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Environmental Assessment
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PROPOSED GRAZING PERMIT RENEWAL FOR KANAB GULCH ALLOTMENT

MOHAVE COUNTY, ARIZONA

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Chapter 1

INTRODUCTION

1.1 BACKGROUND

In 2004, 2008 and 2012, the Bureau of Land Management (BLM) conducted evaluations of rangeland conditions on the Kanab Gulch Allotment (see map in Appendix 1) – a detailed discussion on rangeland health in this allotment can be found on pages 13-16 of this environmental assessment (EA). The Interdisciplinary Assessment Team, during the land health evaluation process, recommended that resource conditions on the Kanab Gulch Allotment are meeting all applicable Standards for Rangeland Health. The BLM is now considering the renewal of an existing grazing permit on the Kanab Gulch Allotment. Livestock grazing on public lands is managed according to grazing regulations found in the *Code of Federal Regulations* (at 43 CFR Part 4100). The BLM is responsible for determining the appropriate levels and management strategies for livestock grazing in this allotment.

An EA for the renewal of the grazing permit for the Kanab Gulch Allotment was completed in October 2008. A Proposed Decision was issued on October 3, 2008, and a Final Decision was issued on May 22, 2009. That Final Decision was appealed to the Interior Board of Land Appeals (IBLA). On May 19, 2010, Administrative Law Judge Harvey C. Sweitzer granted the appellant's motion for summary judgment and set aside the Kanab Gulch Allotment permit renewal final decision. The matter was remanded back to the BLM for additional NEPA analysis. This EA reflects the re-analysis of the proposed grazing permit renewal.

This EA has been prepared to disclose and analyze the environmental consequences of the proposed grazing permit renewal, as well as alternative livestock management, for the Kanab Gulch Allotment. This analysis provides information as required by the BLM implementing regulations for the National Environmental Policy Act (NEPA), the Taylor Grazing Act, and the Federal Land Policy Management Act (FLPMA) to determine whether to authorize grazing within this allotment, and whether changes to current management are necessary. This EA also serves as a tool to help the authorized officer make an informed decision that is in conformance with the Arizona Strip Field Office Resource Management Plan (RMP) (BLM 2008a). The action culminates an evaluation conducted on the allotment under the Arizona BLM Standards for Rangeland Health and Guidelines for Grazing Management. In addition, this EA determines if current grazing management practices would maintain desirable conditions and continue to allow improvement of public land resources, or whether changes in grazing management for the allotment are necessary. This EA is intended to evaluate the findings of the land health evaluation as it relates to vegetation conditions and resource values in the allotment. This is done in an effort to balance demands placed on the resources by various authorized uses within the allotment.

The EA is a site-specific analysis of potential impacts that could result with the implementation of a proposed action or alternatives to the proposed action. The EA assists the BLM in project planning and ensuring compliance with the NEPA, and in making a determination as to whether any "significant" impacts could result from the analyzed actions. "Significance" is defined by

NEPA and is found in regulations 40 CFR 1508.27. An EA provides evidence for determining whether to prepare an environmental impact statement (EIS) or a statement of "Finding of No Significant Impact" (FONSI). If the decision maker determines that this project has "significant" impacts following the analysis in the EA, then an EIS would be prepared for the project. If not, a decision record (DR) in accordance with 43 CFR 4160 may be signed for the EA approving the selected alternative. A DR, including a FONSI statement, documents the reasons why implementation of the selected alternative would not result in "significant" environmental impacts (effects) beyond those already addressed in the Arizona Strip Field Office RMP (BLM 2008a).

1.2 PURPOSE AND NEED

The BLM is proposing to fully process the term grazing permit on the Kanab Gulch Allotment in accordance with all applicable laws, regulations, and policies. Because Grazing Permit No. 05224 expired on June 25, 2010, the BLM renewed the permit with the same terms and conditions pursuant to Section 416 of Public Law 111-8, pending compliance with applicable laws and regulations. Compliance with all applicable laws and regulations includes consultation, coordination and cooperation with affected individuals, interested publics, States, and Indian Tribes; completion of the applicable level of National Environmental Policy Act (NEPA) review; consultation with the United States Fish and Wildlife Service (USFWS) under Section 7 of the Endangered Species Act; and ensuring that allotments are achieving or making significant progress toward achievement of land health standards and RMP objectives for the allotment. The BLM now intends to consider whether to renew, renew with modifications, or not renew Permit No. 05224, in accordance with those applicable laws and regulations.

The purpose of this action is to provide for livestock grazing opportunities on public lands where consistent with meeting management objectives, including the Arizona Standards for Rangeland Health and Guidelines for Livestock Grazing Management (Appendix 2) and the Arizona Strip Field Office RMP (BLM 2008a).

The BLM adopted the Arizona BLM Standards for Rangeland Health and Guidelines for Grazing Management in 1997 (Appendix 2); these Standards for Rangeland Health and Guidelines for Grazing Management were incorporated into the Arizona Strip Field Office RMP. Standards for rangelands should be achieving or making significant progress towards achieving the standards and to provide for proper nutrient cycling, hydrologic cycling, and energy flow. Guidelines direct the selection of grazing management practices and, where appropriate, livestock facilities to promote significant progress toward, or the attainment and maintenance of, the standards. The RMP identifies resource management objectives and management actions that establish guidance for managing a broad spectrum of land uses and allocations for public lands in the Arizona Strip Field Office. The RMP identified public lands within the Kanab Gulch Allotment as available for domestic livestock grazing. Where consistent with the goals and objectives of the RMP and land health standards, allocation of forage for livestock use and the issuance of grazing permits to qualified applicants are provided for by the Taylor Grazing Act and FLPMA.

The rangeland health assessment completed for the Kanab Gulch Allotment identified both Standards 1 and 3[1] as being achieved on the allotment, including achievement of Desired Plant Community (DPC) objectives and desired resource conditions.

The Arizona Strip Field Manager is the authorized officer responsible for the decisions regarding management of public lands within this allotment. Based on the results of the NEPA analysis, the authorized officer will issue a determination of the significance of the environmental effects and whether an EIS would be required. If the authorized officer determines that it is not necessary to prepare an EIS, the EA will provide information for the authorized officer to make an informed decision whether to renew, renew with modifications, or not renew the permit and if renewed, which management actions, mitigation measures, and monitoring requirements will be prescribed for the Kanab Gulch Allotment to ensure management objectives and Arizona Standards for Rangeland Health are achieved.

1.3 CONFORMANCE WITH LAND USE PLAN

The alternatives described in Chapter 2 of this EA are in conformance with the Arizona Strip Field Office RMP, approved January 29, 2008 (BLM 2008a). The alternatives are consistent with the following decisions contained within this plan.

The following decisions are from Table 2.11 in the RMP regarding management of livestock grazing:

- **DFC-GM-01:** Healthy, sustainable rangeland ecosystems will be maintained or improved to meet Arizona's Standards for Rangeland Health (1997), and produce a wide range of public values such as wildlife habitat, livestock forage, recreation opportunities, clean water, and functional watersheds.
- **DFC-GM-02:** Livestock use and associated management practices will be conducted in a manner consistent with other resource needs and objectives to ensure that the health of rangeland resources is preserved or improved so that they are productive for all rangeland values. Where needed, public rangeland ecosystems will be improved to meet objectives.
- **LA-GM-01:** All allotments will continue to be classified as available for grazing by live-stock under the principle of multiple use and sustained yield, except where specifically noted.[2]
- **MA-GM-02:** Implementing the Arizona Standards for Rangeland Health will continue on all grazing allotments in accordance with established schedules and congressional requirements. The Arizona Standards for Rangeland Health and Guidelines for Grazing Management will apply to all livestock grazing activities. These guidelines address management practices at the grazing AMP-level and are intended to maintain desirable conditions or improve undesirable rangeland conditions within reasonable time frames.

[1] As described in Section 2.1.1 of this EA, Standard 2 does not apply in the Kanab Gulch Allotment.
[2] No restrictions are associated with the Kanab Gulch Allotment.

- **MA-GM-03:** The interdisciplinary allotment evaluation process will continue to be used to provide specific guidance and actions for managing livestock grazing. Existing AMPs and other activity plans will be consistent with achieving the DFCs and standards for rangeland health. They will contain the site-specific management objectives, as well as actions, methods, tools, and appropriate monitoring protocols.
- **MA-GM-04:** Existing management practices and levels of use on grazing allotments will be reviewed and evaluated on a priority basis to determine if they meet or are making progress toward meeting the Arizona Standards for Rangeland Health. Appropriate and timely actions will be implemented to deal with those areas not meeting the standards.
- **MA-GM-05:** The allotment management categorization process will continue to be used to define the level of management needed to properly administer livestock grazing according to management needs, resource conflicts, potential for improvement, and BLM funding/staffing constraints. The allotment categories are Custodial, managed custodially to protect resource conditions and values; Maintain, managed to maintain current satisfactory resource conditions and are actively managed to ensure that the condition of resource values do not decline; and Improve, actively managed to improve unsatisfactory resource conditions.
- **MA-GM-07:** Allowable use on key forage species is 50% on allotments with rotational grazing systems, except in tortoise habitat. On allotments in desert tortoise habitat or being less intensively managed, then utilization is set at 45%[3].
- **MA-GM-08:** Any hay or other feed used in administering the livestock operation will be certified weed-free.

The allotment analyzed in this EA is classified as available for grazing under the RMP, with no seasonal restrictions. The alternatives would meet these land use plan decisions. It has also been determined that the alternatives would not conflict with other decisions throughout the RMP.

1.4 RELATIONSHIPS TO STATUTES, REGULATIONS, OR OTHER PLANS

The authority to renew grazing permits is provided for in 43 CFR 4100 where the objectives of the regulations are "....to promote healthy, sustainable rangeland ecosystems; to accelerate restoration and improvement of public rangelands to properly functioning conditions; to promote the orderly use, improvement and development of the public lands; to establish efficient and effective administration of grazing of public rangelands; and to provide for the sustainability of the western livestock industry and communities that are dependent upon productive, healthy public rangelands" (43 CFR 4100.0-2).

[3] The Kanab Gulch Allotment is a less intensively managed allotment, so maximum utilization is set at 45%.

The proposed action complies with 43 CFR 4100.0-8 which states, in part, "The authorized officer shall manage livestock grazing on public lands under the principle of multiple use and sustained yield, and in accordance with applicable land use plans." The proposed action also complies with 43 CFR 4130.2(a) which states, in part, "Grazing permits or leases shall be issued to qualified applicants to authorize use on the public lands and other lands under the administration of the Bureau of Land Management that are designated as available for livestock grazing through land use plans".

The proposed action is consistent with the Fundamentals of Rangeland Health (43 CFR 4180.1) and Arizona's Standards and Guidelines, which were developed through a collaborative process involving the Arizona Resource Advisory Council and the BLM State Standards and Guidelines team. The Secretary of the Interior approved the Standards and Guidelines in April 1997. These standards and guidelines address watersheds, ecological condition, water quality, and habitat for special status species. These resources are addressed later in this document.

The regulations at 43 CFR Part 10 specifically require land use authorizations, including leases and permits, to include a requirement for the holder of the authorization to notify the appropriate Federal official immediately upon the discovery of human remains and other items covered by the Native American Graves Protection and Repatriation Act (see 43 CFR 10.4(g); the actual requirement for persons to notify the Federal agency official and protect the discovery is in 43 CFR 10.4(b) and (c)). This requirement has been incorporated into the alternatives.

Executive Order 13186 requires the BLM and other Federal agencies to work with the USFWS to provide protection for migratory birds. Implementation of the proposed action is not likely to adversely affect any species of migratory bird known or suspected to occur on the allotment. No take of any such species is anticipated**.**

The subject allotment is in Mohave County, Arizona. The proposed action is consistent with the *Mohave County General Plan* (adopted in 1994 and revised December 5, 2005). While livestock grazing is not specifically addressed in the Mohave County General Plan, this action does not conflict with decisions contained within the Plan.

In addition, the proposed action would comply with the following laws and/or agency regulations, other plans and is consistent with applicable Federal, state and local laws, regulations, and plans to the maximum extent possible.

- Taylor Grazing Act of 1934
- Federal Land Policy and Management Act (FLPMA) of 1976 (43 U.S.C. 1701 et seq.)
- Public Rangelands Improvement Act (PRIA) of 1978
- Endangered Species Act of 1973, as amended
- 43 CFR 4100 Grazing Administration - Exclusive of Alaska
- Arizona Water Quality Standards, Revised Statute Title 49, Chapter II
- Section 106 of the National Historic Preservation Act of 1966, as amended

- Native American Graves Protection and Repatriation Act of 1990 (25 U.S.C. 3001-3013; 104 Stat. 3048-3058)
- National Environmental Policy Act (NEPA) of 1969
- Executive Order 13186 – *Responsibilities of Federal Agencies to Protect Migratory Birds*

1.5 IDENTIFICATION OF ISSUES

Identification of issues for this assessment was accomplished by considering the resources that could be affected by implementation of one of the alternatives. These issues were identified by the Rangeland Resources Team, Interdisciplinary Assessment Team, and livestock permittees during the scoping meeting held on October 22, 2003 for the Kanab Gulch Allotment (see *Standards for Rangeland Health and Guidelines for Grazing Administration Implementation Project: Allotment Assessment for Kanab Gulch*) (BLM 2007a)[4], as well as through the public review process for this grazing permit renewal EA. The issues identified through the process described above are:

- Livestock grazing – permit renewal is required in order to allow continued livestock use on this allotment.

- Vegetation – the potential exists for deterioration in ecological condition in the allotment if proper livestock grazing practices are not followed.

- Wildlife (including sensitive species and migratory birds) – habitat for these species, as well as for their prey, may be impacted if proper livestock grazing practices are not followed.

- Threatened, Endangered, and Candidate Species – habitat considered suitable for the Mexican spotted owl is present within this allotment. Improper livestock grazing practices may affect habitat for this species.

[4] The Kanab Gulch and Gulch Allotment S&G Assessment is available at the Bureau of Land Management's Arizona Strip Field Office, 345 E. Riverside Drive, St. George, Utah 84790.

Chapter 2

DESCRIPTION OF THE ALTERNATIVES

This EA focuses on the proposed action, reduced grazing, and no grazing alternatives. The BLM interdisciplinary team explored and evaluated several different alternatives to determine whether the underlying need for the proposed action, ensuring that the allotment is achieving land health standards, would be met.

2.1 ACTIONS COMMON TO ALL ALTERNATIVES

2.1.1 Arizona Standards for Rangeland Health

The allotment would be managed to achieve the following objectives, as described in the *Arizona Standards for Rangeland Health*:

1) Upland soils exhibit infiltration, permeability, and erosion rates that are appropriate to soil type, climate, and landform (ecological site).
2) Riparian and wetland areas are in properly functioning condition.[5]
3) Productive and diverse upland and riparian-wetland plant communities of native species exist and are maintained.

2.2 ALTERNATIVE A – PROPOSED ACTION

The livestock grazing management practices proposed under this alternative (i.e., season of use; utilization levels; and ecological condition and desired plant community objectives) were designed to manage the overall rangeland resources present, provide for a diversity of wildlife and plant species, maintain functioning ecosystems, and maintain and/or improve ecological condition. Specifically, under this alternative the BLM would:

- Cancel the existing grazing permit and issue a new grazing permit for the Kanab Gulch Allotment for a period of ten years. There is no proposed change in number of livestock or season of use for the allotment. Livestock grazing would occur during the season of use, and with the number of Animal Unit Months (AUMs) limited to the current active preference (Table 1).

[5] This standard does not apply in the Kanab Gulch Allotment. As described in Table 6 (pages 19-20) of this EA, there are no wetland/ riparian areas in the allotment. Bessie Spring flows out of sandstone with a small amount of water collecting in a small slick rock pool; there is no associated riparian-obligate vegetation other than a few tamarisk (see photos in Appendix 4). Due to the hydrological characteristics of the site (e.g., lack of consistent water flow or stable water levels, both surface and subsurface; lack of substrate/soil on which riparian-obligate species can establish; and lack of vegetation or physical characteristics reflective of permanent surface or subsurface water influence), the area is not defined as a wetland/riparian area.

Table 1. Grazing Proposed Under Alternative A

Allotment Name	Livestock			Active AUMs	Suspended AUMs	Public Land (PL) (acres)	% Federal Range
	No.	Kind	Season of Use				
Kanab Gulch	26	Horses	11/16 - 04/30	143	67	4,260	100

- Manage the allotment (which is a less intensively managed allotment) for no more than 45% utilization of current year's production removed through grazing or other loss. The BLM would assess resource conditions through field inspections and determine, in consultation with the permittee, whether management changes (e.g., changes in livestock numbers, adjustment of move date, or other changes or use within the parameters identified under this alternative) may be implemented prior to reaching maximum utilization. The move off date (i.e., removal of livestock from the allotment) may be adjusted if monitoring indicates maximum utilization has been reached, or due to unusual climatic conditions, fire, flood, or other acts of nature. If maximum utilization is reached on key species/areas in an allotment before the scheduled removal date, the use of salt, herding, or other management options may be used to distribute livestock away from an area where maximum utilization has been reached, or livestock may be removed from the use area or allotment (after consultation with the permittee), as deemed necessary by the BLM.

- Manage the allotment to achieve the Desired Plant Community (DPC) objectives listed on pages 9-10 of this EA.

2.2.1 Grazing System

The Kanab Gulch Allotment would continue to be grazed seasonally by 26 horses (from November 16 to April 30). Active grazing use is 143 AUMs, with 67 suspended non-use AUMs (total AUMs is 210). The Kanab Gulch Allotment contains a single pasture, so no grazing rotation has been established because no pasture fence exists for the allotment. Once the horses leave this seasonal allotment on April 30, they go to private lands which are part of an overall yearlong grazing system.

2.2.2 Terms and Conditions of Grazing Permit

- Billing for grazing use on the allotment would be based on the advance billing due November 15 each year. Livestock may be moved 5 days before or after scheduled move dates.

