat – That portion of a wild animal's habitat that is critical for the continued survival of the species as declared by the Secretary of the Interior.

Cultural Resource – The physical remains of past human cultural systems and places or sites of importance in human history or prehistory.

Desired Conditions- Descriptions of the social, economic and ecological attributes that characterize or exemplify the desired outcome of land management. They are aspirational and likely to vary both in time and space.

Dispersed Recreation – In contrast to developed recreation sites (such campgrounds and picnic grounds) dispersed recreation areas are the lands and waters under Forest Service jurisdiction that are not developed for intensive recreation use. Dispersed areas include general undeveloped areas, roads, trails and water areas not treated as developed sites.

Ecological Type – Ecological types are derived directly from the TES document and describe the potential vegetation for a particular soil type. The potential vegetation was defined through intensive field sampling. See the Terrestrial Ecosystem Survey Handbook, USDA 1986 for a full description of how potential vegetation descriptions were derived.

Endangered Species – Any species that is in danger of extinction throughout all or a significant portion of its range, as declared by the Secretary of the Interior.

Environmental Analysis – An analysis of alternative actions and their predictable short- and long-term environmental effects, including physical, biological, economic and social effects.

Environmental Assessment – The concise public document required by regulations for implementing the procedural requirements of NEPA (40 CFR 1508.9).

Ephemeral – A stream that flows only in direct response to precipitation, and whose channel is above the water table at all times.

Erosion – The wearing away of the land’s surface by running water, wind, ice or other geological agents. Erosion includes detachment and movement of soil or rock fragments by water, wind, ice or gravity.

Forage – All non-woody plants (grass, grass-like plants and forbs) and portions of woody plants (browse) available to domestic livestock and wildlife for food.

Forage Utilization – The portion of forage production by weight that is consumed or destroyed by grazing animals. Forage utilization is expressed as a percent of current year’s growth.

Forest Plan – A document, required by Congress, assessing economic, social and environmental impacts, and describing how land and resources will provide for multiple use and sustained yield of goods and services.

Grazing Capacity – The maximum level of plant utilization by grazing and browsing animals that will allow plants or associations of plants to meet their physiological and/or reproductive needs.

Grazing Period - The length of time grazing livestock or wildlife occupy a specific land area.

Grazing Permittee – An individual who has been granted written permission to graze livestock for a specific period on a range allotment.

Gully Erosion – The erosion process whereby water accumulates in narrow channels and, over short periods, removes the soil from this narrow area to depths ranging from several feet to as much as 75 to 90 feet.

Habitat – The sum total of environmental conditions of a specific place occupied by a wildlife species or a population of such species.

Impaired Soil Condition – 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. Changes in land management practices or other preventative measures may be appropriate.

Improvement – Manmade developments such as roads, trails, fences, stock tanks, pipelines, power and telephone lines, survey monuments and ditches.

Instream Flows – Those necessary to meet seasonal streamflow requirements for maintaining aquatic ecosystems, visual quality and recreational opportunities on National Forest lands at acceptable levels.

Interdisciplinary (ID) Team– A group of individuals with skills from different resources. An interdisciplinary team is assembled because no single scientific discipline is sufficient to adequately identify and resolve issues and problems. Team member interaction provides necessary insight to all stages of the environmental analysis process.

Intermittent (or Seasonal Stream) – A stream that flows only at certain times of the year when it receives water from springs or from some surface source such as melting snow in mountainous areas.

Issue – a point of discussion, debate, or dispute with a Proposed Action based on some anticipated effect.

Key Area - A relatively small portion of a range selected because of its location, use or grazing value as a monitoring point for grazing use.

Management Indicator Species – A wildlife species whose presence in a certain location or situation at a given population level indicates a particular environmental condition. Population changes are believed to indicate effects of management activities on a number of other wildlife species.

Monitoring - The orderly collection, analysis, and interpretation of resource data to evaluate progress toward meeting management objectives. This process must be conducted over time in order to determine whether or not management objectives are being met.

National Environmental Policy Act (NEPA) – An act to declare a National policy that will encourage productive and enjoyable harmony between man and his environment; to promote efforts that will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of man; to enrich the understanding of the ecological systems and natural resources important to the Nation and to establish a Council on Environmental Quality.

National Forest System Land – National forests, national grasslands and other related lands for which the Forest Service is assigned administrative responsibility.

Perennial Stream – A stream that flows continuously. Perennial streams are generally associated with a water table in the localities through which they flow.

Permitted Grazing – Authorized use of a National Forest range allotment under the terms of a grazing permit.

Proper Functioning Condition (PFC) - A methodology for assessing the physical functioning of riparian and wetland areas. The term PFC is used to describe both the assessment process, and a defined, on-the-ground condition of a riparian-wetland area. PFC evaluates how well the physical processes are functioning through use of a checklist.

Proper Functioning Condition (PFC) Assessment - Provides a consistent approach for assessing the physical functioning of riparian-wetland areas through consideration of hydrology, vegetation, and soil/landform attributes. The PFC assessment synthesizes information that is foundational to determining the overall health of a riparian-wetland area.

Proposed Action – In terms of the National Environmental Policy Act, the project, activity or action that a Federal agency intends to implement or undertake and that is the subject of an environmental assessment.

Range Allotment – A designated area of land available for livestock grazing upon which a specified number and kind of livestock may be grazed under a range allotment management plan. It is the basic land unit used to facilitate management of the range resource on National Forest System and associated lands administered by the Forest Service.

Range Condition – The state of health of a range land site based on plant species composition and forage production in relation to the potential under existing site conditions. Range condition is rated as satisfactory or unsatisfactory.

Riparian – Land adjacent to perennial and intermittent streams, lakes and reservoirs. This land is specifically delineated by the transition ecosystem and defined by soil characteristics and distinctive vegetation communities that require free and unbound water.

Satisfactory Soil Condition – 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.

Sheet Erosion – The removal of a fairly uniform layer of soil from the land surface by rainfall and runoff water without the development of conspicuous water channels.

Soil Erosion – The wearing away of the land surface by running water, wind, ice or other geological agents, including such processes as gravitational creep. Detachment and movement of soil or rock by water, wind, ice or gravity.

Soil Productivity – The capacity of a soil in its normal environment to produce a specified plant or sequence of plants under a specified system of management.

Species Composition – Species composition refers to a descriptive list of species that together make up a given ecological community.

Species Diversity – Diversity refers to the measure of composition for a given community and is also referred to as species richness.

Structural Range Improvement – Any type of range improvement that is manmade (e.g., fences, corrals, water developments).

Terrestrial Ecosystem Survey (TES) - consists of the systematic analysis, classification and mapping of terrestrial ecosystems. It describes and maps the soils and potential vegetation (ecological types). This Ecological Classification describes the existing vegetation (community types) associated with the ecological map units.

Threatened Species – Any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

Trend- The direction of change in an attribute as observed over time.

Unsatisfactory Soil Condition – 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.

Utilization- The proportion or degree of the current year's forage production that is consumed or destroyed by animals (including insects). The term may refer either to a single plant species, a group of species, or to the vegetation community as a whole.

Watershed – The entire area that contributes water to a drainage or stream.

Watershed Condition – A description of the health of a watershed in terms of the factors that affect the hydrologic function and soil productivity.

Wildlife Habitat – The sum total of environmental conditions of a specific place occupied by a wildlife species or a population of such species.