- Any hay or other feed used in administering the livestock operation would be certified weed-free.

- Use of nutritional livestock supplements is allowed, including protein, minerals and salt. However, any supplements used must be dispersed at a minimum of ¼ mile from any known water sources, riparian areas, populations of special status plant species, and cultural or any other sensitive sites.

- If any human remains, funerary objects, sacred objects or objects of cultural patrimony as defined in the Native American Graves Protection and Repatriation Act (P.L. 101-601; 104 Stat. 3048; 25 U.S.C. 3001) are discovered in connection with allotment operations under the grazing permit, the permittee would be required to protect the immediate area of the discovery and immediately notify the BLM authorized officer or her authorized representative.

2.2.3 Desired Plant Community Objectives

The allotment would be managed to achieve the DPC objectives included in the *Standards for Rangeland Health and Guidelines for Grazing Administration Implementation Project: Allotment Assessment for Kanab Gulch* (BLM 2007a). The allotment assessment lists and evaluates achievement of the allotment's DPC objectives. These objectives are expressed in species composition by weight (CBW) and are listed below. These DPCs provide for the habitat needs (both forage and cover) of wildlife, protection for soils and hydrologic functions, and forage for livestock.

Many factors influence changes or differences in frequency of vegetation as shown in the ecological site guides developed by the Natural Resources Conservation Service (NRCS). This particular area is a transition between two major land resource areas[6] - it is a transition between 7-11-inch and 10-14-inch precipitation zones. The site was determined to be more appropriate in the 10-14-inch zone because it does have some scattered sagebrush and pinyon-juniper which are not found in the 7-11-inch zone; however, even this is not a good "fit" because the sagebrush and pinyon-juniper are very sparse and only present due to the influence of the top of the Kanab Plateau (on the ridge above the Kanab Gulch Allotment).

It is important to note that the site guides are just that – they are "guides. Long-term monitoring of a site indicates what a particular area is capable of producing. For example, although the site guide predicts 5-10% cover in trees, none exist at either key area. In addition, although both key areas in this allotment are in the same ecological site, monitoring has shown that Key Area #2 is a shrub dominated site (current composition of shrubs is 92%, versus the 20-40% predicted by the site guide) that is not capable of producing a high grass composition such as occurs at Key Area #1. These differences are due to in part to slope, aspect, vegetation, precipitation timing and patterns, along with a caliche or calcium carbonate layer of different soil types present at Key Area #2 (and absent at Key Area #1), which are all factors resulting in these two key areas having different vegetation.

As described in Appendix 5, long-term monitoring of the two key areas on the Kanab Gulch Allotment has indicated that the key areas are not capable of producing the forage objectives identified in the Arizona Strip Field Office RMP for bighorn sheep habitat and mule deer winter

[6] Land resource areas are nearly homogenous geographic areas of soil, climate, land use, water resources, elevation, topography, and potential natural vegetation (NRCS 2013).

crucial habitat, with the exception of grasses at Key Area #1. The DPC objectives therefore reflect the potential of each site. The DPC objectives for Kanab Gulch Allotment are:

Key Area #1 (Breaks 10"-14" p.z.)
- Maintain the perennial grass composition between 15-40%.
- Maintain the shrub/browse composition between 25-45%.
- Maintain the forb composition between 1-10%.

Key Area #2 (Breaks 10"-14" p.z.)
- Maintain the perennial grass composition between 2-10%.
- Maintain the shrub/browse composition between 25-45%.
- Maintain the forb composition between 1-10%.

2.2.4 Range Improvements

The rangeland health assessments for this allotment did not indicate the need for new range improvements. Thus, none are proposed under this alternative. Existing range improvements (which on this allotment consist of short sections of boundary fence) would be maintained as currently required. Any new range improvements proposed in the future to assist in grazing practices and promote rangeland health would be considered through a separate NEPA process.

2.2.5 Monitoring and Adaptive Management

The proposed action includes adaptive management, which provides a menu of management options that may be needed to adjust management decisions and actions to meet desired conditions as determined through monitoring. BLM resource specialists would periodically monitor the allotment over the 10-year term of the grazing permit to ensure that the fundamentals or conditions of rangeland health are being met, in accordance with 43 CFR 4180. If monitoring indicates that desired conditions are not being achieved and current livestock grazing practices are causing non-attainment of resource objectives, livestock grazing management on the allotment would be modified in cooperation with the permittee. Adaptive management allows the BLM to adjust the timing, intensity, frequency and duration of grazing; the grazing management system; and livestock numbers temporarily or on a more long-term basis, as deemed necessary. An example of a situation that could call for adaptive management adjustments is drought conditions. If a permittee disagrees with the BLM's assessment of the resource conditions or the necessary modifications, the BLM may nevertheless issue a Full Force and Effect Grazing Decision to protect resources.

2.3 ALTERNATIVE B – ISSUE NEW 10-YEAR GRAZING PERMIT with REDUCED GRAZING

The livestock grazing management practices proposed under this alternative would be similar to those proposed for Alternative A. A new grazing permit would be issued for the Kanab Gulch Allotment for a period of ten years. Proposed utilization levels, ecological condition and desired

plant community objectives would be the same as those described for Alternative A in order to manage the overall rangeland resources present, provide for a diversity of wildlife and plant species, maintain functioning ecosystems, and maintain and/or improve ecological condition. Terms and conditions of the grazing permit would be the same as those for Alternative A. In addition, monitoring and adaptive management described for Alternative A would also be a part of this alternative (Alternative B). However, the livestock grazing proposed in Alternative B would occur outside the phenological development stages (growth through seed ripe) for all key vegetative species (see Table 8 on page 24). Thus, season of use authorized would be December 1 – March 15 each year, which is two months shorter than that proposed for Alternative A. Number of livestock would remain at 26 horses, but the shorter grazing season would result in a permit issued for 91 active AUMs (the remaining 52 AUMs that are currently active would be suspended AUMs, for a total of 119 suspended AUMs) – see Table 2.

Table 2. Grazing Proposed Under Alternative B

Allotment Name	Livestock			Active AUMs	Suspended AUMs	Public Land (PL) (acres)	% Federal Range
	No.	Kind	Season of Use				
Kanab Gulch	26	Horses	12/1 - 03/15	91	119	4,260	100

No new range improvements are proposed under this alternative.

2.4 ALTERNATIVE C – NO GRAZING

Alternative C is to reissue a ten-year term grazing permit on the Kanab Gulch Allotment with 0 authorized AUMs for active preference (i.e., livestock grazing would be deferred for the ten-year permit period). No new range improvement projects would be constructed and no modifications would be made to existing projects.

2.5 ALTERNATIVE(S) CONSIDERED BUT ELIMINATED FROM FURTHER ANALYSIS

2.5.1 No Action – Renewing Grazing Permit With Current Terms and Conditions

Under this alternative, a new ten-year term grazing permit would be issued for the Kanab Gulch Allotment with the same terms and conditions as the current permit (which was renewed under the provisions of Public Law 111-8 pending full processing of new permit, as described on page 2 of this EA). No new range improvement projects would be constructed and no modifications would be made to existing projects. Livestock grazing on the allotment would continue the same as outlined under Alternative A (Proposed Action). Potential impacts to elements of the environment would therefore be the same as those described for Alternative A, so a separate analysis of the No Action alternative is not required (BLM 2008b).

Chapter 3

AFFECTED ENVIRONMENT

This chapter provides information to assist the reader in understanding the existing situation and current grazing management on the Kanab Gulch Allotment. The affected environment is tiered to the Arizona Strip Proposed RMP/Final EIS (BLM 2007b). This EA also incorporates by reference the Standards for Rangeland Health and Guidelines for Grazing Administration Implementation Project: Allotment Assessment for Kanab Gulch and Gulch (BLM 2007a). This assessment describes the resources and issues applicable to the allotment.

The affected environment of this EA was considered and analyzed by an interdisciplinary team. Table 4 (found later in this chapter) addresses the elements and resources of concern considered in the development of this EA; this table indicates whether the element/resource is not present in the project area, present but not impacted to a degree that requires detailed analysis or present and potentially impacted. The resources identified below include the relevant physical and biological conditions that may be impacted with implementation of the proposed action, and provides the baseline for comparison of impacts described in Chapter 4.

3.1 General Setting

The Arizona Strip is comprised of 2.8 million acres of BLM-administered land in the northwestern portion of Arizona. The Kanab Gulch Allotment (see map in Appendix 1 of this EA) is located in Mohave County, Arizona on lands managed by the BLM's Arizona Strip Field Office. The Kanab Gulch Allotment is about 40 miles south of Fredonia, Arizona. The allotment lies outside of Grand Canyon-Parashant and Vermilion Cliffs national monuments.

3.1.1 Topography

Topography of the allotment is typified by steep-sloped canyons and steep toe slopes of sandstone, limestone, and shale within Kanab Creek and tributary drainages (such as Chamberlain Canyon). The allotment includes the Esplanade, an expansive bench-like (relatively flat) plateau made up of predominantly windblown sandstone. Elevation of the allotment ranges from 4,200 feet on the lower rim of the Esplanade (in Hack Canyon) to 5,521 feet on the rim of Water Canyon Point.

3.1.2 Climate

Precipitation on the allotment is similar to that recorded by the Big Jackson rain gauge. Table 3 presents a summary of the annual average precipitation for this rain gauge, while detailed precipitation data can be found in Appendix 6.

Table 3. Average Precipitation Data (inches)

Station	Fall	Winter	Spring	Summer	Annual
Big Jackson	1.82	2.90	2.24	4.81	11.76

Precipitation over the last 25 years has been at or above normal for 12 of these years, while precipitation has been below normal for the other 13 years. The highest precipitation received during that time period was in 2005 when annual precipitation was 166% of normal; the lowest was in 2002 when precipitation was 34% of normal. Annual precipitation over the past four years has been at or above normal.

3.1.3 Land Health Evaluation

The BLM regularly conducts inventories and assessments of natural resource conditions on public lands. The need for natural resource inventories was established in 1976 by Congress in Section 201(a) of FLPMA and reaffirmed in 1978 in Section 4 of PRIA. These Acts mandate that Federal agencies develop and maintain inventories of range conditions and trends on public rangelands and update inventories on a regular basis.

Rangeland landscapes are divided into ecological sites for the purposes of inventory, evaluation, and management. An ecological site is a distinctive kind of land with specific physical characteristics that differs from other kinds of land in its ability to produce a distinctive kind and amount of vegetation. It is the product of all the environmental factors responsible for its development. Within each precipitation zone, ecological sites are classified based on the differences in site factors (soil, slope, aspect, parent material, topographic potential, etc.) that affect the potential to produce vegetation.

Ecological sites have developed a characteristic kind and amount of vegetation. The natural plant community on an ecological site is typified by an association of species that differs from that of other ecological sites in the kind and/or proportion of species or in annual production (BLM 2001). While the natural plant community of a particular ecological site is recognized by characteristic *patterns* of species associations and community structure, the *specific species* present from one location to another may exhibit natural variability - the natural plant community is not a precise assemblage of species for which the proportions are the same from place to place, or even in the same place from year to year. Variability is the rule rather than the exception. The distinctive plant communities associated with each ecological site (including the variability which frequently occurs) can be identified and described, and are called ecological site descriptions.

The BLM measures range condition, or ecological condition, by the degree to which the existing vegetation of a site is different from the Potential Natural Community (PNC) for the respective ecological site, as identified in the ecological site description. PNC is “the biotic community that would become established if all successful sequences were completed without interferences by humans under the present environmental conditions. It may include naturalized non-native

species" (BLM 2005 and BLM 2001). This differs from "historic climax plant community" in that an historic climax plant community is "the plant community that existed before European immigration and settlement (BLM 2001). The BLM uses "potential natural community" terminology rather than "historic climax plant community" because PNC recognizes past influences by man. Knowing the PNC of the area, and using the ecological site descriptions as a guide (which consider the potential of a site to produce certain kinds and amounts of vegetation), DPC objectives can be developed. The DPC then becomes the objectives by which management actions would be measured (see pages 9-10 of this EA for the DPC objectives for this allotment).

Ecological condition expresses the relative degree to which the kinds, proportions, and amounts of plants in a plant community resemble that of the potential natural plant community for the site. Ecological condition for most of the sites in this area change slowly. Ecological condition is reported in the following four classes, or seral stages, which are the developmental stages of ecological succession:

- **Early Seral:** 0-25% similar to the expected potential natural community exists.
- **Mid Seral:** 26-50% similar to the expected potential natural community exists.
- **Late Seral:** 51-75% similar to the expected potential natural community exists.
- **Potential Natural Community or PNC:** 76-100% similar to the expected potential natural community exists.

The land health evaluation report for this allotment was completed in 2007. This evaluation was made in accordance with the Arizona Standards for Rangeland Health and Guidelines for Grazing Management (Appendix 2) and standard BLM methods for estimating ecological condition and current trend. Evaluation sites, or key areas as defined in Technical Reference 1734-4 (BLM 1999b), were selected (location and amount) using professional judgment based upon terrain, past uses of the area, and location of waters. Specific locations of key areas are available in the project file. Existing trend studies, ecological condition data, actual use, and utilization studies for the allotment was analyzed.

The trend identified in the land health evaluation assessed erosion status, vegetative cover, vigor, species diversity, location of the most palatable plants in relation to access to a grazing animal, and general age classes. The land evaluation identified trend over a wider area within each ecological site or sites surveyed than the 3- foot x 3-foot and 5-foot x 5-foot areas the monitoring studies represent. In 2011, 2012 and 2013 additional monitoring (pace-frequency and utilization) data was collected; this data was used to re-evaluate the allotment (see Appendix 5). The 2011 frequency data for the allotment indicated that the trend for Key Area #1 is up while the trend for Key Area #2 is down.

BLM resource specialists evaluated the monitoring data to determine causal factor(s) for the downward trend at Key Area #2, including whether current management practices are contributing. It should be noted that the Breaks 10"-14" p.z. ecological site occurs as hills and steep escarpments. Due to the shallow soils and steep slopes, this site is subject to significant runoff (bedrock areas may be quite vertical). As stated on page 9 of this EA, this ecological site tends to be dominated by shrubs. Both canopy and basal cover values of grasses and some shrubs decrease during prolonged drought.

On the Kanab Gulch Allotment, Key Area #2 is mostly deep-rooted shrubs that have depressed the grasses in the interspaces; this has resulted in more shrubs over time (current composition of shrubs is 92%). The grass component has steadily decreased since the trend study plot was established (in 1982). The decrease in trend of this shrub dominated site is due to many factors that have influenced this vegetative shift to shrubs, including recent precipitation patterns and inclusions of different soil types producing different vegetation over time. The major reason for this is the shallow caliche or calcium carbonate soil that is characterized by a natural "hard pan" (i.e., impenetrable layer) which the shallow rooted grasses cannot easily penetrate, and therefore die off during a drought or drier periods. The caliche layer then favors the deep rooted shrubs which can penetrate this layer and survive. The site in which Key Area #2 is located has this shallow caliche soil inclusion created by a multitude of soil textures, depths and developments. Key Area #1 has much deeper soils with very little caliche or hardpan inclusions; these deeper soils produce more grass, which can more easily flourish and better withstand drought.

The base year in which the trend plot was established (1982) followed three years of above average precipitation, while the years before the most recent trend reading (2011) received below normal moisture. Key Area #2 has shown an increase in shrub species such as blackbrush and Mormon tea which have strong and deep tap roots that will help the plants maintain or increase under a dry climate regime; because of the precipitation patterns in the years immediately prior to 2011 (compared to the 14-16 inches received in the early 1980s when this key area was first established), the frequency of grasses has decreased while shrubs have increased. Utilization on key species at both key areas has been light in recent years (see Table 4). In addition, winter grazing (i.e., grazing during the dormant season) has little effect on grasses (see discussion in Section 4.2.1 of this EA). Thus, the downward trend appears to be a result of drought and the associated increase in shrubs which have inhibited the grasses from growing in these shallow caliche hardpan soils, and not due to livestock grazing.

Table 4. Utilization Percentages of All Key Species on the Kanab Gulch Allotment

Key Area	Species	2004	2009[7]	2011	2012	2013
1	Grasses	14%	Grasses: 29% Shrubs: 27% **28**	10%	21%	25%
	Shrubs	16%		11%	21%	19%
	Average all species	**15**		**11**	**20**	**22%**
2	Grasses	14%		21%	13%	24%
	Shrubs	16%		15%	12%	18%
	Average all species	**15**		**17**	**13**	**21%**

[7] Utilization was not read at either key area, but in a "representative area" of the allotment very near the key areas, along the Esplanade Trail.

Table 5 lists both key areas, the ecological site of each key area, and current ecological status. Also listed is the current trend of the vegetation based on pace-frequency studies.

Table 5. Vegetation Characteristics within the Kanab Gulch Allotment

Allotment (Pasture)	Key Area	Ecological Site	Ecological Status	Trend
Kanab Gulch	1	Breaks 10"-14" p.z.	Late seral	Up
Kanab Gulch	2	Breaks 10"-14" p.z.	Late seral	Down

Based on analyses of the allotment monitoring data and supporting documentation contained in the evaluation report (BLM 2007a) and the 2013 update (Appendix 5), including achievement of DPC objectives, resource conditions on the allotment are meeting all applicable standards for rangeland health.[8]

3.2 Elements/Resources of the Human Environment

The BLM is required to consider many authorities when evaluating a Federal action. Those elements of the human environment that are subject to the requirements specified in statute, regulation, or executive order, and must be considered in all EAs (BLM 2008b), have been considered by BLM resource specialists to determine whether they would be potentially affected by the proposed action. These elements are identified in Table 6, along with the rationale for determination on potential effects. If any element was determined to be potentially impacted, it was carried forward for detailed analysis in this EA; if an element is not present or would not be affected, it was not carried forward for analysis. Table 6 also contains other resources/concerns that have been considered in this EA. As with the elements of the human environment, if these resources were determined to be potentially affected, they were carried forward for detailed analysis in this document.