Appendix 5 – Response to Comments from Draft EA

Letters from interested and/or affected parties are analyzed to identify specific comments and determine if those comments are issues. For this analysis, issues are defined as points of dispute or disagreement with the proposed action or its effects and that are: 1) within the scope of the proposed action; 2) not already decided by law, regulation, Forest Plan, or other higher level decision; 3) relevant to the decision to be made; and 4) not conjectural or unsupported by scientific or factual evidence. Comments that do not meet one or more of these qualifications are so noted. Issues may result in changes to the analysis, mitigations, or alternatives.

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Comment

| Response | | | |
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| 1 | 1 | In regards to the proposed range improvements, the Department would recommend the following actions: 1. Reconstruction of the allotment boundary [fence] is wildlife permeable, smooth wire on the bottom strand, approximately 16-18 inches above the ground; 2. Constructed waters are year-round, whereby the ranch should not turn waters on and off to facilitate livestock movement. | New fence construction will be implemented with specific construction standards that will allow for wildlife needs. New water sources on the allotment will be managed by the Forest Service to allow for preservation of groundwater dependent ecosystems (GDE) like riparian vegetation. The Forest Service will consider the benefits of providing water for wildlife habitat year round versus the impacts to groundwater supplies and associated GDEs. |
| 1 | 2 | The Department recommends that vegetation treatment in Pronghorn habitat reduces juniper slash to 18-24 inches, with masticating woody debris and/or allowing wood cutters to utilize the piles. In the preliminary EA, pages 23-24, it states that "Treatments may be designed to allow for juniper slash or whole trees to remain on site and protect newly established grasses from grazing and to provide a favorable microclimate for grasses to establish". Although trees and slash do offer protection from grazing and aid in establishing new grasses, old juniper skeletons can also hinder pronghorn in areas where clipped trees are nearly as tall as upright trees. Masticating clipped trees will still offer protection for establishment of grasses, while providing the added benefit of eliminating visual barriers for pronghorn. | The benefit to pronghorn habitat from mastication of downed trees will be considered when designing and implementing juniper cutting treatments. There is additional cost to mastication versus cutting and leaving the juniper trees. |
| 2 | 1 | The proposal includes a lot of things that will cost money to implement. I'm talking about several miles of new livestock water pipeline, some new water troughs and storage tanks, and a new fence. It also includes the removal of lots of juniper and brush, along with some prescribed burns, in order to try and preserve or reestablish open grasslands. But there's no mention of how much all of this will cost or who will pay for it. Are all of these range "improvements" going to be paid for by the grazing permittee, or the taxpayers? | The cost of the various proposed vegetation treatments can vary greatly depending on the method used to implement the treatments. Range improvements are funded cooperatively by the Forest Service and the permittee. The amount of money received each year to fund new range improvements is based on a refund of a percentage of grazing fees to the Forest, called |

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| | | | range betterment funds. The grazing fees are set nationally by Congress and are outside the scope of this analysis. The projects that have benefits to wildlife habitat and watershed values may be funded by non-governmental groups or State partners if funds are available. |
| 3 | 1 | As laid out in the EA, the context of the proposed action is significant. While many grazing allotment authorizations and management plans call for limited changes from past management, and therefore are authorized after the completion of an EA only, the context for this NEPA process is much different. The proposed action includes not only management guidelines for grazing within the K Four Allotment, it would also authorize extensive vegetation management strategies and infrastructure additions. The potential impacts of these actions will affect 27,200 acres of forest land. These actions, both cumulatively and separately may have significant environmental effects that can only be adequately analyzed within an EIS. | As stated on page 10 of the draft EA, "the [District] Ranger will make a finding on the significance of the environmental effects anticipated from the implementation of the selected action and whether an environmental impact statement (EIS) will need to be prepared". The project considers vegetation treatments because it was recognized that changes in grazing management alone would not improve watershed and soil condition in some areas. It is an efficient use of Forest Service specialist's time to consider and analyze the effects of grazing and vegetation management together within the same project area. The cumulative effects were considered for all proposed activities. |
| 3 | 2 | The intensity of the proposed action's impacts is also significant. Within this proposed project, the Forest Service intends to authorize continued livestock grazing, prescribed burning activities, logging and vegetation removal, and the construction of additional infrastructure for water resources. Prescribed burning has the potential to impact human health and safety in surrounding communities with potentially significant impacts on air quality and the increased risk of wildfires that escape the control of the Forest Service. Neither of these potential impacts is addressed within this EA. | See response to 3-1 for discussion on "significant" effects. Design and implementation of prescribed burning activities would be conducted by trained Forest Service personnel and would consider and mitigate risks to public and firefighter health and safety. An Air Quality report was prepared for this project and the final EA will contain a summary of its findings. |
| 3 | 3 | The action area is also unique in the number of riparian areas it contains and the habitat it provides for sensitive species. Because of the number and extent of proposed project components, some of which require intensive vegetation management, this action is also likely to be highly controversial for surrounding communities, forest users, and organizations concerned with management of National Forests. | The Hydrology & Water Resources Specialist Report for the K Four Allotment discusses the riparian resources and the effects of the alternatives, and the Wildlife, Fish, and Rare Plant Report discusses the effects of the alternatives to sensitive species that may be present. The public, various agencies, and tribes were informed of the proposed action in a letter dated 5/28/2013. The contacted parties are shown on pages 53-54 of the draft EA. The extensive public outreach did not |

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| | | | result in any comments from the public that would characterize the project as highly controversial. Furthermore, controversy as a factor to consider when determining the potential significance of a project relates to scientific controversy regarding the effects, not social controversy. |
| 3 | 4 | Finally, this action is likely to establish a precedent for future action on other allotments throughout the Prescott National Forest and will contribute to cumulative impacts on forest resources. As stated by the Forest Service, each National Forest must “establish and adhere to a schedule for completing NEPA environmental analysis on all grazing allotments.” EA at 3. Therefore, it is likely that the outcome of this project will govern proposals for management on other grazing allotments on the Prescott National Forest that have not yet completed the NEPA process and may set a precedent for future management activities, which will cumulatively significantly impact forest resources, such as water resources and wildlife habitat. | The District Ranger decides what design features will be included in the analysis to reissue grazing permits. Because each allotment has some differences from any other, the analysis and decision for one allotment does not set a precedent for future management on others. Cumulative impacts are considered for activities proposed by this project and NOT for all other allotment analyses. |
| 3 | 5 | The EA outlines several potential impacts to the allotment itself, including impacts to soil resources, wildlife habitat, recreational opportunities, riparian ecosystems, vegetation coverage and characteristics, and water quality. These impacts need to be more fully analyzed within an EIS before a project of this magnitude is undertaken. | See response to 3-1. |
| 3 | 6 | In addition to analyzing the two current alternatives for this action presented in this EA, the Forest Service should consider an additional alternative. This alternative should allow restoration projects intended to benefit species habitat, water resources, and soils, while eliminating grazing from the allotment. According to the EA, needs for this project include: (1) “improve soil and watershed conditions in some juniper-woodland plant communities,” (2) “improve wildlife habitat,” (3) “reintroduce controlled application of fire in some P/J chaparral areas to maintain shrub health,” (4) “protect important breeding habitat for lowland leopard frogs.” EA at 5. All of these needs would be best met through an alternative that would propose implementing the nonstructural range improvements and monitoring outlined in this EA, while eliminating grazing and the accompanying activities associated with it from the allotment. | As stated on page 9 of the draft EA: “The decision to implement the vegetation management activities can occur independently of the decision whether or not to continue livestock grazing on the allotment”. There is no need to create an additional alternative to allow this to happen. The Deciding Official will consider the effects of the various components of the proposal, and can pick and choose those parts that best meet the purpose and need for the project. There are several needs being addressed by the proposal, and the Deciding Official will decide if one or more needs take precedence over others. |
| 3 | 7 | The Forest Service identifies two additional needs specifically related to livestock grazing for this proposed action, (1) “improve cattle distribution by | See response to 3-6 |

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| | | <p>providing additional reliable water sources,” and (2) “re-establish the allotment boundary on Forest Service land.” EA at 5. However, both of these needs are identified under the assumption that livestock grazing will take place, and therefore will need to be controlled to allow resource protection and improvement, which is the purpose of the action. Essentially, the Forest Service has created Alternative 1, the proposed action, in an attempt to improve some resource elements while working around continued livestock grazing. There is no identified need or requirement to continue livestock grazing on this allotment. Rather, the purpose and needs identified by the Forest Service within this EA point to the need for restoration projects that will not be hindered by livestock grazing. For these reasons, the Forest Service should consider the Center’s proposed alternative in either a supplemental EA or draft EIS.</p> | |
| 3 | 8 | <p>The proposed authorization and permit for livestock grazing for the K Four Allotment would allow a range of 2100 to 3600 AUMs on a seasonal basis for 6 months annually. EA at 5. “[T]his stocking level would provide for livestock numbers to range from 350 to 600 head of cattle.” Id. Based on the information provided within the EA, there is no support for the permitted range to be so high.</p> <p>According to the Forest Service, the average stocking level from 1995 to 2013 for this allotment was 2357 AUMs or 393 cattle for a 6-month period. Id. at 19. During a severe drought period, the actual use number reached as low as 833 AUMs, a number significantly lower than the proposed minimum stocking level. Id. Additionally, under the analysis and estimates completed for the Prescott National Forest, the range of capacity was 2165 AUMs to 2658 AUMs, the difference associated to the inclusion of slopes greater than 10%. Id. While these estimates are qualified as a forest average and therefore, capacity estimates may be different depending on the allotment, there is no evidence presented in the EA that the Four K Allotment contains forage sufficient to create a maximum allowable level above 2658 AUMs.</p> | <p>The Vegetation and Range Management Specialist Report lists the stocking levels on the allotment from 1995 to 2013, which is also summarized on page 19 of the draft EA. During this time, the allotment has supported as many as 3,430 AUMs, or about 572 head of cattle for 6 months. While stocked by a range of cattle up to 572 head at times, the condition of vegetation in key areas has been satisfactory as shown on page 17 of the draft EA. The maximum stocking level being proposed is within 5% of the maximum number that has been supported in the past. The additional water sources and vegetation treatments being proposed will likely increase the amount of available forage for grazing, and would make the upper limit achievable in some years with favorable precipitation. The site specific information on vegetation condition responses to past stocking levels is a much more reliable indicator of grazing capacity than the average production values for soil map units across the entire Forest. Stocking levels each year will be determined by a site specific evaluation of forage and water availability.</p> |
| 3 | 9 | <p>Indeed, based on historical use, climate change, and the potential for continued and worsening drought conditions, the allowable use proposed by</p> | <p>The Forest Service approves the number of cattle that will graze each year based upon a review of site</p> |

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| | | <p>the Forest Service is not justified and is likely to result in significant negative impacts to soil, vegetation, and water resources within this allotment. Prior estimates of range capability did not account for synergistic effects of livestock grazing and climate change on soil, water, vegetation and fire regimes (Beschta et al. 2012). It is also unlikely – or, at best, uncertain – that rangelands in the analysis area ever will return to “historical norms” that supported forage production capacity in wetter periods over the past century.</p> | <p>specific allotment conditions including forage and water availability, and soil and watershed health. Climate is the single largest influence on forage production, and changes to forage production will be accompanied by changes in stocking levels authorized. This has been taking place already on the allotment, as shown on page 19 of the draft EA that mentions a range of stocking from 139 head to 572 head that has occurred from 1995 to 2013. The maximum stocking level was authorized in 2000/2001, not during wetter periods over the past century.</p> |
| 3 | 10 | <p>Seager and Vecchi (2010: 21282). Model projections indicate that megadrought-level stresses on water availability and vegetation production will be regularly exceeded by the mid-21st century, and even the wettest and coolest years of the late-21st century will be more severe than the driest, warmest years of the past millennium (Williams et al. 2012). The Forest Service needs to provide supplemental information about how it reached the determination that 2100 to 3600 AUMS is appropriate for this allotment beside photos showing good forage conditions in some areas of the allotment. Based on the evidence provided about current soil conditions, the potential impacts of the proposed nonstructural range improvements, and current and likely impacts to range capacity from climate change and drought, the Forest Service also needs to formulate more reasonable permit range for stocking levels for Alternative 1. At present, the determination of the Forest Service is arbitrary and capricious.</p> | <p>This analysis discloses anticipated effects to resources over the life of the grazing permit, approximately 10 years, instead of considering anticipated effects in 2050 to 2100 that are referenced. As discussed above, stocking levels will be adjusted each year commensurate with actual forage production and water availability so that allowable use levels will not be exceeded, and desired resource conditions are being met or making progress towards being met.</p> |
| 3 | 11 | <p>Part of the proposed action is the use of prescribed fire to maintain what the Forest Service considers to be desirable vegetation structure after the removal of pinyon pines and juniper trees. One of the reasons for this proposed activity is the lack of natural fire regimes within this allotment. According to the EA, “[h]istorical fires in Pinyon-Juniper vegetation types tended to kill all or most of the trees within the places that burned.” EA at 23. While not explicitly stated within the EA, it would seem that a general lack of fire within the allotment, including the suppression of some fires, has led to the absence of a natural fire regime and deviation from historical vegetation conditions. Therefore, the Forest Service is proposing to use prescribed fire to maintain and improve some ecosystem elements within the K Four Allotment. However, the Forest Service has provided no</p> | <p>The proposal does not mention the cutting of pinion trees; only juniper trees (see pages 23-24 of the draft EA). The referenced quote from Romme 2007 is in the publication Historical and Modern Disturbance Regimes of Pinyon-Juniper Vegetation in the Western U.S. in reference to persistent woodland types. It is an explanation for having areas of even-aged trees because fires do not thin only the small trees, but tends to kill all or most of the trees within the place that burned. It is not the objective to promote a natural fire regime within the project area given the private land inholdings within the allotment and</p> |