[8] At Key Area #2, relative criteria for meeting standards, and indicators of rangeland health, resulted in a recommendation that the area was partially meeting Standard #3 because of the low composition of grasses (which also resulted in the down trend at this site). However, this low grass composition was not of great concern due to the natural variation that occurs across the same ecological site. In addition, long-term monitoring has shown that Key Area #2 is a shrub-dominated site that is not capable of producing a high grass composition such as occurs at Key Area #1 due to factors such as slope, aspect, recent precipitation patterns, and inclusions of different soil types that produce different vegetation over time. The site in which Key Area #2 is located has more caliche soil inclusions than at Key Area #1 – these soil inclusions favor deep-rooted shrubs. Based on the complete ecological site inventory for the allotment, the group agreed that when looking at the entire Breaks 10-14" site across the Kanab Gulch Allotment, Standard #3 would be met.

Table 6. Elements/Resources of the Human Environment

NP = not present in the area impacted by any of the alternatives
NI = present, but not affected to a degree that detailed analysis is required
PI = present with potential for impact – analyzed in detail in the EA

Resource	Determination	Rationale for Determination
Air Quality	NI	The Kanab Gulch Allotment is included in an area that is unclassified for all pollutants and has been designated as Prevention of Significant Deterioration Class II. Air quality in the area is generally good. Exceptions include short-term pollution (particulate matter) resulting from vehicular traffic on unpaved roads. Fugitive dust is also generated by winds blowing across the area, coming from roads and other disturbed areas. None of the alternatives would result in increased grazing activities over those currently authorized, and none would cause Class II standards to be exceeded. The alternatives would therefore not measurably impact air quality.
Areas of Critical Environmental Concern	NP	There are no Areas of Critical Environmental Concern within this grazing allotment.
Environmental Justice	NI	The proposed action would have no disproportionately high or adverse human health or other environmental effects on minority or low income segments of the population. Also, continued livestock grazing would have no effect on low income and minority populations.
Farmlands (Prime or Unique)	NP	There are no prime or unique farmlands within the allotment.
Floodplains	NI	No actions are proposed that result in permanent fills or diversions, or placement of permanent facilities, in floodplains or special flood hazard areas. Continued properly managed livestock grazing use would not affect the function of the floodplains within the allotment.
Native American Religious Concerns	NP	During consultations with the American Indian Tribes that claim cultural affiliation to northern Arizona, no Native American religious concerns have been identified in relation to livestock grazing within this allotment.
Threatened, Endangered or Candidate Plant Species	NP	No Threatened, Endangered, or Candidate plant species occur in the allotment.
Threatened, Endangered or Candidate Animal Species	PI	The California condor may occasionally fly over or feed in this allotment at any time of year. California condors are federally listed as endangered and a population of these condors was reintroduced on the Arizona Strip in 1996. This population is designated as experimental non-essential under Section 10(j) of the Endangered Species Act. Condors are strictly scavengers and prefer to eat large, dead animals such as mule deer, elk, pronghorn, bighorn sheep, cattle, and horses. Condors range widely, easily covering over 100 miles in a day, and their current range includes the entire Arizona Strip. Although condors may either fly over or feed within the allotment, they have not been observed doing so. There is no evidence that rangeland health on this allotment is limiting or restricting condor population growth. Thus, no effect to this species is expected from the proposed action. Southwestern willow flycatchers (SWIFL) (*Empidonax traillii extimus*), federally listed as threatened, are neotropical migrants that

Resource	Determination	Rationale for Determination
		breed in the southwestern U.S. and migrate to Mexico and Central America during the winter. SWIFL are a riparian obligate species. According to the habitat description in the final rule designating critical habitat for SWIFL (USFWS 2005), this species occurs in riparian habitats along rivers, streams, or other wetlands where dense growths of willows (*salix* sp.), *Baccharis,* arrowweed (*Pluchea* sp.), button bush (*Cephalanthus* sp.), tamarisk (*tamarisk* sp.), Russian olive (*Eleagnus* sp.), or other plants are present, often with a scattered overstory of cottonwood (*Populus* sp.). There is no habitat for SWIFL within the allotment. Thus, renewal of the grazing permit would have no effect on SWIFL.
Cultural Resources	NI	Livestock grazing has continued as an historic use of the public land in this allotment. The BLM would manage the allotment to ensure that livestock grazing would continue to be in compliance with Section 106 of the National Historic Preservation Act (36 CFR 800.3). Cultural resources project files –AZ-BLM-010-2004-10 (Kanab Gulch) – contain documentation of compliance with Section 106 of the National Historic Preservation Act. New range improvement actions, including fences, water facilities, and vegetation treatments, are subject to a Class III inventory and consultation with the Arizona State Historic Preservation Office. No Class II or III intensive inventories have occurred on the Kanab Gulch Allotment, although rock art sites are known to occur – these sites are located in areas that are inaccessible to livestock and no damage from livestock has been identified. In the event that significant archaeological resources (standing walled historic or prehistoric structures, rock art, or other sites potentially eligible to the National Register of Historic Places) are found to be adversely impacted by cattle, preventative and mitigation measures will be implemented including but not limited to fencing, recordation, data collection, and monitoring as is standard operating procedure under the National Historic Preservation Act. The renewal of grazing permits, in the absence of any construction of new range improvements, therefore does not constitute a potential adverse effect to cultural resources.
Invasive, Non-native Species	NI	No noxious weeds have been identified within the Kanab Gulch Allotment. Bessie Spring, in Chamberlain Canyon, contains a very few tamarisk plants. Cheatgrass is present in some areas across the allotment. Cheatgrass is not on the Arizona Noxious Weed list. However it can be a very invasive non-native grass species. Research by Douglas et al. (1990) and Hunter (1991) shows that cheatgrass readily invades areas that have not been disturbed and do not have livestock influence. Young and Evans (1978) speculated that removal of livestock would actually accelerate conversion to cheatgrass because of increased fuel accumulations and more frequent wildfires. Proper range practices can help prevent the spread of undesirable plant species (Sheley 1995). Sprinkle et al (2007) found that grazing exclusion does not make vegetation more resistant to invasion by exotic annuals. Reasons for this may include: 1) grazing may result in

Resource	Determination	Rationale for Determination
		a more diverse age classification of plants due to seed dispersal and seed implementation by grazing herbivores, and 2) grazing removes senescent plant material, and if not extreme, helps open up the plant basal area to increase photosynthesis and rainfall harvesting (Holechek 1981). Loeser et al. (2007) reported that moderate grazing was superior to both grazing exclusion and high-impact grazing in maintaining plant diversity and in reducing exotic plant recruitment in a semiarid Arizona grassland. It is also important to note that removal of grazing by domestic livestock does not automatically lead to disappearance of cheatgrass (Young and Clements 2007). Proper grazing use which maintains stable plant communities (as is the case in the Kanab Gulch Allotment – the plant communities are in late seral, which is a very stable condition) should minimize or have no effect on the spread of invasive non-native species. Monitoring and treatment of tamarisk at Bessie Spring would be conducted in accordance with the current ASFO Weed Management Plan. Successful treatment would enhance rangeland health and facilitate the achievement of management objectives. The renewal of the grazing permit and continued livestock grazing are therefore not anticipated to increase the rate at which invasive species are spread throughout the area.
Wastes (hazardous or solid)	NP	No known hazardous or solid waste issues occur in the allotment.
Water Quality (drinking / ground)	NI	The only perennial water that occurs in the allotment is Bessie Spring. Water from this spring flows across the sandstone and collects in a small rock basin (see photos in Appendix 4). Site visits to the allotment do not indicate that current livestock use is altering water quality – no surface water within the allotment is used for domestic drinking water. Thus, no effect to water quality is expected from the proposed action.
Wetlands / Riparian Zones	NP	Federal policy defines wetlands as areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and which, under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. BLM Manual 1737, *Riparian-Wetland Area Management,* includes marshes, shallow swamps, lakeshores, bogs, muskegs, wet meadows, estuaries, and riparian areas as wetlands. BLM's manual further defines riparian areas as a form of wetland transition between permanently saturated wetlands and upland areas. These areas exhibit vegetation or physical characteristics reflective of permanent surface or subsurface water influence. Lands along, adjacent to, or contiguous with perennially and intermittently flowing rivers and streams, glacial potholes, and the shores of lakes and reservoirs with stable water levels are typical riparian areas (BLM 1998). Bessie Spring is located within the Kanab Gulch Allotment. Bessie Spring flows out of sandstone and water collects in a small slick rock basin; during dry periods, very little water accumulates (see photos in Appendix 4). Due to the hydrologic characteristics of the site (e.g., lack of consistent water flow or stable water levels, both surface and subsurface; lack of substrate/soil on which riparian-obligate species can

Resource	Determination	Rationale for Determination
		establish; and lack of vegetation or physical characteristics reflective of permanent surface or subsurface water influence), the area is not defined as a wetland/riparian area. A field visit in 2010 observed a few small tamarisk plants at Bessie Spring, which were not present in a 2004 visit. No other riparian-obligate vegetation was observed at the site.
Wild and Scenic Rivers	NP	There are no river segments within the allotment that are designated, eligible, or suitable as wild, scenic, or recreational under the Wild and Scenic Rivers Act.
Wilderness	NI	The majority of the Kanab Gulch Allotment (91%) is within the Kanab Creek Wilderness. Livestock grazing is an historical use that was identified as acceptable in the Wilderness Act of 1964. Grazing was occurring in the allotment at the time of wilderness designation. Livestock grazing in this allotment has had no noticeable impact on wilderness characteristics historically, and the nature of grazing in the next 10 years is not expected to change. There are no proposals at this time for new facilities (e.g. fences or ponds) or surface disturbing activities; any facilities or activities that may be proposed in the future would be considered on a case-by-case basis, and impacts to wilderness would be assessed and mitigated as appropriate at that time. Consequently, there would be no impacts to wilderness as a result of actions proposed in this EA, and this issue is therefore not analyzed further.
Livestock Grazing	PI	Permit renewal is required to allow continued livestock use on the allotment; this issue is therefore analyzed in detail later in this EA.
Woodland / Forestry	NI	Continued livestock use would not affect the availability of, or access to, these resources. Access is already restricted due to the remote and inaccessible nature of the allotment, as well as its being primarily located within designated wilderness.
Vegetation	PI	Grazing has a direct impact on vegetation resulting from the practice of grazing in which livestock eat and trample plants within the allotment. This issue is therefore analyzed in detail later in this EA.
BLM or State Sensitive Plant Species	NP	No BLM sensitive plant species occur in the allotment.
Wildlife (including sensitive species and migratory birds)	PI	Multiple sensitive animal species, including migratory birds, may occur within the Kanab Gulch Allotment Desert bighorn sheep and mule deer are big game species that are known to occur throughout the allotment. Interactions with livestock and competition for forage could occur; this issue is therefore analyzed in detail later in this EA.
Soil Resources	NI	Standard #1 (Upland Sites) is being achieved – see Appendix 5. Soils in the allotment are mainly very shallow to moderately deep Torriorthents on steep canyon slopes. Parent materials consist of limestone, sandstone, and shales that form very steep walls and steep toe slopes within Kanab Canyon and its side canyons. There are a few small drainages containing mixed gravelly and sandy alluvium. Soil condition evaluations were accomplished by field inspections during the rangeland health evaluation. Field reconnaissance to locate possible problem areas on the allotment via onsite soil profile property determinations indicated no areas of concern for the soils resource (i.e., no excessive erosion patterns or hydrologic systems not properly functioning); Standard 1 (Upland Sites) is being met. Livestock grazing as proposed under the

Resource	Determination	Rationale for Determination
		alternatives is therefore not expected to impact soil resources within the Kanab Gulch Allotment.
Recreation	NI	The area within this allotment is managed for dispersed, unstructured recreation opportunities that focus only on visitor health and safety, user conflict, and resource protection issues (i.e., an extensive recreation management area) while maintaining the area's naturalness/remoteness. The allotment's recreational values derive from its geology, scenic viewsheds, and remoteness. General recreation activities include those associated with primitive and unconfined recreation such as horseback riding, hiking, camping, hunting, photography, bird watching, and nature study. Continued livestock use would not affect the availability of recreational opportunities within the allotment.
Visual Resources	NI	The majority of the allotment is designated as Visual Resource Management (VRM) Class I due to its location within the Kanab Creek Wilderness. The objective of Class I is to preserve the existing character of the landscape. The level of change to the characteristic landscape should be very low and must not attract attention. Continuing livestock grazing as proposed would not affect visual resources because no new range improvements are proposed, so the existing character of the landscape would not change. That portion of the allotment outside designated wilderness is VRM Class II. The objective of this class is to retain the existing character of the land-scape. The level of change to the characteristic landscape should be low. Management activities may be seen, but should not attract the attention of the casual observer. Any changes must repeat the basic elements of form, line, color, and texture found in the predominant natural features of the characteristic landscape.
Geology / Mineral Resources / Energy Production	NP	Although mineral exploration activities (uranium and oil and gas) are occurring across the Arizona Strip, the allotment is almost entirely within designated wilderness and is therefore withdrawn from mineral entry. Continuing livestock grazing would not alter geological features or mineral resources within the allotment.
Paleontology	NP	No paleontological resources are known to occur in the allotment.
Lands / Access	NI	Access to public lands would not be altered or impaired by implementation of the proposed action. No other lands issues have been identified in connection with the proposed action.
Fuels / Fire Management	NI	No hazardous fuel reduction or fuels management projects are proposed for the area. Continued livestock use would not affect fire management, other than the continued reduction of some light fuels through livestock grazing. During the period of 1980-2013 only one fire was reported for the area, which burned less than one acre.
Socio-economic Values	NI	The economic base of the Arizona Strip is mainly ranching with a few gypsum/selenite and uranium mines. Nearby communities are supported by tourism (including outdoor recreation), construction, mining activities, and light industry. The social aspect involves remote, unpopulated settings with moderate to high opportunities for solitude. Issuance of the permit under the proposed action would allow the permittee to continue his grazing operation with some

Resource	Determination	Rationale for Determination
		degree of predictability during the 10-year period of the term permit and would allow a historical and traditional use of the land to be maintained. The proposed action would have no overall effect on the economy of the county since other industries and tourism/recreational uses are contributing increasing amounts to the economy of the region and cattle ranching is no longer a significant contributor.
Wild Horses and Burros	NP	There are no wild horses or burros, or herd management areas, within the allotment.
Wilderness characteristics	NI	That portion of the allotment outside designated wilderness (422 acres) has been assessed and determined to contain the wilderness characteristics of naturalness, opportunities for solitude, and opportunities for primitive and unconfined recreation, and is managed to maintain these characteristics. As described previously, livestock grazing is an historical use in this allotment and has had no noticeable impact on wilderness characteristics historically, and the nature of grazing in the next 10 years is not expected to change. There are no proposals at this time for new facilities (e.g. fences or ponds) or surface disturbing activities; any facilities or activities that may be proposed in the future would be considered on a case-by-case basis, and impacts to wilderness characteristics would be assessed and mitigated as appropriate at that time. Consequently, there would be no impacts to wilderness characteristics as a result of actions proposed in this EA, and this issue is therefore not analyzed further.

3.3 Resources Brought Forward for Analysis

3.3.1 Livestock grazing

A grazing permit is issued for livestock forage produced annually on the public lands and is allotted on an AUM basis. (An AUM is a unit of measurement indicating how much forage is eaten by a cow/calf pair in one month.) The BLM does not control adjacent private lands owned by the permit holders. The livestock operator assumes grazing management responsibility with the intent to maintain or improve existing resources. Livestock are to be grazed on public lands only during the established season of use. If private land is used during different periods, it is the permittee's responsibility to keep livestock off the public land during non-grazing periods. The BLM retains the right to manage the public lands for multiple uses and to make periodic inspections to ensure that livestock grazing is in compliance with the terms and conditions of the permit.

The allotment is categorized as a "custodial" (C) allotment. Custodial allotments are typically small areas of public land intermingled with larger blocks of private land. The *Arizona Strip Field Office RMP* (BLM 2008a) defines custodial allotments as those in which:

a) Present range condition is not a paramount factor;
b) Allotments have low resource production potential, and are producing near their potential;
c) Limited resource-use conflicts/controversy may exist;

d) Opportunities for positive economic return on public investment do not exist or are constrained by technological or economic factors;
e) Present management appears satisfactory or is the only logical practice under existing resource conditions or land ownership pattern.

Custodial allotments do not generally have an AMP, and none exists for the Kanab Gulch Allotment. This allotment is currently grazed from November 16 through April 30. It is grazed by 26 horses and contains 143 AUMs, with 67 suspended non-use AUMs (total AUMs is 210). Voluntary non-use has varied from 1 to 91 AUMs per year from 2000 to 2014. Non-use reflects seasonally dry periods, drought years, or other factors. Actual use data is displayed in Table 7 (below).

Table 7. Actual Use Data – Kanab Gulch Allotment

Grazing Year	AUMs Used	% of Permitted Use	Non-Use
2000-2001	142	99%	1
2001-2002	82	57%	61
2002-2003	60	42%	83
2003-2004	65	45%	78
2004-2005	114	80%	29
2005-2006	90	63%	53
2006-2007	114	80%	29
2007-2008	52	36%	91
2008-2009	121	84%	22
2009-2010	142	99%	1
2010-2011	142	99%	1
2011-2012	79	55%	64
2012-2013	71	50%	72
2013-2014	103	72%	40

Range Improvements

There are no range improvements on the Kanab Gulch Allotment other than short pieces of allotment boundary fence – other fences are not necessary because topographic features (steep cliffs and canyon walls) serve the same purpose.