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| | | information concerning the likely causes for the lack of natural fire regime, namely historical and current livestock grazing, nor how vegetation will be maintained in a desirable condition after the initial mechanical removal and prescribed fire actions have been completed with continued livestock grazing. | the risk to public health and safety. Instead, we propose to reintroduce the benefits of controlled fire into the project area. There are measures explained on pages 7 and 8 of the draft EA that will dictate when and if follow-up prescribed burning activities are conducted. Grazing management after treatments will consider whether grazing will have a detrimental effect to forage plants, soil, or watershed resources on a site specific basis. |
| 3 | 12 | There is ample evidence suggesting that post-settlement livestock grazing in Arizona and throughout the West contributed to the spread and proliferation of pinyon-juniper woodlands. This was primarily due to the reduction in fine fuels, which would otherwise have allowed the spread of fire throughout grasslands and into wooded areas (Miller and Tausch 2002: 19-21). "The shrub-dominated sites . . . are expected to remain stable unless fire or mechanical treatments are undertaken." EA at 20. Without fine fuels facilitating the spread of fire, there is no chance that natural fire regimes can return to this ecosystem. This position has clearly been adopted by the Forest Service, which in this EA states that "there will likely be limited to no improvement in perennial grass cover unless the tree and/or shrub is removed by fire or vegetation treatments." Id. | Livestock grazing was a widespread, uncontrolled land use for many decades prior to the establishment of the Forest Service. This proposal is to authorize controlled and managed grazing during the dormant season. Whatever effect that historic grazing practices had on the natural fire regime is outside the scope of this analysis and without adequate information to form science-based recommendations. We are proposing to create a mosaic of openings in the shrub communities by reintroducing controlled fire. Introducing a natural fire regime is not within the purpose and need for this project due to the potential hazards to public health and safety, and damage to private land inholding infrastructure. |
| 3 | 13 | If the goal of the Forest Service is to improve and maintain grassland, shrub, and pinyon-juniper habitat, and reintroduce fire into this ecosystem, then continuing to allow livestock grazing in this areas seems counter-productive. Continued livestock grazing will continue to eliminate fine fuels needed to sustain and allow the spread of fire. Additionally, increasing the use of fire within a livestock grazed allotment has the potential to increase the presence of invasive plant species and soil erosion, both of which are potential results of fire in disturbed ecosystems. | Page 4 and 5 of the draft EA outlines the purpose and need for this project. The stated need for fire is to "reintroduce controlled application of fire in some P/J chaparral areas to maintain shrub health and improve palatability to wildlife and livestock". The proposal allows for complete growing season rest every year. Areas to be burned will be assessed for fuel loading and can be deferred from grazing before treatment to allow fine fuels to accumulate. The implementation plan for controlled burning will consider how best to mitigate negative effects to soils and watersheds, as described on pages 37-38 of the draft EA. Mitigation measures will also be employed to avoid introducing invasive plant species. |
| 3 | 14 | The Forest Service needs to supplement this EA with additional discussion as to the role that | Current resource conditions are mainly acceptable as disclosed |

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| | | livestock grazing played in the creation of the current conditions, which the Forest Service has deemed to be undesirable. Additional analysis is also needed as to how livestock grazing will impact natural fire regimes in this allotment. Finally, the Forest Service needs to present information as to how livestock grazing may impact the desired outcomes of the nonstructural range improvements, including how the use of prescribed fire in livestock grazing areas may impact soil resources and lead to the introduction or spread of invasive plants into vulnerable landscapes. | under the various resource descriptions contained on pages 15-52 of the draft EA. See response to 3-12 concerning natural fire regimes, and 3-13 regarding implementation of nonstructural range improvements. |
| 3 | 15 | This proposed project will likely have significant impacts on watersheds and aquatic resources due to the presence of multiple riparian areas within the allotment boundary. The proposed action "calls for fencing portions of Hitt Wash to protect habitat for the lowland leopard frog," EA at 39, but does not include fencing of any other riparian areas. The streams and springs of this allotment drain into the Verde River, which provides habitat for numerous threatened and endangered species, as well as drinking water for millions of people. The Forest Service should take this opportunity to restrict livestock access to these riparian areas to allow for the maintenance and recovery of riparian areas, as well as maintenance and improvement of water quality and species habitat. According to the Forest Service (USDA 2012: 30), "Stream channel and riparian area recovery are considered optimal when direct effects of livestock grazing are eliminated." | The effects to riparian resources on the allotment is discussed fully in the Hydrology & Water Resources Specialist Report in the project record, and summarized in the draft EA on pages 33-42. Water quality is discussed in this report, as well. The effects of the Proposed Action and No Grazing alternative to water resources will be considered by the Deciding Official. |
| 3 | 16 | The Forest Service should add additional requirements related to riparian areas to the proposed action. Namely these restrictions should include: 1) Prevent, rather than minimize or cure, damage to stream banks and channels. 2) Eliminate direct grazing effects to riparian vegetation through fencing or other management strategies. 3) Avoid diverting water out of riparian areas including natural springs. 4) Do not use riparian pasture for livestock holding, trailing or drought relief. In addition, the Forest Service needs to provide supplemental information and analysis about the likely impacts to water resources and riparian ecosystems from the development of additional water projects that will lead to the diversion of more water out of these sensitive areas. | The Hydrology & Water Resources Specialist Report in the project record discloses the anticipated potential effects of new groundwater withdrawals and expansion of existing water developments that are proposed. There are Best Management Practices that will be followed to protect water quality in compliance with the Clean Water Act. Design features implementing the proposed water developments will consider how best to deliver the necessary amount of water to wildlife and livestock without waste. The proposed grazing use is the same as currently permitted, so this proposal does not result in higher demand for water by livestock, but rather dispersing the demand throughout the pastures more evenly. |
| 3 | 17 | The proposed action calls for monitoring and adaptive management to ensure that livestock | Incorporated by reference from District files and summarized within |

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| | | grazing within the K Four Allotment will meet the standards and guidelines contained within the Prescott National Forest management plan and the requirements of the permit. However, the monitoring proposed in this EA is insufficient to ensure resource protection or allow for adaptive management. | the Vegetation and Range Management Specialist Report in Appendix 1 are 21 range inspections that have occurred on the allotment from 1996 to 2013. The results of the inspections were used to inform management adjustments made through adaptive management. During that same timeframe, the stocking levels ranged from 139 to 572 head of cattle in response to the results from monitoring. This process will continue if grazing is re-authorized on the allotment. |
| 3 | 18 | The “effectiveness” monitoring, which is the monitoring that will evaluate whether desired conditions are being met, may only be completed once within the ten-year period of this permit. Without seasonal monitoring, there is no way for the Forest Service to adequately assess impacts on forest resources or effectiveness of permit conditions. The concept of adaptive management relies heavily on consistent collection and processing of monitoring data. Therefore, based on the monitoring requirements proposed for this action, it is unlikely that adaptive management would be effective for this allotment. | Page 8 of the draft EA explains that effectiveness monitoring may also be conducted if data and observations from implementation monitoring (annual monitoring) indicate a need. Also see response to 3-17 concerning past monitoring on the allotment. |
| 3 | 19 | The Forest Service needs to provide a more detailed monitoring plan for this allotment and incorporate annual or seasonal monitoring requirements. Without such a plan, adaptive management will not actually be implemented and it is exceedingly unlikely that the Forest Service will meet the desired conditions for this allotment or the forest as a whole. | See responses to 3-17 and 3-18 |
| 3 | 20 | The EA contains no discussion of the financial or economic impact on the Forest Service or local community from the proposed action. Grazing fees on public land, which are currently set at \$1.35 AUM, remain low compared to those on private lands. Additionally, the cost to the Forest Service to manage and monitor the K Four Allotment and associated infrastructure in order to meet the standards and conditions contained in the Forest Plan, as well as comply with various federal laws, is not insignificant. In order to fully analyze the various effects of the proposed action and no-action alternative, the Forest Service needs to complete an economic analysis for this project. | Grazing fees are set annually at the National scale and that determination is outside the scope of this analysis. The NEPA process does not require the preparation of an economics analysis, but the final EA will display the costs associated with range improvements and vegetation treatments, on average. |
| 4 | 1 | It seems that you are dramatically increasing the permitted number of livestock from what has been grazed in the past 18 years. Why? What gives you such confidence that, especially in the allotment that has not been grazed for many years, conditions will be improved? | As stated on page 3 of the draft EA, the term grazing permit has authorized about 3600 Animal Unit Months (AUMs) of grazing use on this allotment since the 1960s, though the season of use has fluctuated from yearlong to winter |