3.3.2 Vegetation

According to the NRCS, the dominant ecological site on the allotment is Breaks 10-14" p.z. There are small inclusions of other ecological sites present (such as the caliche inclusion at Key Area #2)

that make up less than five percent of the allotment. The principal vegetative type within this allotment is desert shrub, which consists of fourwing saltbush, winterfat, shadscale, ephedra, wolfberry, blackbrush, a variety of warm and cool season grasses, and annual species such as phlox, euphorbia, and globemallow.

Key species on the Kanab Gulch Allotment are:

- Browse species – winterfat and Mormon tea
- Warm season grasses – sand dropseed, galleta and black grama
- Cool season grasses – desert needlegrass, needle-and-thread grass, and hairy tridens.

Table 8 (below) displays the phenological development stages of representative key species for the allotment. These species are selected for their similarity to other grasses and browse species that occur in the allotment.

Table 8. Phenological Development of Key Species for the Kanab Gulch Allotment

Key Species	Development Stages (dates vary based upon yearly fluctuations in specific climatic conditions and elevation)			
	Begin Growth	Flowering	Seed Ripe	Seed Dissemination
Winterfat	4/15	6/15	11/01	12/01
Mormon tea	5/01	7/15	9/15	12/01
Sand dropseed	4/15	5/20	7/15	8/30
Black grama	6/01	8/01	9/15	10/10
Sideoats grama	6/01	8/01	9/15	10/10
Galleta	5/01	6/01	7/15 – 9/30	10/01
Needle and thread	3/15	5/15	7/01	8/01
Hairy tridens	6/01	8/01	9/01	9/30

3.3.3 Wildlife, Including Big Game, Migratory Birds, and Sensitive Species

3.3.3.1 Big Game

Desert bighorn sheep (*Ovis canadensis nelsoni*)

Desert bighorn sheep habitat has been identified from habitat analysis that evaluates a combination of slope, topography, aspect, vegetation, proximity to escape cover, and water availability (Bighorn Sheep Core Team 2011). To escape predators, bighorn sheep prefer rough, rocky terrain with slopes greater than 20%, as is found in the Kanab Gulch Allotment. Desert bighorn sheep

likely obtain some of the moisture they need from succulent vegetation. During the hot summer months, the sheep stay in shaded areas near water as much as possible and are seldom found more than three miles from dependable water sources. When rain or snowfall occurs, bighorn sheep expand their use of suitable habitat and range out from permanent waters. They also commonly drink from ephemeral pools of water found in rock pockets (Bighorn Sheep Core Team 2011).

Desert bighorn sheep are present in the Kanab Gulch Allotment. After Grand Canyon National Park was expanded in 1974, supplemental transplants of desert bighorn were made in lower Hack Canyon to ensure a huntable population was maintained. Several sheep water facilities were constructed overlooking Kanab Creek Canyon.

The Kanab Creek Habitat Area for bighorn sheep includes this allotment. This habitat area is 112,996 acres in size, 41% of which is on BLM-administered land, with the other 59% on National Forest System lands. The Kanab Gulch Allotment (at 4,260 acres) is entirely within the habitat area. The Bighorn Sheep Management Plan, as amended in 2011, estimated that this habitat area as a whole can support a theoretical maximum of 820 bighorn sheep – 340 on BLM lands, plus 480 on Forest Service lands (Bighorn Sheep Core Team 2011). This maximum number represents what is believed to be the upper sustainable population limit for the habitat area (and is not necessarily a goal) based on a population density of 4 bighorn sheep per square mile; it is unclear whether this number is actually realistic. According to AGFD, the intent of this language in the plan is to recognize their overall goal of increasing bighorn sheep populations across the Arizona Strip. In developing the plan it was felt that a density maximum should be identified – thus, the 4 bighorn sheep per square mile and the population maximum for Kanab Creek of 820 (AGFD 2014). In total, 63 animals were translocated into this locality between 1985 through 1996.

In 2003, bighorn sheep managers started to have concerns related to declining sheep population levels in the Kanab Creek drainage. The population dropped to an estimated 65 sheep in 2005. It has been theorized that the extreme drought of 2002 concentrated sheep around relatively limited water sources, which could have resulted in an increase in disease transmission (AGFD 2007). Disease is thought to be the primary reason for declining sheep numbers, and a disease assessment of the Kanab Creek population took place in 2006 and again in 2009 with several viral infections identified. These diseases apparently have an impact on the productivity of a population and may explain the slow decline in sheep numbers over the past several years although no sheep have been seen with disease symptoms in the last four years (AGFD 2013). AGFD also identifies lack of lamb survival (concurrent with the disease outbreak) over the past 10 years as the limiting factor in population growth of bighorn sheep in Kanab Creek (AGFD 2014). Unit wildlife managers have completed a sheep recovery plan to address these issues, and have begun implementation of the actions identified in the plan. Strategies for improving bighorn sheep distributions in the Kanab Creek Habitat Area include repairing and maintaining existing catchments and spring developments, constructing a network of new sheep waters along the eastern boundary of the Kanab Creek Wilderness, and extending bighorn sheep distributions throughout the suitable habitat. Progress toward increasing the bighorn sheep population in the habitat area is being made – the herd has grown from the 65 sheep in 2005 to 148 presently – and the plan identifies objectives to achieve it – namely water distribution, trans-locations etc. AGFD has begun plans to augment this population utilizing transplanted sheep; there is no identified schedule to date on

when this may occur. AGFD and BLM are hopeful that disease is no longer an issue in this habitat area, and that lamb production will improve so population growth will occur.

Mule deer (*Odocoileus hemionus*)

Mule deer occur in a wide variety of habitat types; although vegetative communities vary throughout the range of mule deer, habitat is nearly always characterized by areas of thick brush or trees interspersed with small openings. The thick brush and trees are used for escape cover whereas the small openings provide forage and feeding areas. Unit 13A (where the Kanab Gulch Allotment is located) contains extensive Great Basin short grass prairie, extensive pinyon-juniper woodlands, grassland pinyon-juniper association, and a ponderosa pine ecotype in the Mt. Logan and Mt. Trumbull areas (southwest of these allotments). Mule deer inhabit most of the unit including the Kanab Plateau and associated areas such as Bulrush and Sunshine points, and the Kanab Creek drainage, which are adjacent to the Kanab Gulch Allotment (AGFD and BLM 2010). As described in Section 3.3.2, the principal vegetative type within the Kanab Gulch Allotment is desert shrub, which consists of fourwing saltbush, winterfat, shadscale, ephedra, wolfberry, blackbrush, a variety of warm and cool season grasses, and annual species such as phlox, euphorbia, and globemallow. Deer eat a wide variety of plants including browse, forbs and grasses. Deer are especially reliant on shrubs for forage during critical winter months. Fawn production is closely tied to the abundance of succulent, green forage during the spring and summer months.

AGFD has categorized habitat characteristics for big game species within the state. Habitat categories are based on several factors such as topography, forage and cover, availability of water, and limiting factors such as prohibitive fencing. Kanab Gulch Allotment is categorized by AGFD as 100% winter crucial habitat[9] for mule deer. Population survey data, counts, and estimates of total population within GMU 13A are included as Attachment 3 of this EA. While no population estimates are available specifically for this allotment, AGFD considers the mule deer population in GMU 13A to be stable but low.

3.3.3.2 Migratory Birds

Executive Order 13186 requires the BLM and other federal agencies to work with the USFWS to provide protection for migratory birds. These species are protected by law and it is important to maintain habitat for these species so migratory patterns are not disrupted. All migratory birds are protected under the 1918 Migratory Bird Treaty Act (16 USC 703), which prohibits the taking of any migratory birds, their parts, nests, or eggs unless specifically permitted by regulation. Additional protection is provided by the Neotropical Migratory Bird Conservation Act of 2000 (16 USC Chapter 80). Birds found within the allotment are typical of desert scrub and rocky canyon habitats such as violet-green swallow, white-throated swift, black-throated sparrow, western meadowlark, rock wren, and canyon wren.

[9] "Crucial habitat" is defined as "sensitive use areas that, because of limited abundance and/or unique qualities, constitute irreplaceable crucial requirements for high interest wildlife" (UBWR 2011).

3.3.3.3 Sensitive Species

Sensitive species are usually rare within at least a portion of their range. Many are protected under certain State and/or Federal laws. Species designated as sensitive by the BLM must be native species found on BLM-administered lands for which the BLM has the capability to significantly affect the conservation status of the species through management, and either:

1. There is information that a species has recently undergone, is undergoing, or is predicted to undergo a downward trend such that the viability of the species or a distinct population segment of the species is at risk across all or a significant portion of the species range; or

2. The species depends on ecological refugia or specialized or unique habitats on BLM-administered lands, and there is evidence that such areas are threatened with alteration such that the continued viability of the species in that area would be at risk."

All federally-designated candidate species, proposed species, and delisted species in the 5 years following delisting are included as BLM sensitive species. Based on occurrence records and monitoring data, the sensitive species that may occur within the Kanab Gulch Allotment and that may be affected by actions proposed in one of the alternatives presented in Chapter 2 are displayed in Table 9.

Table 9. Sensitive Species Associated with the Kanab Gulch Allotment

Species	Potential for Occurrence
American peregrine falcon (*Falco peregrinus*)	verified
Ferruginous hawk (*Buteo regalis*)	potential
Golden eagle (*Aquila chrysaetos*)	verified
Western burrowing owl (*Athene cunicularia hypugea*)	verified

Five additional sensitive species may also occur within the allotment. However, it has been determined by BLM resource specialists that these species would not be affected by actions proposed in this EA. These species are therefore not addressed further in this document. Table 10 lists the sensitive species that will not be discussed in further detail, along with the rationale for their exclusion from further analysis.

Table 10. Sensitive Species Excluded from Further Analysis

Species	Rationale for Excluding from Further Analysis
Allen's big-eared bat *Idionycteris phyllotis*	Roost sites such as caves and abandoned mineshafts are inaccessible to livestock and impacts from grazing would not alter prey species (insects) populations or distribution. No measurable impacts (changes from the existing condition) would be expected.
Townsend's big-eared bat *Corynorhinus townsendii*	Roost sites such as caves and abandoned mineshafts are inaccessible to livestock and impacts from grazing would not alter prey species (insects) populations or distribution. No measurable impacts (changes from the existing condition) would be expected.
California leaf-nosed bat *Macrotus californicus*	Roost sites such as boulder piles, caves, and abandoned mineshafts are inaccessible to livestock and impacts from grazing would not alter prey species (insects) populations or distribution. This species is primarily found in Sonoran desert scrub south of the Mogollon Plateau and is unlikely to occur in the project area. No measurable impacts (changes from the existing condition) would be expected.
Greater western mastiff bat *Eumops perotis californicus*	Roost sites such as rock crevices are inaccessible to livestock and impacts from grazing would not alter prey species (insects) populations or distribution. No measurable impacts (changes from the existing condition) would be expected.
Spotted bat *Euderma maculatum*	Roost sites such as crevices in cliff faces are inaccessible to livestock and impacts from grazing would not alter prey species (insects) populations or distribution. No measurable impacts (changes from the existing condition) would be expected.

Peregrine falcon (*Falco peregrinus anatum*)

Habitat and Range Requirements. Peregrine falcons utilize areas that range in elevation from 400 to 9,000 feet and breed wherever sufficient prey is available near cliffs. Preferred habitat for peregrine falcons consists of steep, sheer cliffs that overlook woodlands, riparian areas, and other habitats that support a high density of prey species. Nest sites are usually associated with water. In Arizona, peregrine falcons now occur in areas that had previously been considered marginal habitat, suggesting that populations in optimal habitats are approaching saturation (AGFD 2002).

Nesting sites, also called eyries, usually consist of a shallow depression scraped into a ledge on the side of a cliff. Peregrine falcons are aerial predators that usually kill their prey in the air. Birds comprise the most common prey item, but bats are also taken (AGFD 2002).

Project Area Evaluation. Potential nesting habitat is found along the steep cliff faces of the allotment. Peregrine falcons have been seen hunting for birds within the allotment (Willey 2012, personal comm.).

Ferruginous hawk (*Buteo regalis*)

Habitat and Range Requirements. Ferruginous hawks are large hawks that inhabit the grasslands, deserts, and open areas of western North America – they are the largest North American hawk and are often mistaken for eagles due to their size. Ferruginous means "rusty color" and refers to the bird's colored wings and legs. During the breeding season, they prefer

grasslands, sagebrush, and other arid shrub country. Nesting occurs in trees or utility poles surrounded by open areas. Mammals generally comprise 80 to 90 percent of the prey items or biomass in the diet with birds being the next most common mass component.

Project Area Evaluation. Suitable habitat for the ferruginous hawk is present on the allotment. This species has been verified within the Arizona Strip District, but not from within this allotment.

Golden eagle (*Aquila chrysaetos*)

Habitat and Range Requirements. Typically found in open country, prairies, arctic and alpine tundra, open wooded country and barren areas, especially in hilly or mountainous regions. Black-tailed jackrabbits and rock squirrels are the main prey species taken (Eakle and Grubb 1986). Carrion also provides an important food source, especially during the winter months. Nesting occurs on rock ledges, cliffs, or in large trees. Several alternate nests may be used by one pair and the same nests may be used in consecutive years or the pair may shift to an alternate nest site in different years. In Arizona they occur in mountainous areas and vacate desert areas after breeding. Nests were observed at elevations between 4,000 and 10,000 feet. Nests are commonly found on cliff ledges; however, ponderosa pine, junipers, and rock outcrops are also used as nest sites.

Project Area Evaluation. Golden eagles have been seen within the allotment and potential nest sites are present along the cliff faces on the west side of the allotment.

Burrowing owl (*Athene cunicularia hypogea*)

Habitat and Range Requirements. Burrowing owls occupy a wide variety of open habitats including grasslands, deserts, or open shrublands. Burrowing owls do not dig their own burrows and must rely on existing burrows dug by prairie dogs, ground squirrels, badgers, skunks, coyotes, and foxes but will also use manmade and other natural openings. Nest-site fidelity is high and burrows are often reused for several years if not destroyed (Haug et al. 1993). Moderate grazing can have a beneficial impact on burrowing owl habitat by keeping grasses and forbs low (MacCracken et al. 1985) but the control of burrowing rodent colonies in grazed areas is believed to be a significant factor in the burrowing owl's decline (Desmond and Savidge 1996). Burrowing owls are infrequently encountered on the Arizona Strip likely due to the lack of prairie dog or other large rodent colonies.

Project Area Evaluation. Potential burrowing owl habitat is present but very limited within the allotment.

3.3.4 Threatened, Endangered, and Candidate Species

Mexican spotted owl (*Strix occidentalis lucida*)

Habitat and Range Requirements. The Mexican spotted owl was listed as threatened on April 15, 1993. The range of the Mexican spotted owl extends from the southern Rocky Mountains in Colorado and the Colorado Plateau in central and southern Utah, southward through Arizona and

New Mexico and into northern Mexico. Although the Mexican spotted owl's entire range covers a broad area of the southwestern United States and Mexico, it does not occur uniformly throughout its range. Instead, it occurs in disjunct localities that correspond to isolated forested mountain systems, canyons, and in some cases steep, rocky canyon lands. Surveys have revealed that the species has an affinity for older, uneven-aged forests, and the species is known to inhabit a physically diverse landscape in the southwestern United States and Mexico. Mexican spotted owls are intolerant of moderately high temperatures and this may lead them to seek out cool microclimates during the breeding season in either closed-canopy forests or deep shady canyons (Ganey et al. 1993). On the Colorado Plateau (which includes the majority of the Arizona Strip), spotted owls use narrow, steep-walled canyons where ledges and caves provide cover from high temperatures, as well as nest sites and foraging habitat. In essence, complex, rocky terrain has been substituted for old-growth forest (Willey and Ward 2003).

In southern Utah, southern Colorado, northern Arizona, and portions of New Mexico, spotted owls have been found primarily in narrow, steep-walled canyons with conifer inclusions (Rinkevich and Gutierrez 1996, Willey 1993). They nest in these areas on cliff ledges, in stick nests built by other birds, on debris platforms in trees, and in tree cavities (USFWS 2012, AGFD 2005). In southern Utah, Colorado, and some portions of northern New Mexico, most nests are in caves or on cliff ledges in rocky canyons. Rinkevich (1991) and Willey (1993) located numerous nesting pairs scattered across Utah's canyon country, and predicted that the owl is strongly associated with steep sandstone canyons. A single owl's range averages 1,600 acres, while a mating pair's home range averages 2,000 acres (AGFD 2005).

A tool for predicting suitable canyon habitats that may have higher potential for species occupancy and nesting birds than other nearby canyons is the Willey and Spotskey Mexican spotted owl habitat model (created in 1997 and revised in 2001). This model uses a geographic information system to identify key features of owl habitat and then map the extent of suitable habitat (Willey and Spotskey 2000). The model uses terrain parameters to determine depth and width of canyons (owls need cooler microsites for nesting and roosting) and other features (such as distance to water and north facing cliff sites). The model predicts the canyons most likely to support nesting owls; from this it can then be determined if any "higher quality" habitat (according to the model) exists. It is important to note that any model is only an analysis tool, and experience with the current owl model has shown it to be accurate in some cases, but not in others (such as delineating cliff faces outside of canyons as high potential owl habitat).

Project Area Evaluation. The Kanab Gulch Allotment contains 10 polygons of Spotskey-Willey modeled habitat, for a total of 350 acres, mostly on north and east-facing cliffs. Additionally, modeled habitat can be found in the Hacks, June Tank, and Gulch Allotments all of which border the Kanab Gulch Allotment.

In 2011 an aerial survey overflight of several canyons was conducted on the Arizona Strip. This survey included the allotment and indicated potential MSO habitat in "Kanab Creek from Snake Gulch south to the boundary with Grand Canyon National Park, including Grama Canyon, Hack Canyon (including Water and Robinson Canyons), and Chamberlain Canyon" (Willey 2011, unpublished report).