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| | | | seasonal. The current proposal would authorize a maximum of 3600 AUMs. Conditions have improved on the allotment since changing to winter seasonal grazing, and stocking the allotment appropriately and adhering to allowable use guidelines is expected to continue to improve allotment conditions. |
| 4 | 2 | According to the EA, the Prescott NF never prepared an AMP for this allotment, even though this was supposed to have happened twenty or more years ago. This time you should prepare the AMP along with the decision and present it to the public for review. It seems you also have let the permittee graze beyond the permitted off-date. Is it normal practice on the Prescott NF to ignore these requirements? Why should the public believe you will begin following them now? | There will be an AMP prepared after the decision. This is an administrative document that will contain the same project design features as disclosed in the EA. An AMP is a public document available for public review, but it is not required as part of the NEPA process to provide the AMP to the public before a decision is reached. The actual use records shown in the Vegetation and Range Management Specialist Report display no more than a 2 week adjustment of on and off dates, and the use period was not extended beyond the 6 months permitted. The current proposal adjusts the season to reflect what has typically been done, beginning of the season is October 15 th , and the end of the season is April 15 th . It is at the discretion of the District Ranger to allow minor adjustments to the season of use as long as resource conditions will allow for such. |
| 4 | 3 | You cite a need to improve soils based upon the TEUI, but wasn't that inventory completed decades ago? Why wasn't this need addressed in the past? | A site-specific evaluation of soil condition was done for this project, with data collected in 2011. This is the first site-specific analysis of allotment soil condition that has been done since the Forest developed its Terrestrial Ecosystem Survey in 2000. The TES survey helped to identify potential characteristics for soils, so departures from potential could be discerned. |
| 4 | 4 | The EA needs to show where the study plot will be established and give some real information about how it will be maintained, how big it will be, and so forth. So often these things are never actually done, or done and then neglected. | The EA on page discloses on page 6 that the study plot will be an extension of an existing study plot. The design of the plot will be determined by the Forest Soil Scientist. |
| 4 | 5 | I notice that in this very allotment there is a former riparian exclusion that has been allowed to disintegrate, and there seem to be no plans to | The Hyde Creek enclosure was constructed in the mid-1970s to protect riparian habitat. Permanent |

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| | | reinstated it. Why was it originally constructed? As a part of what decision? It seems it was probably put in place for a reason, and my bet is that certain promises were made regarding it that are similar to what you now promise with your grazing enclosure. Should I anticipate that this enclosure will suffer the same fate as the riparian enclosure did? | plots were established inside the enclosure and outside to determine the level of improvement that could be realized from excluding livestock. After 5 years in place, monitoring of the permanent plots showed that the woody riparian vegetation inside the enclosure had decreased in average height as compared to woody vegetation outside the enclosure. It was postulated that due to the location of the enclosure in a narrow, confined section of the channel, flooding events were more likely to scour and remove vegetation than outside the enclosure. The enclosure may be re-established if monitoring shows that the vegetation needs further protection from grazing. This is disclosed on pages 6 and 36 of the draft EA. |
| 4 | 6 | You say the new stocking level will range from 350 to 600 head of cattle—a significant increase over what has been grazed in the past 18 years. Is that 350 number a floor? Are you guaranteeing the permittee at least 350 per year? EA at 5. | Page 19 of the draft EA shows that actual stocking of the allotment from 1995 to 2013 ranged from 139 head to 572 head of cattle. The proposed range represents a level of stocking that is typical. Under adaptive management, the actual stocking can fall below the proposed range of numbers if conditions are such that it is warranted, such as in the case of recurrent drought. There is no guarantee to the permittee that stocking will be at least 350 head in any given year. |
| 4 | 7 | You rely on monitoring but never explain when that monitoring will occur or what will happen should it not occur, and you do reveal where the key areas are that it will allegedly occur in. For example, you state that “in the event that the resource protection measures do not accomplish site-specific resource objectives, additional optional measures may be implemented.” EA at 6. But if the measures are “optional” and they only “may” be implemented, and if you do not reveal when the monitoring will occur or what it must show even to trigger these optional, discretionary measures, then this is not a plan that provides much protection for the landscape, particularly given the history of this allotment. You must state these things or it is arbitrary and capricious to rely on the monitoring. | The monitoring component of the proposed action is explained on pages 8-9 of the draft EA, and pages 5-6 reveal how monitoring data is used in adaptive management, and the prescribed utilization levels that will serve as triggers to make management adjustments. The wording in the draft EA about “optional measures” will be replaced with “management options”. The documentation of range inspections on the allotment that is in the District 2210 files does not reveal a history of non-compliance with stated allowable use levels. |
| 4 | 8 | Later you state that monitoring “may” include things like utilization monitoring or “may” only include “visual observation.” Yet so much relies on this monitoring that it seems may never even | Monitoring protocols follow Agency direction as described in manuals, handbooks, R-3 Rangeland Analysis and Management Training Guide, |

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| | | occur. | and Interagency Technical references. Ocular measurement of utilization is an acceptable monitoring protocol. |
| 4 | 9 | Where do you get your stubble-height and grazing levels? Is there some study you are relying on that says a “four to six inch” stubble height is sufficient to accomplish your goals? | There is limited research in the Southwest on stubble heights needed for effective function and improvement of function, both for obligate herbaceous species and those which are facultative but still important for bank stability and riparian ecosystem function. Available data has been summarized by Subirge (2008). Clary and Leininger (2000) discuss stubble height and recommend 4 inches as a “starting point”. Much of the available research was conducted in systems with perennial streams in more humid regions than the Southwest. In a later presentation Clary and Kruse (2003) point out that 6-8 inches of residual height may be required to reduce browsing on willows or to indirectly limit trampling impact to vulnerable streambanks. They also state that many southwestern streams without perennial flow, but periodic flash flooding, “...have banks of sandy, noncohesive soils susceptible to disturbance, the maintenance of protective vegetation cover and appropriate channel form and structure is often more challenging than for many other parts of the country.” (Clary and Kruse 2003). Full literature citations are found in the Hydrology and Water Resources Specialist Report. |
| 4 | 10 | Your Forest Plan requires, among other things, that you evaluate trend. It says you need to manage in a way that leads to fair or better range condition with an upward trend. It appears you have departed from your Forest Plan. | A discussion of long-term vegetation trends is found in the Vegetation and Range Management Specialist Report. The draft EA discloses on page 17 that current range condition is satisfactory and meeting Forest Plan guidelines. |
| 4 | 11 | You say that “conservative utilization guidelines as prescribed for this project have been shown to increase forage production and improve vegetation composition” but you cite to a large textbook for that principle. Please give a cite that would allow a reader to find the passage cited. | The citation will be corrected to read “range research has shown that conservative utilization levels (35-45%) generally maintain forage production on semiarid grassland ranges” which is found on page 192 of the referenced book, Range Management Principles and Practices, 1989 edition. The |

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| | | | reference Holecheck, et al. 1999 will be added to the final EA that is a compendium of grazing studies that shows improvement in forage production and range trend when stocked at conservative levels versus high grazing intensity. This project does not promote high grazing intensity levels. The final EA will be updated to make this point clearer to the reader. |
| 4 | 12 | Will you be constructing the range “improvements” before you introduce livestock to the Round Pasture? | At least one new water development will be constructed and the protective enclosure at Round Valley Spring will be in place prior to using the Round Pasture. |
| 4 | 13 | After many years of no grazing, the riparian are in Hitt Wash, which is currently rated as “Functional At Risk” will be grazed again. Why are you so confident this will not further impair this riparian area? Will the 4-6 inch stubble height really accomplish the same thing as no grazing at all? | The Round Pasture was last scheduled for grazing in 2008, but there have been instances of unauthorized use in Hitt Wash by cattle from other allotments as well as the K Four. This is an administrative issue that is being corrected. See response 4-9 concerning the stubble height recommendations. The purpose of the grazing plan will be to achieve desired resource conditions. If the proposed stubble height recommendations are not successful in achieving long-term goals for riparian areas, they may be adjusted, or additional resource protection measures implemented as described on page 6 of the draft EA. The effects analysis for Water Resources and Watersheds on pages 38-42 of the draft EA does not disclose identical effects for alternatives 1 and 2, but achieving minimal stubble height guidelines is expected to allow for achievement of desired conditions, but at a slower rate than no grazing. |
| 4 | 14 | And when exactly will you even be monitoring this stubble height? How does this comport with your plan to “Maintain fully functional riparian systems?” | Stubble height in riparian areas is monitored while cattle are using the pasture, per Agency protocols. The riparian areas would also be visited periodically to determine compliance with pasture rotations and scheduled use periods, per grazing administration protocols. |
| 4 | 15 | Where is your science that places so much of the blame for the impaired riparian areas on pinyon and juniper? EA at 37 (“As in other locations with pinyon-juniper, channel erosion appears to have | The quote is a site-specific observation made by the hydrology specialist. It doesn’t “blame” the pinyon juniper but merely highlights |