As a result of the aerial reconnaissance flight, Hack Canyon, Kanab Creek, and Chamberlain Canyon were selected for clearance surveys. These surveys consisted of playing taped Mexican spotted owl calls (or imitating the calls using human voice) at predetermined points over the course of four visits to each site from May to August (Willey 2011, unpub. rep.). One spotted owl was heard during two survey visits in 2012 and one spotted owl was heard during one survey visit in 2011. Subsequent searches for a nest site were inconclusive (Willey 2011 and 2012, unpub. rep.).

Chapter 4

ENVIRONMENTAL CONSEQUENCES

The potential consequences or effects of each alternative are discussed in this chapter. Only impacts that may result from implementing the alternatives are described in this EA. If an ecological component is not discussed, it is because BLM resource specialists have considered effects to the component and found the proposed action would have minimal or no effects (see Table 6). The intent of this analysis is to provide the scientific and analytical basis for the environmental consequences.

General effects from projects similar to the proposed action are also described in the documents to which this EA is tiered (the *Arizona Strip Proposed RMP/Final EIS*, BLM 2007).

4.1 LIVESTOCK GRAZING

4.1.1 Impacts of Alternative A – Proposed Action

The proposed action would affect the livestock grazing permittee on the Kanab Gulch Allotment by renewing the term grazing permit. The proposed action would maintain the current level of livestock grazing authorized for the permittee for an additional ten years, which would result in a continued viable ranching operation for the livestock operator, and provide some degree of stability for the permittee's livestock operation. Permit renewal would also meet the purpose and need for action identified in Chapter 1 of this EA – to provide for livestock grazing opportunities on public lands where consistent with meeting management objectives, including the Arizona Standards for Rangeland Health and Guidelines for Livestock Grazing Management and the Arizona Strip Field Office RMP (BLM 2008a), and to respond to applications to fully process and renew permits to graze livestock on public land.

4.1.2 Impacts of Alternative B – Issue New 10-Year Grazing Permit with Reduced Grazing

This alternative would also affect the livestock grazing permittee on the Kanab Gulch Allotment by issuing a new term grazing permit. The action would shorten the season of use and reduce AUMs authorized for the permittee, which would not provide as much stability and compatibility

for the permittee's livestock operation as Alternative A because he would not be authorized to move onto the next coordinated allotment and grazing system until May 1. The permittee would be required to pursue other options for his livestock between March 15 and May 1 (as well as from November 16 to December 1), such as leasing private pasture or obtaining a substitute federal grazing permit on a different allotment.

4.1.3 Impacts of Alternative C – No Grazing

This alternative would dramatically affect the livestock grazing permittee on the Kanab Gulch Allotment by not authorizing any active preference under the new term grazing permit. The action would cancel the current level of livestock grazing numbers and season of use authorized. This would not provide current or future use, stability and compatibility for the permittee livestock operation because he would not be authorized to move onto the allotment. The permittee would need to seek alternate arrangements for his herd during the time he had formerly grazed on this allotment, such as leasing private pasture or obtaining a substitute federal grazing permit on a different allotment. This alternative would not meet the purpose and need for action identified in Chapter 1 of this EA – to provide for livestock grazing opportunities on public lands where consistent with meeting management objectives, including the Arizona Standards for Rangeland Health and Guidelines for Livestock Grazing Management and the Arizona Strip Field Office RMP (BLM 2008a). (See Section 4.2 for a discussion on the vegetative condition on the allotment, including the Arizona Standards for Rangeland Health and Guidelines for Livestock Grazing Management land health evaulation.)

4.2 VEGETATION

4.2.1 Impacts of Alternative A – Proposed Action

Plants live in ecosystems full of herbivores that range from small insects to large grazing animals. Losing leaves or stems to herbivores is a common event in the life of a rangeland plant. For rangeland plants to remain healthy and productive, enough vegetation must remain after grazing so that plants can photosynthesize and manufacture energy to produce more leaves, stems, and seeds. Plants also need to produce and store energy such as starches and sugars in roots and crowns to successfully start the next season of growth. Only when too much of the plant is removed does the plant suffer in a way that yields lasting detrimental effects. Substantial damage to rangeland plants generally only occurs under repeated and heavy grazing (University of Idaho 2011).

The impact of grazing on plant growth depends greatly on when grazing occurs during the growing season and at what stage of the plant's life cycle. Plants are generally less damaged by grazing early in the growing season when time, soil moisture, and nutrients needed for regrowth are abundant. Plants are most sensitive to grazing when they are flowering and forming seeds. At this time, the plant has high energy demands to produce seeds, complete growth for the season, and store energy to get through the dormant season. Plus, this generally occurs at the peak of summer when the environment is hot and dry and not favorable for regrowth. Once the plant produces seeds and turns brown (i.e., begins to senesce and becomes dormant), it is no longer sensitive to

grazing. At this time, the leaves are not photosynthesizing and are no longer being used by the plant (University of Idaho 2011).

Livestock can directly affect vegetation by reducing plant vigor, decreasing or eliminating desirable forage species, increasing soil instability and erosion, reducing water quantity and quality, and causing loss of, or injury to, individual plants from trampling, particularly near water developments. Long-term changes in vegetation may result if livestock use consistently exceeds established allocations, or drought or other environmental factors reduce range carrying capacity. Improper grazing practices (such as excessive utilization which removes vegetative cover) may lead to soil compaction, reduced infiltration rates, increased runoff and erosion, and declines in watershed condition. Grazing impacts on vegetation are mitigated by timing of use, adjustment of stocking rates, limiting utilization rates, and conformance with the Arizona Standards for Rangeland Health and Guidelines for Livestock Grazing Management. The current grazing on this allotment is predominately dormant season use (outside the critical growing season), which would minimize adverse effects to vegetation.

Range plants evolved to withstand grazing and can withstand a heavy grazing event if done in the right season and if plants are given enough time to recover after grazing. Thus, plants can withstand removal of a part of their current year's growth and still achieve normal growth the following year. Most rangeland grasses and forbs can have 40-50% of their leaves and stems removed every year and still remain healthy and productive. In general, light use is considered less than 40%, moderate 40-65%, and heavy greater than 65% of biomass removed. The season during which the grazing occurs is very important. Properly managed livestock grazing is designed to cause minimal impacts to rangeland resources. As stated above, plants are most sensitive to grazing when they are flowering and forming seeds. Under this alternative, livestock would be authorized to graze in the dormant season on all plant species except for needle and thread, which would only be grazed very early in its post dormant season. Grazing vegetation during the non-growing season or early season (as plants are just coming out of dormancy) would allow plants to fix carbon, reproduce and set seed as the growing season progresses into the summer. Dormant season grazing would have neutral to negligible effects on plant communities because plants would be able to fix a significant amount of carbon prior to biomass removal and would be able to set seed. Perennial grasses would have increased capability to produce seed because grazing would occur after they have produced much of their above-ground biomass. Overall plant vigor would be maintained because plants would be grazed only after senesce (the plant growth phase from full maturity to death or dormancy). After the grasses go dormant, they are affected little by grazing (University of Idaho 2011).

When considering effects of grazing on shrub species, one must look at the amount of usage of current year's growth – these include the leaves and young stems that are important for photo-synthesis. The current year's growth of shrubs is the most digestible part of the plant and is the portion generally removed by browsing animals such as deer and livestock. The buds are especially important to protect from grazing because they will be the source of new stems and leaves for continued growth after grazing. In winter, shrubs survive by using energy compounds (i.e., starches and sugars) stored in the stems. Thus, though the shrub is dormant, it is important to watch browsing of these stems. An indicator of "overgrazing" of shrubs is moderate or heavy

hedging (i.e., growth of lateral stems just below a grazed point) and a lack of new or juvenile plants (University of Idaho 2011). Table 11 shows recent utilization on shrubs, based on percent of current year's growth by production, during the grazing season. As shown, utilization has been well below the allowed 45%. Frequency of total shrubs has remained static at Key Area #1 and has increased at Key Area #2 (mainly due to an increase in blackbrush); frequency of palatable shrubs has increased at Key Area #1, while remaining static at Key Area #2. One can therefore conclude that the current grazing operation is not affecting the health and vigor of shrub species in the Kanab Gulch Allotment.

Table 11. Utilization Percentages of Key Shrub Species on the Kanab Gulch Allotment

Key Area	2004	2009	2011	2012	2013
1	16%	27%	10%	19%	19%
2	16%	27%	15%	12%	18%

As described in Chapter 3 of this EA, current monitoring indicates that trend at Key Area #1 is up, while trend at Key Area #2 is down. BLM resource specialists evaluated monitoring data to determine causal factor(s) for the downward trend at Key Area #2, including whether current management practices are contributing. As described on page 15 of this EA, Key Area #2 is mostly deep-rooted shrubs that have depressed the grasses in the interspaces; this has resulted in more shrubs over time (current composition of shrubs is 92%), a solid grass component does not exist where the trend study plot was established. The grass component has steadily decreased since the trend study plot was established in 1982; this decrease in trend is due to many factors that have influenced this vegetative shift, including recent precipitation patterns and inclusions of different soil types. The complex geology and topography of the area has created a multitude of soil textures, depths and developments which has formed a shallow caliche or calcium carbonate hard pan layer that is somewhat impenetrable for the shallow rooted grasses that cannot penetrate as easily as shrubs and therefore die off during a drought or drier periods. The caliche layer therefore favors the deep rooted shrubs, which can penetrate this layer and survive. This site in which Key Area #2 is located has this shallow caliche soil inclusion; Key Area #1 has much deeper soils with very little caliche or hardpan inclusions, so more grass is produced and can more easily flourish. Key Area #2 has shown an increase in some species such as blackbrush and Mormon tea which have strong and deep tap roots that will help the plants maintain or increase under a dry climate regime; because of the precipitation patterns in the years immediately prior to the most recent trend monitoring (2011), compared to the 14-16 inches received in the early 1980s when this key area was first established, the frequency of grasses has decreased while shrubs have increased. As shown in Table 4 (page 15 of this EA), utilization on key species has been light in recent years.

Allotment monitoring data indicates that resource conditions on the allotment currently meet all applicable standards for rangeland health. One factor in making this determination was the assessment that DPC objectives for vegetation components at the key areas (as outlined on pages 9-10 of this EA) are being met on the Kanab Gulch Allotment. Since this same management regime has been in place for many years, it is expected that livestock grazing proposed under this alternative would minimally affect vegetation, and ecological condition would be maintained (the key areas are in late seral stage, which is a very stable condition). Monitoring of the allotment

would continue – if future monitoring indicates any areas within the allotment are not in compliance with the Fundamentals of Rangeland Health, changes to the grazing use would be made (as described in Section 2.2.5 of this EA). However, current monitoring data does not indicate that any changes to grazing management are necessary.

4.2.2 Impacts of Alternative B – Issue New 10-Year Grazing Permit with Reduced Grazing

Impacts would be similar to those described for Alternative A except that season of use would be two months shorter – livestock would be removed from the allotment 1½ months earlier in the spring and would turn out 15 days later in the fall. This season of use would be in the dormant period for all key species. As described in Section 4.2.1, grazing vegetation during the non-growing season allows plants to fix carbon, reproduce and set seed as the growing season progresses into the summer. Dormant season grazing would have neutral to negligible effects on plant communities because plants would be able to fix a significant amount of carbon prior to biomass removal and would be able to set seed. Perennial grasses would have increased capability to produce seed because grazing would occur after they have produced the current season's above-ground biomass. Overall plant vigor would therefore be maintained.

Impacts to shrubs would be similar to those described for Alternative A in that grazing would only occur during the dormant season. However, grazing intensity under this alternative would likely be less (i.e., lighter utilization) because the grazing season would be two months shorter. Thus, less removal of stems (where energy compounds – starches and sugars – are stored) by livestock would occur. Shrubs, which can be susceptible to moderate to heavy utilization in winter because of this energy storage, would benefit from lighter use (although frequency of shrubs, including palatable species, is already either stable or on the increase – see discussion in Section 4.2.1 on pages 32-34).

As stated in Section 4.2.1, allotment monitoring data indicates that resource conditions on the allotment currently meet all applicable standards for rangeland health. Continued livestock grazing would minimally affect vegetation, and ecological condition would be maintained. Monitoring of the allotment would continue – if future monitoring indicates any areas within the allotment are not in compliance with the Fundamentals of Rangeland Health, and livestock grazing is a causal factor, changes to the grazing use would be made (as described in Section 2.2.5 of this EA).

4.2.3 Impacts of Alternative C – No Grazing

Under this alternative, vegetation would have the most rest and recovery as compared to the other alternatives. Although the allotment is meeting all applicable standards for rangeland health, plant communities would still benefit from rest. Because no livestock grazing would occur, plants would remain ungrazed or minimally grazed (by wildlife) each year. Grasses would see negligible benefits as compared to Alternatives A or B because the dormant season grazing proposed under those alternatives does not impede their ability to fix a significant amount of carbon prior to biomass removal, produce seed, and set seed.

The plants that would most benefit from no grazing are shrub species. As described previously, current year's growth – the leaves and young stems that are important for photosynthesis – is the most digestible part of the plant and is the portion generally removed by browsing animals. The buds are especially important to protect from grazing because they will be the source of new stems and leaves for continued growth after grazing. In winter, shrubs survive by using energy compounds (i.e., starches and sugars) stored in the stems. Under this alternative, no livestock grazing would occur so shrubs would only be minimally grazed by wildlife. This alternative would therefore result in the least grazing on shrubs, meaning the plants would have the maximum amount of energy compounds in their stems for survival over the winter dormant season.

4.3 Wildlife, Including Big Game, Migratory Birds, and Sensitive Species

Vegetation provides forage and concealment cover for wildlife species, particularly during the spring breeding period when calving, fawning, nesting, and rearing of young occurs. Livestock grazing reduces the height and amount of herbaceous vegetation. The presence of livestock and the movement of livestock between areas of use could result in the direct disturbance or displacement of some wildlife from preferred habitats, nesting/birthing sites, or water sources. Both the disturbance and displacement of wildlife and the reduction of herbaceous forage and cover could limit the productivity and reproductive success of some species. However, the livestock grazing proposed in the alternatives would occur in the winter, outside wildlife breeding season. Thus, livestock would not displace wildlife from nesting/birthing sites in this allotment.

4.3.1 Impacts of Alternative A – Proposed Action

Big Game

Desert bighorn sheep

The rugged and steep nature of bighorn habitat limits contact between sheep and livestock to a few areas within this allotment. The majority of habitat used by desert bighorn sheep in the allotment is essentially ungrazed due to its steep nature and resulting inaccessibility to livestock.

The Arizona Strip Desert Bighorn Sheep Management Plan (page 6) states that "Springs located on BLM land are impacted by cattle" (Bighorn Sheep Core Team 2011). As described on pages 19-20 (Chapter 3, Table 6) of this EA, Bessie Spring (the only perennial water source in the allotment) is located in a slickrock canyon. Water flows from the base of a canyon wall and collects in a small sandstone basin; there is no soil deposition in the sandstone basin, and no riparian vegetation associated with this spring other than a few tamarisk plants (see Appendix 4). Thus, there are no riparian resources present that could be impacted by livestock use. Recent site visits to this spring have also not revealed any conflicts between bighorn sheep and livestock for water – this spring water is available and accessible to all animals. One study (Ostermann-Kelm, et al. 2008) has experimentally shown that if horses linger at a water source, bighorn sheep will avoid using that water source while the horses are present. It is unknown whether the horses present on this

allotment interfere with use of Bessie Spring by bighorn sheep. However, as described above (and shown in the photographs in Appendix 4), the water collects in a small rock basin then flows for a short distance across sandstone bedrock before dissipating; there is no feed for either wildlife or livestock associated with the spring, so animals immediately trail out and away once they water. Even if horses do temporarily cause bighorn sheep to avoid Bessie Spring (or any other waters), the season of use that would occur under this alternative is during the winter and early spring when water needs for bighorn sheep are not as critical and numerous alternate water sources are present – other water sources available for bighorn sheep across the allotment consist of seasonal ephemeral slick rock pools. These water sources are not impacted by livestock because they occur in rock, are numerous, and are widely scattered (making them readily available to wildlife, including bighorn sheep). In addition to these pools, three wildlife catchments on the canyon rim (above/outside of this allotment) also provide sources of water for bighorn sheep but are inaccessible to livestock. Bighorn sheep also access water along Kanab Creek, one mile east of Bessie Spring on Forest Service managed land that is not grazed and is not accessible to livestock due to topography and range fences. Thus, there are no anticipated conflicts between bighorn sheep and livestock for water in the Kanab Gulch Allotment.

The allotment provides a diversity of forage plants (browse, grasses and forbs) for wildlife, including bighorn sheep. Under this alternative, livestock would be authorized to graze in the dormant season on all plant species except for needle and thread, which would only be grazed very early in its post dormant season. Grazing vegetation during the non-growing season or early season (as plants are just coming out of dormancy) would allow plants to fix carbon, reproduce and set seed as the growing season progresses into the summer. Dormant season grazing would have neutral to negligible effects on plant communities because plants would be able to fix a significant amount of carbon prior to biomass removal and would be able to set seed. Perennial grasses would have increased capability to produce seed because grazing would occur after they have produced much of their above-ground biomass. Overall plant vigor would be maintained by because plants would be grazed only after senesce (the plant growth phase from full maturity to death or dormancy). After the grasses go dormant they are affected little by grazing.

As discussed in Section 4.2.1, shrubs can be adversely impacted by grazing, even in the dormant season, if they are grazed heavily. Recent utilization on shrubs, based on current year's growth by weight has been well below the allowed 45%. Frequency of total shrubs has remained static at Key Area #1 and has increased at Key Area #2 (mainly due to an increase in blackbrush); frequency of palatable shrubs has increased at Key Area #1, while remaining static at Key Area #2. One can therefore conclude that the current grazing operation is not affecting the health and vigor of shrub species in the Kanab Gulch Allotment.