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| | | <p>been ongoing . . .”) I note your Forest Plan has protective measures for riparian areas, and says “projects impacting riparian areas will be designed to protect the productivity and diversity of riparian-dependent resources.” Plan at 39. It also states that “at least 80 percent of stream bank linear distance” must be in stable condition, but I do not see any mention of this in the EA.</p> | <p>a common correlation.</p> <p>The proposed action was designed to comply with Forest Plan guidance for riparian areas. The Forest Plan is incorporated by reference as stated on page 3 of the draft EA.</p> |
| 4 | 16 | <p>Please explain in detail what the “Best Management Practices” are that will protect Hitt Wash, and how you will implement them.</p> | <p>Adherence to the utilization levels prescribed for riparian areas shown on page 6 of the draft EA are expected to improve riparian areas that are not meeting desired conditions. The proposal will also allow for fencing portions of Hitt Wash to protect wildlife habitat. Exclosure fencing may also be expanded beyond the initial breeding pools for frogs, if needed, as described on page 6 under site-specific resource protection measures. The Hydrology and Water Resources Specialist Report contains a complete listing of Best Management Practices that will be included as an appendix in the final EA.</p> |
| 4 | 17 | <p>The final plan needs to comply with the Forest Plan and reveal the key areas.</p> | <p>The Prescott Forest Plan, as amended [PR 1, p. 155, Appendix I] does contain a grazing management guideline to “Identify key ungulate forage monitoring areas.” Revealing key areas in the EA is not required. However, the EA does reveal TEUI map units which will serve as key areas. There were five TEUI map units chosen as key areas on this allotment to monitor vegetation condition (TEUI 419, 440, 461, 481, and 48), and four for soil condition (TEUI 48, 434, 461, 481) with sample locations in four pastures (North, Indian, Round, Bald Mountain). The selection of key areas is discussed on page 16 of the draft EA for vegetation and page 25-26 for soils.</p> <p>The monitoring description on page 6 of the draft EA discusses the use of key areas for future monitoring. The term “key area” is defined on page 62 in Appendix 4, Glossary of Terms.</p> |
| 4 | 18 | <p>We are concerned that future management of this allotment will be the same as the previous management, with little attention paid to</p> | <p>Comment of opinion is noted.</p> |

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| | | monitoring, preparing an AMP that is followed, and complying with the permit. It seems this EA is written to enable that kind of thing, with vague promises that are repeated hedged with words like “may” or “optional” and with a strange refusal to ever give specifics. | |
| 4 | 19 | For example you say that stubble height will be eight inches “where deergrass is key” but you don't say where that is. I want to know where it is because I am worried the Forest Service has no real intention of ever enforcing any of this. | Pages 35-37 of the draft EA in the section “Streamcourses and Riparian” describes the vegetation that is present in the important riparian areas of the allotment. Graver Wash, Hitt Wash, Hyde Creek, and Parker Spring are listed as having deergrass present. Riparian reaches that are monitored will be surveyed by resource specialists to determine what the key species will be for monitoring purposes. |
| 4 | 20 | Your Forest Plan also prohibits increased stocking until “management capability is proven.” I don't believe you have proven that. | The proposed stocking level is within the range of past stocking levels that have led to achievement of satisfactory vegetation conditions and improvement in soil condition over TEUI Soil Conditions Forest-Wide (see map in Appendix 2 of draft EA). Under adaptive management, stocking levels are increased or decreased in response to site-specific resource conditions in a given year. |
| 4 | 21 | Please see that the project has more specific monitoring descriptions and consequences, and that you follow the Forest Plan. We feel this EA needs more substance, and should include a more full discussion of what you know about the unsatisfactory areas and why you know it, and why you think those areas will improve. | Monitoring requirements on this allotment follow Agency protocols. We follow the Forest Plan as required. Comment of opinion is noted. |
| 5 | 1 | I continue to support the latest version of the proposed action in its entirety and particularly the measures relating to juniper treatment and water improvement. The proposed treatment will increase forage, improve the watershed, reduce soil erosion, and improve resource conditions overall. | Supportive comment noted. |
| 5 | 2 | I also support the proposed action regarding range improvements for the development of water resources. The additional water resources will benefit both wildlife and livestock, better distributing them around the allotment and away from the riparian areas. | Supportive comment noted. |

Letter #

Author

Address

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Appendix 6 – Best Management Practices

Soil and water conservation measures are means to comply with the Non-Point Source Section of the Clean Water Act and the Intergovernmental Agreement (IGA) signed by the Forest Service (R3) and the Arizona Department of Environmental Quality (ADEQ) (Jolly 1990). As per the IGA, the most practical and effective means of controlling potential non-point source pollution is through the development of Best Management Practices (BMPs). National direction is included in the Core BMP Technical Guide (USDA FS 2012). The general BMP categories were largely derived from the Southwestern Region Soil and Water Conservation Handbook, but were supplemented and modified to meet project needs (USDA FS 1990a). The number affiliated with each BMP references Southwestern Region FSH 2509.22 (1990a) and this section is organized sequentially following that handbook.

22.0 Range Management

Soil and water resources were considered in the development of the proposed action to ensure desired conditions are maintained or achieved. Part of the adaptive management strategy employs the use of soil and water conservation practices to achieve soil and water desired results. Adaptive management is dynamic and utilizes a number of rangeland management practices based on site specific characteristics and conditions. Some adaptive management strategies that may be considered are: assigning and adjusting stocking levels, adjusting livestock distribution, establishing deferred or rest rotation schedules, setting utilization and/or stubble height standards, adjusting season and duration of use, fencing, exclosures, range improvements, supplementing, etc..

Soil and watershed resources that were not achieving, or vulnerable to not achieve, desired conditions were identified as resource concerns. The interdisciplinary team identified site specific resource protection measures that also serve as BMPs.

22.1 Range Analysis, Allotment Management Plan, Grazing Permit System, and Permittee Operating Plan.

Objective. To manage rangelands through integrated resource management and ensure they are meeting Forest Land Management Plan objectives (USDA FS 1990a).

An interdisciplinary approach was used to ensure objectives of the Forest Land Management Plan are or will be met. This entails reviewing the forest plan and other policy, procedural, and environmental law guidance. Affected environment and current conditions are analyzed for

applicable resources and used to determine what is needed to achieve desired conditions. Land managers evaluate current rangeland strategies and integrate adaptive rangeland prescriptions as a proposal to achieve desired conditions. The analysis is incorporated into the 10-year term permit in the form of an Allotment Management Plan (AMP). Annual operating instructions are created every season to implement the AMP and the terms of the permit.