Both key areas in the allotment are within bighorn sheep habitat. The Arizona Strip Field Office RMP includes a forage objective of at least 20% grasses, 20% forbs, and 20% palatable shrub species in bighorn sheep habitat, where consistent with site potential. The key areas within the Kanab Gulch Allotment currently have the forage compositions listed in Table 12 (following page).

Table 12. Forage Compositions in Bighorn Sheep Habitat

Key Area	Grasses	Objective Met (Y/N)	Forbs	Objective Met (Y/N)	Palatable Shrubs	Objective Met (Y/N)
Key Area #1	49%	**Y**	4%	**N**	16%	**N**
Key Area #2	5%	**N**	4%	**N**	15%	**N**

These forage objectives are not met at the key areas, with the exception of grasses at Key Area #1. A wide variety of shrubs exist at Key Area #1, including fourwing saltbush and Mormon tea. However, palatable shrub species are unlikely to increase more than the current 16% due to the amount of other deep rooted shrubs that are already present (total shrub/woody species composition is currently 47%). This is also the case at Key Area #2 – as described on page 34 of this EA, Key Area #2 contains mostly shrubs which are depressing the few grasses in the interspaces and grasses have given way to more shrubs over time, so a solid grass component does not exist at this site. As described previously (see pages 15 and 34), this decrease in grasses is due to many factors that have influenced this vegetative shift to shrubs – these factors include recent precipitation patterns and inclusions of shallow caliche or calcium carbonate soil that is characterized by an impenetrable layer which the shallow rooted grasses cannot penetrate as easily as shrubs, and therefore die off during a drought or drier periods. This caliche layer (which is present at Key Area #2) then favors the deep rooted shrubs, which can penetrate this layer and survive. Grasses have therefore been depressed by the shrubs and have decreased over time. Due to the high composition of blackbrush – currently at 38% (which has a strong and deep tap root, and is not considered a palatable species for wildlife), it is unlikely that the composition of grasses or palatable shrubs will reach the RMP forage objective at this site (i.e., it is not within the site potential). This shift toward shrub domination is judged to be a result of recent precipitation patterns and not due to livestock grazing – as shown in Table 4 (page 15 of this EA), utilization on key species has been light in recent years. In addition, as discussed in Section 4.2.1, winter grazing (i.e., grazing during the dormant season) has little effect on grasses. Thus, the downward trend appears to be a result of drought and the associated increase in shrubs which have inhibited the grasses from growing in these shallow caliche hardpan soils, and not due to livestock grazing.

Allotment monitoring data indicates that resource conditions on the allotment currently meet all applicable standards for rangeland health. One factor in making this determination was the assessment that DPC objectives for vegetation components at the key areas (as outlined in Section 2.2.3 of this EA) are being met on the Kanab Gulch Allotment. As described above (and in Section 4.2.1), long-term monitoring has indicated that the key areas are not capable of producing the forage objectives identified in the Arizona Strip Field Office RMP for bighorn sheep habitat[10], with the exception of grasses at Key Area #1. The DPC objectives therefore reflect the potential of

[10] Decision No. DFC-WE-29 establishes forage objectives for bighorn sheep habitat "where consistent with site potential." As described in Section 4.2.1 of this EA, the key areas in Kanab Gulch Allotment are not capable of producing these forage objectives.

each site. It is expected that livestock grazing proposed under this alternative would minimally affect vegetation (see Section 4.2.1), and ecological condition would be maintained (the key areas are in late seral stage, which is a very stable condition) since the same management regime has been in place for many years. Monitoring of the allotment would continue – if future monitoring indicates any areas within the allotment are not in compliance with the Fundamentals of Rangeland Health, changes to the grazing use would be made (as described in Section 2.2.5 of this EA). However, current monitoring data does not indicate that any changes to grazing management are necessary.

Mule deer

As described in Chapter 3, the allotment is categorized as winter crucial mule deer habitat, although mule deer are present year-round in this allotment. The presence of livestock and the trailing of livestock between use areas could displace some wildlife from preferred habitats and/or water sources. However, this displacement would only be temporary. In addition, as described above, livestock use occurs during the winter and early spring when water is available throughout the allotment in ephemeral pools (in pockets of rock), and demand for water is not as critical. The rugged terrain within this allotment limits contact between deer and livestock.

The Arizona Strip Field Office RMP includes a forage objective of at least 30% palatable shrubs within winter crucial habitat, where consistent with site potential. The key areas within the Kanab Gulch Allotment have the forage compositions listed in Table 13.

Table 13. Forage Compositions in Winter Crucial Mule Deer Habitat

Key Area	Palatable Shrubs	
	Composition	Objective Met (Y/N)
Key Area #1	16%	**N**
Key Area #2	15%	**N**

The forage objective of at least 30% palatable shrubs in not met at the key areas. As described above, although a wide variety of total shrubs exist at Key Area #1 (including fourwing saltbush and Mormon tea), palatable shrub species are unlikely to increase more than the current 16% due to the amount of other deep rooted shrubs that are already present. Key Area #2 has shown an increase in shrubs (primarily blackbrush, which has a strong and deep tap root that will help the plant maintain or increase under a dry climate regime). Due to this high composition (38%) of blackbrush (which is not considered a palatable species for wildlife), it is unlikely that the composition of palatable shrubs will reach the RMP forage objective at this site (i.e., it is not within the site potential).

Allotment monitoring data indicates that resource conditions on the allotment currently meet all applicable standards for rangeland health, including meeting the DPC objectives for vegetation components at the key areas (as outlined on pages 9-10 of this EA). As described above and

previously in this EA, long-term monitoring has indicated that the key areas are not capable of producing the forage objective identified in the Arizona Strip Field Office RMP for mule deer winter crucial habitat[11]. The DPC objectives therefore reflect the potential of each site. It is expected that livestock grazing proposed under this alternative would minimally affect vegetation (see Section 4.2.1), and ecological condition would be maintained (the key areas are in late seral stage, which is a very stable condition) since the same management regime has been in place for many years. Monitoring of the allotment would continue – if future monitoring indicates any areas within the allotment are not in compliance with the Fundamentals of Rangeland Health, changes to the grazing use would be made (as described in Section 2.2.5 of this EA). However, current monitoring data does not indicate that any changes to grazing management are necessary. The proposed action would therefore not affect meeting habitat objectives (i.e., forage and water) for mule deer.

Migratory Birds

Properly managed livestock grazing is designed to cause minimal impacts to rangeland resources, including wildlife habitat. As described previously, allotment monitoring data indicates that resource conditions on the allotment currently meet all applicable standards for rangeland health. One factor in making this determination was the assessment that DPC objectives for vegetation components at the key areas (as outlined on pages 9-10 of this EA) are being met on the Kanab Gulch Allotment. Managing this allotment to achieve DPC objectives and implementation of the proposed utilization levels would result in maintaining the ecological condition of the allotment (see "Vegetation" discussion above). Livestock would be removed from the allotment before the breeding season begins for most species of migratory birds (which begins approximately April 30). In addition, as described above, livestock use occurs during the winter and early spring when water is available throughout the allotment in ephemeral pools (in pockets of rock); competition between livestock and migratory birds for water is therefore not anticipated. Implementation of the proposed action is therefore unlikely to impact any species of migratory bird known or suspected to occur on the allotment. No take of any migratory bird species is anticipated.

Sensitive Species

Peregrine falcon, ferruginous hawk, golden eagle, burrowing owl

Nesting sites and habitat for peregrine falcons, ferruginous hawks, and golden eagles would not be impacted by livestock within the allotment because these sites are located on crevices in cliff faces that are inaccessible to livestock. Habitat for prey for all four sensitive species would be minimally affected because grazing under this alternative would occur during the vegetative dormant season (see "Vegetation" discussion above). Vegetation in the allotment is sufficient to provide food and shelter requirements for populations of prey species (small mammals, birds, and rabbits) for these

[11] Decision No. DFC-WE-15 establishes forage objectives for bighorn sheep habitat "where consistent with site potential." As described in Section 4.2.1 of this EA, the key areas in Kanab Gulch Allotment are not capable of producing this forage objective.

birds. Managing the allotment to achieve DPC objectives and implementation of the proposed utilization level would result in maintaining or improving the ecological condition of the allotment. Therefore, implementation of the proposed action is not likely to impact BLM sensitive species within the allotment.

4.3.2 Impacts of Alternative B – Issue New 10-Year Grazing Permit with Reduced Grazing

Big Game

Desert bighorn sheep

The rugged and steep nature of bighorn habitat limits contact between sheep and livestock to a few areas within this allotment. The majority of habitat used by desert bighorn sheep in the allotment is essentially ungrazed due to its steep nature and resulting inaccessibility to livestock.

The Arizona Strip Desert Bighorn Sheep Management Plan (page 6) states that "Springs located on BLM land are impacted by cattle" (Bighorn Sheep Core Team 2011). As described on pages 19-20 (Chapter 3, Table 6) of this EA, Bessie Spring (the only perennial water source in the allotment) is located in a slickrock canyon. Water flows from the base of a canyon wall and collects in a small sandstone basin; there is no soil deposition in the sandstone basin, and no riparian vegetation associated with this spring other than a few tamarisk plants (see Appendix 4). Thus, there are no riparian resources present that could be impacted by livestock use. Recent site visits to this spring have also not revealed any conflicts between bighorn sheep and livestock for water – this spring water is available and accessible to all animals. One study (Ostermann-Kelm, et al. 2008) has experimentally shown that if horses linger at a water source, bighorn sheep will avoid using that water source while the horses are present. It is unknown whether the horses present on this allotment interfere with use of Bessie Spring by bighorn sheep. However, as described above (and shown in the photographs in Appendix 4), the water collects in a small rock basin then flows for a short distance across sandstone bedrock before dissipating; there is no feed for either wildlife or livestock associated with the spring, so animals immediately trail out and away once they water. Even if horses do temporarily cause bighorn sheep to avoid Bessie Spring (or any other waters), the season of use that would occur under this alternative is during the winter and early spring when water needs for bighorn sheep are not as critical and numerous alternate water sources are present – other water sources available for bighorn sheep across the allotment consist of seasonal ephemeral slick rock pools. These water sources are not impacted by livestock because they occur in rock, are numerous, and are widely scattered (making them readily available to wildlife, including bighorn sheep). In addition to these pools, three wildlife catchments on the canyon rim (above/outside of this allotment) also provide sources of water for bighorn sheep but are inaccessible to livestock. Bighorn sheep also access water along Kanab Creek, one mile east of Bessie Spring on Forest Service managed land that is not grazed and is not accessible to livestock due to topography and range fences. Thus, there are no anticipated conflicts between bighorn sheep and livestock for water in the Kanab Gulch Allotment.

Water availability, especially during the hot summer months, is essential for desert bighorn sheep. Livestock grazing, as proposed under this alternative, would occur during the winter and early spring months when water needs for bighorn sheep are not as critical. In addition, as described above, Bessie Spring is not impacted by livestock and numerous water sources are available during the season of grazing use. Thus, there are no anticipated conflicts between bighorn sheep and livestock for water in the Kanab Gulch Allotment.

The allotment provides a diversity of forage plants (browse, grasses and forbs) for wildlife, including bighorn sheep. Both key areas in the allotment are within bighorn sheep habitat. As noted previously, long-term monitoring has indicated that the key areas are not capable of producing the forage objectives identified in the Arizona Strip Field Office RMP for bighorn sheep habitat. The DPC objectives therefore reflect the potential of each site. Allotment monitoring data indicates that resource conditions on the allotment currently meet all applicable standards for rangeland health. Habitat for bighorn sheep would be minimally affected because grazing under this alternative would occur during the vegetative dormant season for all key species (see "Vegetation" discussion above). Impacts to shrubs would be similar to those described for Alternative A in that grazing would only occur during the dormant season. However, grazing intensity under this alternative would likely be less (i.e., lighter utilization) because the grazing season would be two months shorter. Thus, less removal of stems (where energy compounds – starches and sugars – are stored) by livestock would occur. Shrubs, which can be susceptible to moderate to heavy utilization in winter because of this energy storage, would benefit from lighter use (although frequency of shrubs is already on the increase – see discussion in Section 4.2.1 on pages 32-34).

Vegetation in the allotment is sufficient to provide forage for bighorn sheep. Managing the allotment to achieve DPC objectives and implementation of the proposed utilization level would result in maintaining the ecological condition of the allotment. Therefore, implementation of this alternative is not likely to impact bighorn sheep within the allotment.

Mule deer

As described in Chapter 3, mule deer are present year-round in and around this allotment, although densities are most likely low. The presence of livestock and the trailing of livestock between use areas could displace some wildlife from preferred habitats and/or water sources. However, this displacement would only be temporary. In addition, as described above, livestock use occurs during the winter and early spring when water is available throughout the allotment in ephemeral pools (in pockets of rock), and demand for water is not as critical. The rugged terrain within this allotment limits contact between deer and livestock.

As described above for bighorn sheep, the allotment provides a diversity of forage plants (browse, grasses and forbs) for wildlife, including mule deer. Both key areas in the allotment are within winter crucial mule deer habitat. As noted previously, long-term monitoring has indicated that the key areas are not capable of producing the forage objectives identified in the Arizona Strip Field Office RMP for mule deer winter crucial habitat. The DPC objectives therefore reflect the potential of each site. Allotment monitoring data indicates that resource conditions on the allotment currently meet all applicable standards for rangeland health. Habitat for mule deer would be minimally affected because grazing under this alternative would occur during the

vegetative dormant season for all key species (see "Vegetation" discussion above). Impacts to shrubs would be similar to those described for Alternative A in that grazing would only occur during the dormant season. However, grazing intensity under this alternative would likely be less (i.e., lighter utilization) because the grazing season would be two months shorter. Thus, less removal of stems (where energy compounds – starches and sugars – are stored) by livestock would occur. Shrubs, which can be susceptible to moderate to heavy utilization in winter because of this energy storage, would benefit from lighter use (although frequency of shrubs is already on the increase – see discussion in Section 4.2.1 on pages 32-34).

Vegetation in the allotment is sufficient to provide forage requirements for populations of prey species (small mammals, birds, and rabbits) for these birds. Managing the allotment to achieve DPC objectives and implementation of the proposed utilization level would result in maintaining the ecological condition of the allotment. Therefore, implementation of this alternative is not likely to impact mule deer within the allotment.

Migratory Birds

Impacts under this alternative would be similar to those described for Alternative A except that livestock would be on the allotment for a shorter period of time (two months less). Livestock would be removed from the allotment before the breeding season began for most species of migratory birds (April 30). Nesting sites for migratory birds would therefore not be impacted by livestock within the allotment.

Properly managed livestock grazing is designed to cause minimal impacts to rangeland resources, including wildlife habitat. Vegetation in the allotment is sufficient to provide food and shelter requirements for migratory birds. Allotment monitoring data indicates that resource conditions on the allotment currently meet all applicable standards for rangeland health. Managing this allotment to achieve DPC objectives and implementation of the proposed utilization levels would result in maintaining the ecological condition of the allotment (see "Vegetation" discussion – Section 4.2.2). Implementation of this alternative is therefore unlikely to impact any species of migratory bird known or suspected to occur on the allotment, and no take of any migratory bird species is anticipated.

Sensitive Species

Peregrine falcon, ferruginous hawk, golden eagle, burrowing owl

Impacts under this alternative would be similar to those described for Alternative A except that livestock would be on the allotment for a shorter period of time (two months less). Vegetation in the allotment is sufficient to provide food and shelter requirements for populations of prey species (small mammals, birds, and rabbits) for these birds, although plants would likely benefit from an additional two months of rest. Allotment monitoring data indicates that resource conditions on the allotment currently meet all applicable standards for rangeland health. Managing the allotment to achieve DPC objectives and implementation of the proposed utilization levels would result in maintaining the ecological condition of the allotment (see "Vegetation" discussion above).

Nesting sites and habitat for these four species would not be impacted by livestock within the allotment. Therefore, implementation of this alternative is not likely to impact BLM sensitive species within the allotment.

4.3.3 Impacts of Alternative C – No Grazing

Big Game

Desert bighorn sheep and mule deer

Under this alternative, vegetation in the allotment would continue to be sufficient to provide forage for bighorn sheep and mule deer. As described in Section 4.2.3, plants would be minimally grazed (by wildlife) each year. Grasses would continue to fix a significant amount of carbon prior to biomass removal, produce seed, and set seed; shrubs would have the maximum amount of energy compounds in their stems for survival over the winter dormant season. In addition, there would be no conflicts between bighorn sheep or mule deer and livestock for water within the allotment.

Migratory Birds

Under this alternative, vegetation would have the most rest and recovery as compared to the other alternatives. Although the allotment is meeting all applicable standards for rangeland health, plant communities would still benefit from rest. Because no livestock grazing would occur, plants would remain ungrazed or minimally grazed (by wildlife) each year. Grasses would continue to fix a significant amount of carbon, produce seed, and set seed; shrubs would have the maximum amount of energy compounds in their stems for survival over the winter dormant season. Vegetation in the allotment would therefore continue to provide sufficient food and shelter requirements for migratory birds. In addition, nesting sites for migratory birds would not be impacted by livestock within the allotment. No take of any migratory bird species would be anticipated from implementation of this alternative.

Sensitive Species

Peregrine falcon, ferruginous hawk, golden eagle, burrowing owl

Under this alternative, vegetation would have the most rest and recovery as compared to the other alternatives. Although the allotment is meeting all applicable standards for rangeland health, plant communities (which provide habitat components for prey species) would still benefit from rest. Because no livestock grazing would occur, plants would remain ungrazed or minimally grazed (by wildlife) each year. Grasses would continue to fix a significant amount of carbon, produce seed, and set seed; shrubs would have the maximum amount of energy compounds in their stems for survival over the winter dormant season. Vegetation in the allotment would continue to be sufficient to provide food and shelter requirements for populations of prey species (small mammals, birds, and rabbits) for these birds. No impacts to sensitive species are therefore anticipated.

4.4 THREATENED, ENDANGERED, and CANDIDATE SPECIES

4.4.1 Impacts of Alternative A – Proposed Action

Mexican spotted owl

As described on page 30 of this EA, there are areas within the allotment that appear to contain canyon habitat and therefore could support nesting spotted owls. While grazing may have some effects on habitat structure (riparian tree species regeneration and cover for small mammal prey species), the canyon habitat preferred by nesting spotted owls would be unaffected by grazing due to its inaccessibility to livestock.

Grazing has the potential to affect spotted owls by altering the vegetative structure and species composition within a foraging area. Mexican spotted owl prey species could be impacted by grazing practices that reduce habitat or resources needed for survival. Mexican spotted owls have been documented to take a variety of prey species, although woodrats (*Neotoma spp*.) are the key species taken in canyon areas of the Colorado Plateau (USFWS 2012). The desert woodrat (*Neotoma lepida*) is the most common woodrat found in canyon areas of the Arizona Strip (Hoffmeister 1986). Desert woodrats feed on a wide variety of food items including seeds, berries, juniper berries, cacti, yucca, and fresh foliage (Stones and Hayward 1968, Cameron and Rainey 1972). This adaptability gives the desert woodrat an advantage in avoiding the adverse effects of competition (Cameron and Rainey 1972).

In southeast Arizona, Bock et al. (1984) found lower numbers of some species of rodents on grazed rangeland but did not detect a significant difference in numbers of deer mice, a secondary Mexican spotted owl prey species, on grazed vs. ungrazed plots. Furthermore, the grazed plots in the study were on a pasture that was stocked at one cow per 10 hectares which is much higher than the proposed action for the Kanab Gulch Allotment (1 horse/66 ha).

Grazing on the allotment under this alternative would be limited to 26 horses from November 15 to April 30 – dormant season grazing, which as described in Section 4.2.1, would minimally affect vegetation. Effects of grazing on the allotment to Mexican spotted owl prey species would therefore be negligible and would not be sufficient to reduce prey numbers or availability to a level that results in the take of any spotted owls. Table 14 shows recent utilization on all key species, based on current year's growth by weight, during the grazing season. Utilization has been well below the allowed 45%.

Table 14. Utilization Percentages of Key Species on the Kanab Gulch Allotment

Key Area	2004	2009	2011	2012	2013
1	15	28	11	20	22
2	15	28	17	13	21

Willey and Willey (2010) found that woodrat and *Peromyscid* mice numbers were lower in grazed vs. ungrazed plots in riparian areas. However, the Kanab Creek riparian area would not be affected by grazing because it is located outside the Kanab Gulch Allotment[12] – this allotment encompasses the cliffs and benches of the Esplanade Plateau, an upland area separated from Kanab Creek by steep cliffs; livestock are physically excluded from entering these areas by high cliffs as well as range fences, thereby barring access to riparian zones.

The proposed action may affect, but is not likely to adversely affect, Mexican spotted owls, their habitat, or prey species. USFWS concurred with this determination on August 7, 2013.

4.4.2 Impacts of Alternative B – Issue New 10-Year Grazing Permit with Reduced Grazing

Mexican spotted owl

Impacts under this alternative would be similar to those described for Alternative A except that livestock would be on the allotment for a shorter period of time (two months less). Vegetation in the allotment is sufficient to provide food and shelter requirements for populations of prey species (small mammals, birds, and rabbits) for Mexican spotted owls, although plants would likely benefit from an additional two months of rest. Allotment monitoring data indicates that resource conditions on the allotment currently meet all applicable standards for rangeland health. Managing the allotment to achieve DPC objectives and implementation of the proposed utilization levels would result in maintaining the ecological condition of the allotment (see "Vegetation" discussion above).

As discussed under Alternative A, the effects of grazing on the allotment to Mexican spotted owl prey species would be negligible and would not be sufficient to reduce prey numbers or availability to a level that results in the take of any spotted owls. Table 13 shows recent utilization based on current year's growth, by weight, during the grazing season (prior to 2004 utilization was last measured in 1987). Utilization has been well below the allowed 45%. Grazing on the allotment would be limited to 26 horses from December 1 to April 15, which is a shorter season than the proposed action, and would avoid most of the breeding season. Nesting sites and habitat for this species would therefore not be impacted by livestock within the allotment.

4.4.3 Impacts of Alternative C – No Grazing

Mexican spotted owl

Implementation of the no grazing alternative would be unlikely to impact Mexican spotted owls or their prey species. Under this alternative, vegetation would have the most rest and recovery as compared to the other alternatives. Although the allotment is meeting all applicable standards for rangeland health, plant communities (which provide habitat components for prey species) would still

[12] As described in Table 6, there are no wetland/riparian areas in the Kanab Gulch Allotment.

benefit from rest. Because no livestock grazing would occur, plants would remain ungrazed or minimally grazed (by wildlife) each year. Grasses would continue to fix a significant amount of carbon prior to biomass removal, produce seed, and set seed; shrubs would have the maximum amount of energy compounds in their stems for survival over the winter dormant season. Vegetation in the allotment would continue to be sufficient to provide food and shelter requirements for populations of prey species (small mammals, birds, and rabbits) for Mexican spotted owls. No take of any Mexican spotted owls would be anticipated.

4.5 Cumulative Impacts

"Cumulative impacts" are those impacts resulting from the incremental impact of an action when added to other past, present, or reasonably foreseeable actions regardless of what agency or person undertakes such other actions. This EA attempts to qualify and quantify the impacts to the environment that would result from the incremental impact of the proposed action or alternatives when added to other past, present, and reasonably foreseeable future actions. These impacts can result from individually minor but collectively important actions taking place over a period of time.

There are a wide variety of uses and activities occurring on the lands within and adjacent to the Kanab Gulch Allotment, including livestock grazing, hiking, mining, etc.). Specific actions that are occurring, or are likely to occur in the reasonably foreseeable future are:

- *Livestock grazing* – The Kanab Gulch Allotment and the adjacent BLM-administered land are active grazing allotments. Each of these allotments is managed separately under its own grazing plan and system that is documented and described in an allotment management plan (AMP). Livestock grazing has occurred in the area for 150+ years. The portion of Kanab Creek on U.S. Forest Service lands (adjacent to Kanab Gulch Allotment) is closed to livestock grazing.

  Following completion of the 1979 Grazing EIS, a Notice of Proposed Decision (NOPD) was issued for the Kanab Gulch Allotment. This decision reduced the active grazing preference from 210 active AUMs to 105 AUMs and shortened the season of use on the allotment. Ensuing protests by the permittee and issuance of a Notice of Final Decision (NOFD) in 1981 followed which established an interim carrying capacity that would be adjusted over a five year period (1981-1986) based upon collection of monitoring data. This NOFD returned the active preference to 210 active AUMs, pending the results of monitoring. The monitoring data the BLM agreed to collect included actual use, utilization, precipitation, and trend. This data provided the basis for evaluating progress toward allotment objectives and determining appropriate modifications in grazing use (and resulted in the establishment of key areas). In 1986, an evaluation of the results of the monitoring from 1982-1986 was completed and a new NOPD was issued in 1987, which reduced the grazing preference by 67 AUMs (to an active preference of 143 AUMs) and shortened the season of use by 15 days – this reflects the current grazing permit. The 67 AUMs placed in suspension for livestock were allocated to wildlife, which includes desert bighorn sheep.

The 1979 Grazing EIS also indicated that sheep habitat in this area was in "fair condition", which is now considered the equivalent to mid-seral (26-50 percent similar to PNC) in ecological condition class standards. The 2011 Kanab Gulch Land Health Update (Appendix 5) indicates the current ecological conditions at the key areas on the allotment are at 52% and 60% similar to PNC, which is Late Seral and is equivalent to what was once recognized as "good condition".

- *Mining and Mineral Resources* – Public lands adjacent to the Kanab Gulch Allotment (i.e., outside designated wilderness) are open to mineral development (see below for a discussion on the Northern Arizona Proposed Withdrawal). The primary economic mineral resource in the area consists of locatable mineral deposits, including breccia pipe deposits (i.e., vertical collapse features formed from the collapse of karst solution caverns in the underlying Redwall limestone). Other potential mineral resources in the area are salable minerals (consisting primarily of sand, stone and gravel). The potential for gravel is high. Several existing mineral material pits occur in the area, the closest of which to the allotment is in Robinson Canyon (several miles up Hack Canyon).

- *Northern Arizona Mineral Withdrawal* – On January 9, 2012, the Secretary of the Interior issued a decision to withdraw approximately 1 million acres of Federal locatable minerals in northern Arizona from the location of new mining claims under the Mining Law of 1872 [30 USC 22–54] (Mining Law), subject to valid existing rights. The affected lands are located near Grand Canyon National Park in northern Arizona, and consist of lands managed by the BLM and the U.S. Forest Service. The decision to withdraw these lands was made in order to protect the Grand Canyon watershed from adverse effects of locatable mineral exploration and development. The withdrawal does not affect use, management, or disposition of the lands other than under the Mining Law. A portion of the withdrawn lands on the Arizona Strip are adjacent to the Kanab Gulch Allotment (on the Kanab Plateau. The Kanab Gulch Allotment is located within a designated wilderness and was already withdrawn from all forms of mineral entry.

- *Recreation* – Recreation activities occurring throughout the area involve a broad spectrum of pursuits ranging from dispersed and casual recreation to organized, BLM-permitted group uses. Typical recreation in the area consists primarily of more primitive activities such as hiking, wildlife viewing, horseback riding, camping, backpacking, and hunting. The Arizona Strip is known for its large-scale undeveloped areas and remoteness, which provides an array of recreational opportunities for users who wish to experience primitive and undeveloped recreation, as well as those seeking more organized or packaged recreation experiences. The Kanab Gulch Allotment lies within the Kanab Creek Wilderness, an area consisting of a network of gorges with vertical walls cut deep into the Kanab and Kaibab Plateaus. Recreational use of this wilderness area consists primarily of hiking and backpacking, as Kanab Creek eventually empties into the Colorado River in Grand Canyon National Park.

4.5.1 Livestock Grazing

Livestock grazing in the region has evolved and changed considerably since it began in the 1860s, and is one factor that has created the current environment. At the turn of the century, large herds of livestock grazed on unreserved public domain in uncontrolled open range. Eventually, the range was stocked beyond its capacity, causing changes in plant, soil, and water relationships. Some speculate that the changes were permanent and irreversible, turning plant communities from grass and herbaceous species to brush and trees. Protective vegetative cover was reduced, and more runoff brought erosion, rills, and gullies.

In response to these problems, livestock grazing reform began in 1934 with the passage of the Taylor Grazing Act. Subsequent laws, regulations, and policy changes have resulted in adjustments in livestock numbers, season-of-use changes, and other management changes. Given the past experiences with livestock impacts on public land resources, as well as the cumulative impacts that could occur on the larger ecosystem from grazing on various public and private lands in the region, management of livestock grazing is an important factor in ensuring the protection of public land resources. Past, present, and reasonably foreseeable actions within the analysis area would continue to influence range resources, watershed conditions and trends. The impact of vegetation treatments, voluntary livestock reductions during dry periods, and implementation of a grazing system have improved range conditions. The net result has been greater species diversity, improved plant vigor, and increased ground cover from grasses and forbs.

In the long-term, as the population of the surrounding area increases (which would increase the use of public lands), conflicts between livestock grazing and these other uses could arise. Resolving conflicts may require adjustments and/or restrictions placed on livestock grazing management. Other factors also influence livestock grazing operations, such as climatic and market fluctuations. A six-year drought in the region occurred between 1998 and 2004 and dramatically affected livestock grazing operations on the Arizona Strip, resulting in virtually all cattle being pulled from the public lands in 2004. Similar fluctuations in livestock numbers would likely occur in the future.

4.5.2 Vegetation

Vegetation on the Arizona Strip has gone through significant changes since the 1870s due to historic land use practices and the introduction of non-native species. Livestock grazing would continue across the area on BLM-administered lands. The Standards and Guides analysis and permit renewal process would help ensure grazing practices are conducted in a manner to maintain or improve the ecological health of the area. Rangeland management practices would act to prevent and control the spread of invasive plant species, maintain diverse and natural plant communities, improve wildlife habitat, reduce erosion, and improve water quality. The objectives developed to manage for healthy rangelands have a goal of keeping the entire ecosystem healthy and productive in order to ensure that it yields both usable products and intrinsic values.

Continuing gypsum and uranium mining in the region, as well as use of mineral material sites in the area, would cumulatively affect vegetation through the loss of vegetation, higher rates of erosion and

sedimentation in drainages/waterways, increased deposition of dust on vegetation adjacent to roadways (i.e., haul routes), and introduction and spread of invasive plants. Reclamation activities would counter some of the reduction in vegetative cover, and preventative measures to inhibit the spread of invasive species could curtail infestation by species such as Scotch thistle.

The effects of livestock grazing on resources in the Kanab Gulch Allotment have been analyzed under the "Direct and Indirect Effects" section of this chapter. Since livestock grazing occurs throughout the area, it is reasonable to assume that impacts similar to those identified earlier in this chapter would occur elsewhere in the area. This additive impact may affect wildlife habitat or corridors and the greater ecosystems by altering vegetation associations. These systems and the health of the region as a whole are important for the survival of many native species. However, given the fact that none of the alternatives propose to increase the level of grazing in the Kanab Gulch Allotment, it is anticipated that none of the alternatives would result in cumulative impacts to vegetation resources when added to other past, present, and reasonably forseeable activities in the area.

4.5.3 Wildlife, Including Big Game, Migratory Birds, and Sensitive Species

Wildlife may be affected by other activities occurring within and adjacent to the allotment, including mineral development and various dispersed recreational activities. Mineral development has led to reduction of habitat quality and physical disturbance in a variety of habitats. Mining-related activities in the area include ongoing operations at the Arizona 1 and Pinenut uranium mines, both of which are located on the Kanab Plateau several miles to the west of the Kanab Gulch Allotment, and the potential for several additional future mines. Impacts to wildlife species from uranium mining activities were fully analyzed in the Northern Arizona Proposed Withdrawal EIS. This analysis stated that "Given the relatively small area of surface impact, it is anticipated that none of the alternatives [including the proposed withdrawal] would result in significant cumulative impacts to migratory birds [and wildlife resources] when added to other past, present, and reasonably forseeable activities in the proposed withdrawal area" (BLM 2011).

Recreational pursuits, particularly OHV use, can cause disturbance to wildlife species and their habitats. Humans can disturb wildlife in a variety of ways. Disturbance can come from vehicle noise, wildlife being chased, or the mere presence of humans. Different species, and individuals within species, react differently to disturbances. The type of reaction also differs with time of year, location of disturbance in relation to breeding sites, type of disturbance, and duration of disturbance. Desert bighorn sheep are particulary sensitive to human disturbance. Human encroachment in bighorn sheep habitat impacts the species through habitat fragmentation, increased noise, and an increased number of humans. Numerous researchers have documented altered bighorn sheep behavior in response to human-related disturbance, including hiking, camping, and motorized vehicle use. Interactions with hiking parties causes bighorn sheep to flee much more often than interactions with vehicles (Papouchis et al 2001). However, since the Kanab Gulch Allotment is located in a remote and inaccessible part of the Arizona Strip (much of it within designated wilderness), interactions with humans are uncommon.

Recreational pursuits, particularly OHV use, have caused disturbance to most all species and their habitats. With the increase in local populations has come a dramatic increase in the level of OHV use, resulting in increased disturbance, injury, and mortality to wildlife, particularly ground dwelling species with low mobility. Transportation corridors exist through the habitat of virtually all species found within the planning area. Impacts vary by species and by the location, level of use, and speed of travel over the road.

The effects of livestock grazing on wildlife resources in the Kanab Gulch Allotment have been analyzed under the "Direct and Indirect Effects" section of this chapter. Since livestock grazing occurs throughout the area, it is reasonable to assume that impacts similar to those identified earlier in this chapter would occur elsewhere in the area. This additive impact may affect wildlife habitat or corridors and the greater ecosystems by altering vegetation associations. These systems and the health of the region as a whole are important for the survival of many native species. However, given the fact that none of the alternatives propose to increase the level of grazing in the Kanab Gulch Allotment, it is anticipated that none of the alternatives would result in cumulative impacts to wildlife when added to other past, present, and reasonably foreseeable activities in the area.

4.5.4 Threatened, Endangered, and Candidate Species

The distribution of the Mexican spotted owl extends well beyond the allotment boundary. Mexican spotted owls may be found in canyon and mixed conifer forests throughout the region; this species occurs in Grand Canyon and Zion national parks, as well as in suitable forested habitats in Arizona, New Mexico, and into northern Mexico. Among the contributing factors in the decline of this species is the loss or fragmentation of available habitat. The effects of livestock grazing on the Mexican spotted owl in the Kanab Gulch Allotment have been analyzed under the "Direct and Indirect Effects" section of this chapter. Since livestock grazing occurs throughout the area (with the exception of the National Forest System lands portion of Kanab Creek where no livestock grazing is authorized), it is reasonable to assume that impacts similar to those identified earlier in this chapter would occur elsewhere in the area. This additive impact may affect wildlife habitat or corridors and the greater ecosystems by altering vegetation associations.

Grand Canyon National Park, a few miles south of the Kanab Gulch Allotment, is known to host one of the highest concentrations of spotted owls in the region, with over 50 known territories (Bowden 2009); both Zion National Park and Grand Staircase-Escalante National Monument (to the north of the Kanab Gulch Allotment) include at least 40 spotted owl territories. These management units are all well within dispersal distances shown by juvenile spotted owls, thus each year, colonizing individuals might enter canyons in the Arizona Strip (including Kanab Creek and its drainages) and establish territories (Willey and Van Riper 1998, Hockenbary 2011). Given the landscape connectivity provided by rugged canyon corridors connecting northern Arizona to Utah, dispersing spotted owls likely perceive the Grand Canyon to Zion region as a continuous landscape, and habitats with the Arizona Strip represent important refugia and linking corridors among the widely scattered subpopulations (USFWS 1995, Bowden 2009, Willey 1998, Willey and Van Riper 1998).