22.11 Controlling Livestock Numbers and Season of Use.

Objective. Safeguard water and soil resources under sustained forage production. Managed forage utilization by livestock to maintain healthy ecosystems for all resource objectives (USDA FS 1990a).

Utilization guidelines for the soil resources are based on allowable use which is the level of grazing utilization that can be permitted on an area when all influencing factors are considered (USDA FS 1999B). Allowable use guidelines for the soil resources focus on how much forage is consumed but the intent is to ensure herbaceous and graminoid biomass is left behind to provide organics and protection for the soil and water resources.

Allowable utilization guidelines will be adjusted and incorporated with a myriad of adaptive management strategies to ensure project objectives and desired conditions are met. Livestock will be managed to respond to fluctuations in weather and resultant variances in forage production. Stocking levels will be adjusted up or down based on Rangeland Health Inspections, Soil Condition Evaluation, and/or Riparian/spring Assessments. Season of use is rotated among pastures generally using a deferred and/or rest rotation system.

22.14 Determining Grazing Capability of Lands.

Objective. To maintain or improve soil stability, soil productivity and water quality by grazing the land within its capability (USDA FS 1990a).

This practice is an administrative and preventative control (USDA FS 1990a). Grazing capacity was determined by evaluating historical use records and reviewing historical production and utilization studies. Projections of livestock capacity were performed based on distance to water, available forage production, and topography. Resource conditions and concerns were evaluated through an interdisciplinary team setting and desired conditions and site specific management objectives were developed. Adaptive management strategies will integrate the resources capabilities to ensure resource desired conditions and objectives are met.

22.12 Controlling Livestock Distribution.

Objective. To manage sustained forage production and forage utilization by livestock while protecting soil and water resources. Maintaining healthy ecosystems for wildlife and other resources (USDA FS 1990a).

Pasture fencing and natural barriers are used to control the distribution of grazing on all allotments. Distribution within each pasture occurs by controlling access to water, by herding, changing season of use, and supplement placement. Distribution needs and techniques will be implemented through Adaptive management.

Manage livestock distribution to meet Forest Plan requirements of maintaining at least 80 percent of streambank linear distance in stable condition. Specific riparian and spring areas are listed under 25.12 Protection of Wetlands and Riparian Areas.

22.15 Revegetation and Reseeding

Objective. Establish vegetative cover on sites to prevent accelerated erosion and sedimentation (USDA FS 1990a). This BMP would apply to ground-disturbed areas from range improvement construction activities.

Reseeding/revegetation, mycorrhizae inoculation, and/or fertilization may occur to improve/maintain rangeland, vegetation, soil, riparian, watershed, and ecosystem health. Revegetation/reseeding preparation may include scarifying and /or ripping soils.

22.16 Erosion Control

Objective. Maintain soil productivity and safeguard water quality (USDA FS 1990a).

22.13 Rangeland Improvements.

Objective. To improve, maintain or restore range resources, including soil and water through the use of rangeland improvements (USDA FS 1990a).

Resource protection in the form of rangeland improvements can be constructed as a means to protect soil, water, and vegetation resources and the ecological services they provide.

Treatment of pinyon-juniper for the purpose of improved soil and vegetative condition is expected to provide immediate protective ground cover in the form of juniper slash for soil stabilization and protection and wildlife habitat. This should include:

Attain and maintain coarse woody material standards for soil productivity, nutrient cycling, and wildlife habitat.

- a. Juniper Grassland PNV 1-2 tons/acre coarse woody debris.
- b. Pinyon-Juniper Woodland PNV 2-5 tons/acre coarse woody debris.
- c. Pinyon-Juniper Evergreen Shrub PNV retain coarse woody debris; strive for 1-5 tons/acre.

The following BMP's provide general guidelines for newly constructed or reconstruction of range improvements. Range improvements may be constructed as an adaptive management technique.

Existing range improvements will be reconstructed and maintained as needed. Adaptive management strategies may lead to constructing new facilities in order to achieve the desirable attainable effects.

24.22 Special Erosion Prevention Measures on Disturbed Land

All sites subjected to surface disturbance will be inspected to determine appropriate erosion control measures. Areas will be evaluated to determine the need for preparatory erosion control measures, such as re-smoothing or sloping areas to its natural contours, ripping or scarifying the soil surface, etc.

24.16 Streamside Management Zone

A designated zone that consists of the stream and an adjacent area of varying width where management practices that might affect water quality, fish, or other aquatic resources are modified. The SMZ is not a zone of exclusion, but a zone of closely managed activity. It is a zone which acts as an effective filter and absorptive zone for sediment; maintains shade; protects aquatic and terrestrial riparian habitats; protects channel and streambanks; and promotes floodplain stability. The SMZ may be wider than the riparian area. Evaluations are done to determine if there is a need for special soil and water conservation prescriptions and, if

so, to develop them. Normally areas up to 150 feet from the channel are evaluated; however, wide floodplains may require a greater area of evaluation and evaluation may determine that a narrower area is all that is required for specific prescriptions.

25.12 Protection of Wetlands and Riparian Areas.

Objective. To avoid adverse impacts, including impacts to water quality, associated with disturbance or modification of wetlands (USDA FS 1990a).

Livestock enclosure fencing may be constructed at spring/seep riparian areas if desired conditions are not achieved through the control of livestock grazing. Enclosure fencing will be designed and constructed to protect the important riparian vegetation while still providing for livestock watering.

Trailing cattle through riparian areas, especially in narrow valley bottoms where cattle must walk in the channel, greenline and near floodplain, should be avoided.

General resource protection guidelines include the following utilization guidelines where riparian areas are in satisfactory condition, i.e., Proper Functioning Condition;

- Minimum stubble height on key riparian herbaceous species: four to six inches where sedges and rushes are key and eight inches where deergrass is key;
- Up to 20% use by weight on key woody species within riparian areas; or less than 50% of terminal leaders browsed on woody species less than 6 feet tall.

Specific springs and riparian areas

There are several perennial springs and riparian segments located within the K Four Allotment. Management objectives are measures to achieve desired conditions: Applicable desired conditions include.

- The quantity and timing of waterflows in streams, seeps, springs, and wetlands is sustained at a level that retains or enhances essential ecological functions.
- Soil and vegetation functions in upland and riparian settings are retained or enhanced.
- Riparian corridors are intact and are in, or are trending toward, properly functioning condition across the landscape.

Adaptive management, including appropriate monitoring, is applied to maintain and/or achieve desired conditions. Monitoring techniques are continually being refined in order to effectively and efficiently determine whether changes or adjustments in management are needed. They may include, but are not restricted to, indicators such as stubble height, utilization of woody riparian growth, and streambank alteration.

The following are brief spring and riparian descriptions and identified management measures to maintain function and meet management objectives:

1. Juniper Spring. Juniper Spring is currently developed with a spring box and water is piped to a storage tank and drinking troughs in the North Pasture. Currently there is not evidence of a riparian community associated with this spring. Normal functional characteristics indicative of a spring ecosystem are missing, such as the presence of riparian dependent vegetation or wetland hydrology that has inundated or saturated the surface for 5% of the growing season.

The riparian potential of the spring source is not known. Further evaluation will be needed to make this determination. Juniper Spring objectives include :

- a. Provide the opportunity of surface water use for wildlife and backcountry recreational use at the spring source. Measures may include developing a trough at the spring source. Although this is desired, no actions will occur until a determination is made regarding the ability of this spring to support a riparian ecosystem.
- b. Use adaptive management measures in the operation and maintenance of the waterflow from the spring system to the livestock storage tank and drinking trough. Measures to retain water for spring ecological function may include: a shut-off valve that would prevent overflow at livestock watering troughs and storage tanks which allows retention of water at the spring source, regular maintenance and inspection of the range improvement plumbing, and shut-off of the spring water source to livestock during non-use periods including summer season.

2. Indian Spring. Indian Spring is perennial and associated with a riparian ecosystem that is excluded from livestock grazing and has a spring box that pipes water outside the enclosure for livestock watering. Further measures may include:

- a. Create a closed watering source to the trough to retain water at the spring source. Measures may include a shut-off valve to retain water at the spring source when livestock are not in the pasture.
- b. Expansion of the water line with additional watering troughs should integrate shut-off valves to prevent water overflow and retain water at the spring source. Locate troughs to improve livestock distribution out of landscapes already prone to livestock concentration and in areas not prone to damage from heavy livestock use.

3. Hyde Spring: This spring is located on a hillside that has saturated soils with minimal to no surface water. Due to the sensitivity of the site, monitoring would occur to determine if livestock use is causing damage to the site. Possible measures may include constructing a drift fence or an enclosure.

4. Parker Spring: This spring produces surface water that supports a riparian ecosystem. The site previously had a rangeland improvement which included a spring box that was piped to a drinking trough for livestock watering. Adaptive management measures may include relocating the drinking trough as described below in 3a, and/or a drift fence or enclosure to minimize impacts.

- a. Monitoring would determine if reconstruction of the livestock watering supply is needed for livestock operations. Reconstruction of the watering supply would place the drinking trough away from sensitive spring and riparian elements. Waterflow to the trough would be managed to create a closed watering system that would prevent water overflow of the trough and dewatering of the spring source such as the use of a cut-off float valve and shut-off the spring water source to livestock during non-use periods including summer season.

- b. If monitoring indicates livestock use at the spring source and its associated riparian is influencing its function, exclosure fencing may be constructed while providing water to livestock operations as described above in “a”.

5. Spring Flow Protection Measures. In the event that groundwater dependent resources at springs, such as riparian vegetation, is negatively impacted by water withdrawal for livestock watering purposes, then the spring may be retired from use for that purpose. Dewatering the spring site may result in mortality of riparian vegetation and loss of persistent surface water. If monitoring shows evidence of site dewatering impacts to riparian resources, then an alternate water source may be implemented to replace the spring watering source, such as a trick tank that collects precipitation into a storage tank with a pipeline and troughs.

6. Hyde Creek. On the upper segment of Hyde Creek between FR 95 and the location of Hyde Spring there is an existing exclosure associated with a portion of this stream reach that currently is not fully functional. Monitoring will determine the degree of fence maintenance needed to prevent livestock concentration and retain riparian function.

7. Hitt Wash. The section of Hitt Wash downstream from the sediment dam at Round Valley Spring supports a riparian system. It begins with perennial flow and pools, transitions to perennial interrupted with pools, then long term intermittent, and downstream from the confluence with Hyde Creek has scattered pools which appear to be present throughout at least the dormant growing season. It was assessed as Functional – At Risk. Specific management actions include:

- a. Construct an exclosure to protect the perennial flow and pools immediately downstream from the dam, a distance of approximately 400 feet.
- b. In the remainder of the approximately 0.4 mile reach below the dam that is not fenced, use monitoring and adaptive management to achieve desired riparian conditions and make progress towards achievement of Proper Functioning Condition (PFC). The unfenced reach will be monitored when cattle are in the pasture to determine if allowable stubble height guidelines are maintained, and streambank alteration is not causing a downward trend in riparian condition. In order to make progress towards PFC in this reach, the retention of at least 6-8 inches stubble height on herbaceous hydrophytic vegetation (sedges and rushes) is recommended. This reach may be fenced at a future date if monitoring shows that desired riparian conditions are not being achieved under managed livestock grazing.
- c. On the lower section down to the allotment boundary, adverse impacts to stream channel features (e.g. streambanks, obligate riparian vegetation) should be minimized by modifying management actions. Examples of modification include, but are not limited to, adjusting timing and season of grazing,

25.16 Soil Moisture Limitations

All operations will be conducted during periods when the probabilities for precipitation, wet soils, and runoff are low.

25.18 Revegetation of Surface Disturbed Areas

All areas that have been disturbed will be evaluated to determine if reseeding is necessary or if natural recruitment is adequate. TES will be used to determine the appropriate grass seed specification.

24.3 Slash Treatment in Sensitive Areas

When conditions are warranted, all disturbed sites will be mulched with vegetation slash, certified weed free hay, or any other material deemed appropriate. Other erosion control practices may be implemented in lieu of mulch on a case-by-case basis (e.g. water bars, etc.).

24.14 Protection of Extremely Unstable Lands

Range improvement installation locations will avoid unstable lands. Unstable lands that are unavoidable will require special erosion control measures.

31.0 Fire and Other Post Vegetation Treatment Recovery

Soil and vegetation resources will be evaluated after post treatment activities to determine livestock adaptive management strategies to ensure the maintenance of site productivity. An evaluation of sites exposed to treatments is required at the end of the second growing season to determine if adequate resource recovery has occurred and identify if any additional adaptive management strategies are needed.

31.11 - Consideration of Water Quality in Formulating Fire Prescriptions.

Objective. To provide for water and soil resource protection while achieving management objectives through the use of prescribed fire.

Layout and implementation of prescribed burning will be coordinated with soil and hydrology criteria and input in order to minimize soil erosion and water quality impacts.

31.12 - Protection of Water Quality from Prescribed Burning Effects.

Objective. To maintain soil productivity, minimize erosion, and prevent detrimental amounts of ash, sediment, nutrients, and debris from entering water bodies.

To promote favorable ecological response from prescribed fire and minimize adverse effects on vegetation, soil, and water, the following fire prescription guidelines will be implemented.

- A streamside management zone adjacent to National Hydrologic Drainages (NHD) will be established to create a filter strip adjacent to riparian ecosystems to alleviate high sediment delivery to drainages and maintain riparian integrity.
- Establish a streamside management zone (SMZ) alongside perennial, interrupted, and intermittent drainages where there is a need to manage the riparian corridor independently of upland vegetation. An SMZ is a designated zone that consists of the stream and an adjacent area of varying width where management practices that might affect water quality, fish, or other aquatic resources are modified. An SMZ is not a zone of exclusion, but a zone of closely managed activity. It is a zone which acts as an effective filter and absorptive zone for sediment; maintains shade; protects aquatic and terrestrial riparian habitats; protects channel and streambanks; and promotes floodplain stability. The SMZ may be wider than the riparian area. Evaluations will be done to determine if there is a need for special soil and water conservation prescriptions along drainages within the prescribed burning and mechanical treatment areas and, if so, they will be developed prior to implementation by the appropriate resource specialists in consultation with those implementing the activity.

- Hillslope burning would be conducted over multiple years to minimize accelerated soil loss and promote vegetative response and recovery. Mosaic burn patterns would also be employed.
 - Targeted initial burn entry would strive to burn from “mid-slope to top-slope”.
 - When vegetation growth and soil stabilization occurs within the initial burn entry the “toe-slope to mid-slope” will be burnt.
- To maintain and protect monarch pinyon and juniper species, mechanical mastication may occur near these species to minimize fire intensity.

41 Access and Transportation Systems

To protect soil and water resources cross country travel will not occur during wet conditions or on slopes of 40% gradient or greater.

41.25 Maintenance of Roads

Road maintenance affiliated with range improvements will concentrate on improving drainage. Road drainage measures will not channel run-off directly into stream channels. This includes out-sloping the road and maintaining leadoff ditches. Roadwork will not occur during wet or storm conditions.