Recreational pursuits, particularly OHV use, can cause disturbance to Mexican spotted owls and their habitats. However, Mexican spotted owls in the Arizona Strip area occur primarily in remote and inaccessible canyons and much of the suitable habitat is within either designated wilderness or unroaded areas, making interactions with humans uncommon.

Mining-related activities in the area include ongoing operations at the Arizona 1 and Pinenut uranium mines, both of which are located on the Kanab Plateau several miles to the west of the Kanab Gulch Allotment, and the potential for several additional future mines. Impacts to federally-listed species (including the Mexican spotted owl) from uranium mining activities were fully analyzed in the Northern Arizona Proposed Withdrawal EIS. This analysis stated that "Given the relatively small area of surface impact and the [Endangered Species Act] requirements concerning impacts to listed species and critical habitat, all of the alternatives [including the proposed withdrawal] would result in minor and less than significant cumulative impacts to threatened, endangered, and candidate species when added to other past, present, and reasonably forseeable activities in the proposed withdrawal area" (BLM 2011).

Given the fact that none of the alternatives in this current EA propose to increase the level of grazing in the Kanab Gulch Allotment, it is anticipated that none of the alternatives would result in cumulative impacts to wildlife when added to other past, present, and reasonably forseeable activities in the area.

4.6 Monitoring

Dry weight ranking (DWR) studies would be used to measure attainment of the key area DPC objectives. In addition, pace frequency studies would be used at each key area to detect changes of individual species which determines a trend or change in vegetation composition. Pace frequency and DWR would be completed on each key area. DWR and pace frequency study methodologies are described in *Sampling Vegetation Attributes*, Interagency Technical Reference 1734-4 (BLM 1999b).

Livestock use on forage plants is determined by conducting grazing utilization studies using the Grazed-Class Method as described in the *Utilization Studies and Residual Measurements* Interagency Technical Reference 1734-3 (BLM 1999a). Utilization studies would be completed by the BLM when livestock are removed from the pasture. Study data would be compiled each year. Other information to be collected and compiled includes precipitation and actual use. All monitoring data would be used to evaluate current management of the allotment and assist the BLM in making management decisions that help achieve vegetation objectives.

The monitoring addressed above and in Chapter 2 is sufficient to identify changes in vegetation as a result of livestock grazing activities. In addition to those methods described, there are efforts in place to inventory for noxious weed establishment.

Chapter 5

CONSULTATION AND COORDINATION

5.1 Summary of Public Participation

Public involvement for the Kanab Gulch Allotment permit renewal process began with scoping meetings for the Kanab Gulch Allotment land health evaluation on October 22, 2003. The assessment was conducted by an Interdisciplinary Assessment Team of BLM resource specialists assisted by the Rangeland Resources Team appointed by the Arizona Resource Advisory Council. Draft evaluations were sent out for public review and comment to individuals, groups, and agencies. Comments were incorporated into the Final Kanab Gulch and Gulch land health evaluation report.

As described in Section 1.1 of this EA, an EA for the renewal of the grazing permit for the Kanab Gulch Allotment was completed in 2008. The Kanab Gulch Allotment permit renewal final decision was appealed and set aside by IBLA. The matter was remanded back to the BLM for additional NEPA analysis. This EA reflects the re-analysis of the proposed grazing permit renewal. The preliminary EA was sent out for a 30-day public review and comment period on August 6, 2013; two letters were received in response, and comments received are addressed in Section 5.3, Table 17 of this EA.

5.2 List of Preparers and Contributors

The following table lists persons who contributed to preparation of this EA.

Table 15. List of BLM Preparers/Reviewers

Name	Title	Responsible for the Following Program(s)
Gloria Benson	Tribal Liaison	Native American Religious Concerns
Whit Bunting	Lead Rangeland Management Specialist	Invasive, Non-Native Species, Range
Lorraine Christian	Arizona Strip Field Manager	Project Oversight
Rody Cox	Geologist	Geology, Minerals
Laurie Ford	Team Lead, Lands & Geological Sciences	Lands & Realty
Shawn Langston	Wildlife Biologist	Special Status Animals, Wildlife
Diana Hawks	Team Lead, Cultural Resources/Wilderness/ Recreation	Wilderness, Recreation, Visual Resources
John Herron	Archaeologist	Cultural Resources
Kevin Schoppmann	Vegetation/Grazing Administration	Rangeland Management Specialist
John Sims	Supervisory Law Enforcement	Law Enforcement
Robert Smith	Soil Scientist	Soils, Water, Air
Richard Spotts	Environmental Coordinator	NEPA Compliance

Table 16. List of Persons, Agencies and Organizations Consulted

Name	Agency/Organization	Consulted for the Following Program(s)
Rob Grumbles	Mohave County Extension Service	Vegetation and Social Economics
Art Meen	Natural Resource Conservation Service	Soils and Vegetation
Vernon Parent	Washington County Extension Service	Vegetation and Social Economics
Steve Rosenstock	Arizona Game and Fish Department	Wildlife and Vegetation
Rick Miller	Arizona Game and Fish Department	Wildlife and Vegetation
LeAnn Skrzynski	Kaibab Paiute Reservation	Tribal and Native American Coordinator

5.3 Response to Public Comments

The following table lists public comments received during this EA process, along with a response to each comment.

Table 17. Public Comments and Responses

Comment	Response
Comment 1: The BLM revised the Desired Plant Community objectives between the 2009 version and the current version of the Land Health Evaluation (LHE). EA at 68. The BLM shifted the precipitation zone and lumped specific grass types into "functional groups" instead. Moreover, the agency downward revised the grass composition requirements on both key areas from 40-70 percent to 15-40 percent and 2-10 percent in the recent LHE, with no diversity requirements that were previously included. Having failed to meet the higher standards the agency had previously set for the allotment, the BLM has simply lowered the bar to rangeland health.	The DPC objectives have been revised based upon a more accurate description of the ecological site guides for the key areas. These adjustments will better reflect and emphasize the true picture of what is going on in the allotment. As described in Appendix 5 of this EA, it is very difficult to manage large areas (such as a grazing allotment) for specific species because variations within such a large area can be quite dramatic (even within a single ecological site). By contrast, managing by functional groups allows range managers to study patterns of vegetation responses from plant groups that have similar life history strategies and responses to environmental stress and disturbance (McIntyre, 1999), which is more useful on the allotment scale. Functional groups are a much better way to manage and track diversity and what is going on. As described on page 9 of this EA, the Kanab Gulch Allotment is a transition area between 7-11" and 10-14" precipitation zones (p.z.). The site was determined to be more appropriate in the 10-14" zone because it has some scattered sagebrush and pinyon-juniper which are not found in the 7-11" zone; however, even this is not a good "fit" because the sagebrush and pinyon-juniper are very sparse and only present due to the influence of the top of the Kanab Plateau (on the ridge above the Kanab Gulch Allotment). Having changed from a 7-11" to a 10-14" p.z. is actually setting a higher standard than previously set for the allotment; the allotment receives more precipitation than 7-11" (it averages 11.76"). Composition of many plant species also changed with the new 10-14" site guide. An example is galleta grass, which changed from 1-5% and is now 1-10% .

Comment	Response
Comment 2: The BLM claims that shrub encroachment is due to drought, but no analysis is presented which factors in drought and livestock grazing.	As described elsewhere in this EA (Sections 3.1.3, 4.2.1, and Appendix 5), there are a variety of factors influencing the increase in shrubs, including the slope and aspect of the site as well as the different soil inclusions which causes more grasses or more shrubs in a similar site. Recent precipitation patterns have also been a causal factor because species such as blackbrush and Mormon tea have strong and deep tap roots that help the plants maintain or increase under a dry climate regime. Recent precipitation patterns have resulted in the frequency of grasses decreasing while shrubs have increased. It should be noted that utilization on key species has been light in recent years (see Table 10). All of these factors indicate that the increase in shrubs is due to factors other than grazing.
Comment 3: The BLM doesn't present any data on grazing utilization grass species at either key area.	Utilization data on grasses is presented in Table 4 of the EA.
Comment 4: Cheatgrass is present on some areas of the Kanab Gulch allotment. EA at 18. The BLM cites outdated scientific research in support of its claims that livestock are neutral or beneficial in limiting cheatgrass infestations. More contemporary research supports the opposite view. *See* Reisner et al 2013. The EA fails to take a hard look at the last twenty years of evidence that grazing does exacerbate cheatgrass infestations.	Cheatgrass is not common on this allotment. As described in Table 6 of this EA, proper grazing use which maintains stable plant communities should minimize or have no effect on the spread of invasive non-native species. This is the case in the Kanab Gulch Allotment – the plant communities are in late seral, which is a very stable condition. In addition the low utilization levels, along with the predominance of native vegetation and the rocky soils that occur in the allotment, make it unlikely that cheatgrass will expand beyond its present status.
Comment 5: Cheatgrass infestation contributes to increased flammability. The BLM errs is claiming there is "No Impact" from any of the alternatives in the EA, and that "Continued livestock use would not affect fire management, other than the continued reduction of some light fuels through livestock grazing."	See response to Comment 4. Fire plays a negligible role in the allotment. Any ignitions would likely be caused by lighting during the summer monsoon season (July and August). During the period of 1980-2013, only one fire was reported for the area, and it burned less than one acre. The potential for wildfire in this area is low given the open canopy and lack of ground fuels.
Comment 6: The EA fails to consider the direct and indirect impacts of livestock grazing on Bessie Spring. The presence of tamarisk on the site should be an indicator that the hydrologic regime has been interrupted. Would riparian vegetation be present if tamarisk were not? Are livestock impacting the ability of riparian species to establish? It appears from the photos in Appendix 3 that there is surface water and near-surface water dependent vegetation present at Bessie Spring. EA at 67. A hard look in the EA would have answered this question, but instead BLM dismisses the issue of impacts to wetlands/riparian zones as "Not Present."	This spring comes out of the ledge and runs down through the slick rock where it puddles and ponds up in various places before disappearing below ground. As stated on page 20 of this EA, there is no associated riparian-obligate vegetation other than a few tamarisk (see photos in Appendix 4). This is due to the hydrological characteristics of the site (e.g., lack of consistent water flow or stable water levels, both surface and subsurface; lack of substrate/soil on which riparian-obligate species can establish; and lack of vegetation or physical characteristics reflective of permanent surface or subsurface water influence) and not due to livestock grazing. Tamarisk can establish in areas with little substrate/soil due to its deep, extensive root system; the species has a primary root that grows with little branching until it reaches the water table, at which point secondary root branching is profuse. Native riparian species do not have such an extensive root system. In addition, tamarisk accumulates salt in special glands in its leaves, and then excretes it onto the leaf surface; foliage of tamarisk is often covered with a bloom of salt. These salts accumulate in the surface layer of soil when plants drop their leaves. As the surface soil becomes more saline over time, particularly in areas that are not subject to regular flooding and

Comment	Response
	scouring, germination and establishment of many native species become impaired (Zouhar 2003). All of these factors result in native riparian species being unable to establish at Bessie Spring.
Comment 7: [Are there additional riparian areas in the allotment? These should also be discussed/analyzed in the EA.] The map of the allotment in the EA shows two (and possibly three) undeveloped springs, but just Bessie Spring is discussed. (The reproduction of the map included in the EA makes it difficult to discern what symbols are used for "undeveloped spring," "water storage tank," and "wildlife drinker.")	There are no riparian areas or additional springs in the Kanab Gulch Allotment (the allotment map included in the preliminary EA has been corrected). This allotment is located on the Esplanade, an expansive and relatively flat plateau that is located several hundred feet above Kanab Creek.
Comment 8: The BLM's analysis of Alternative B pertaining to the effects on the permittee neglects the obvious solution of feeding the horses on private land. EA at 30. The agency is not required to provide forage based on the hardship to the permittees of "only" having the privilege of subsidized federal forage for certain periods each year.	Feeding the livestock currently grazing on the Kanab Gulch Allotment on private land is discussed in the EA – see Sections 4.1.2 and 4.1.3.
Comment 9: The EA only mentions how difficult it would be to find another compatible permit on federal lands. The EA should instead consider how the shortened season of use corresponds to weather patterns, climatic changes, seasonal migrations, and competition between livestock and native wildlife species.	Sections 4.3.2 and 4.4.2 discuss effects of a shortened season of grazing use within the Kanab Gulch Allotment on wildlife and threatened/endangered species; Sections 4.3.3 and 4.4.3 discuss the effects of no livestock grazing on wildlife and threatened/ endangered species. Sections 4.2.2 and 4.2.3 discuss the effects of a shortened season and no livestock grazing, respectively, on vegetation within the Kanab Gulch Allotment.
Comment 10: The EA does not disclose if the current permittee uses adjacent allotments or other BLM permits and how the current operation would affect those. The original LHE was conducted on this and the Gulch allotment, but it is not clear how these allotments are connected with each other. Any management overlap should be analyzed and disclosed in the EA.	The Gulch Allotment permittee is the same as the Kanab Gulch Allotment permittee. However, these two allotments are run separately with different livestock and numbers; when the animals leave the allotments, each herd goes to non-federal lands. Thus, management of these allotments is not connected and has no management overlap with other BLM-managed allotments.
Comment 11: The EA discusses goat use on shrubs. EA at 32. Are there goats on the Kanab Gulch allotment?	The mention of goats came from the literature cited in that section of the EA. No goats occur on the Kanab Gulch Allotment, so the reference to goats has been deleted.
Comment 12: The EA includes utilization data for key shrub species on the Kanab Gulch allotment. EA at 33. The EA does not include utilization data for grass species, which horses prefer, and the analysis of impacts to vegetation is limited to shrubs under each alternative.	Table 4 lists utilization on both key grasses and key shrubs. Sections 4.2.1, 4.2.2, and 4.2.3 do include a discussion on impacts to perennial grasses.

Comment	Response
Comment 13: The EA also does not include actual use data, which limits the meaningfulness of the statement, "One can therefore conclude that the current grazing operation is not affecting the health and vigor of shrub species in the Kanab Gulch Allotment." Id. Sure, but one doesn't know what the current grazing operation actually is and how it relates to what is proposed under each of the alternatives. Without information about how many AUM have actually been used in the years monitoring occurred, the claims about how status quo grazing relates to the proposed action are baseless. The EA contains one general summary of the range of actual use from 1995-2008 (EA at 22); shrub utilization was measured in 2004, 2009, 2011, 2012, 2013.	A table showing actual grazing use from 2001 to 2014 has been added to this EA.
Comment 14: The EA states that both key areas on the allotment are within bighorn sheep habitat. The EA also states, "The rugged and steep nature of bighorn habitat limits contact between sheep and livestock to a few areas within the allotment. The majority of habitat used by desert bighorn sheep in the allotment is essentially ungrazed due to its steep nature and resulting inaccessibility to livestock." So: a) Are the key areas in ungrazed-by-livestock portions of the allotment or in the few areas where habitat of bighorn sheep overlaps with livestock use? b) Is this representative of livestock use throughout the allotment? c) How do the key areas relate to livestock concentration areas? d) The EA doesn't explicitly identify the difference in terrains accessible to horses or cattle; did BLM consider the greater agility of horses to reach rugged areas?	a) The key areas are in representative areas used by livestock and are also utilized by wildlife, including bighorn sheep. b) The key areas do represent livestock (and wildlife) use throughout the allotment. c) This allotment really does not have any concentration areas since waters are scattered throughout the allotment (primarily in ephemeral pools found in rock pockets after precipitation events). d) The BLM considered the range that horses may access on the allotment. Since the proposed permit is for horse use, a comparison of horse versus cattle agility was not deemed necessary.
Comment 15: The EA also fails to discuss the non-forage impacts of the proposed action on bighorn sheep. As noted in the RMP, "Activities that adversely affect breeding, feeding, or sheltering activities of priority wildlife species may be modified, mitigated, or otherwise restricted to minimize disturbance to the species." RMP at 2-29. The EA doesn't even mention modifications or mitigation measures that would minimize disturbance, but simply reaffirms grazing practices that are already not allowing for the forage objectives to be met. This fails to conform to the RMP's direction.	The only non-forage impact that could occur as a result of the proposed action (and other alternatives) is the potential for horses to interfere with bighorn sheep use of waters on the allotment. As described in Section 4.3.1 of this EA, it is unknown whether the horses present on this allotment interfere with use of water by bighorn sheep – this has never been studied or documented. However, even if the horses do cause bighorn sheep to avoid particular waters, the season of use that would occur under this alternative is during the winter and early spring when water needs for bighorn sheep are not as critical, and there are numerous watering opportunities for both the livestock and bighorn sheep in the ephemeral pools of water in rock pockets scattered throughout the allotment. In addition to these pools, three wildlife catchments on the canyon rim (above/outside of this allotment) also provide sources of water for bighorn sheep but are inaccessible to livestock. Bighorn sheep also access water along Kanab Creek, one mile east of Bessie Spring on Forest Service

Comment	Response
	managed land that is not grazed and is not accessible to livestock due to topography and range fences. Thus, there are no anticipated conflicts between bighorn sheep and livestock for water in the Kanab Gulch Allotment.
Comment 16: The BLM contradicts the information in the Arizona Strip Desert Bighorn Management Plan regarding the effects of cattle on the springs of the allotment. EA at 39. The EA doesn't explain how the plan got this information so very wrong since the BLM is claiming here that livestock do not affect Bessie Spring. Id. The EA should contain an explanation of why the plan was so misinformed.	The Arizona Strip Desert Bighorn Sheep Management Plan (Bighorn Sheep Core Team 2011) states the following in regards to springs within the Kanab Creek Habitat Area: *"Permanent water flows south from Clearwater Spring for at least five miles. The major side canyons on both BLM and USFS lands are arid. Important springs in the area include Grama, Willow, and Water Canyon on BLM lands and Willow, Horse, Little, Sowats, JumpUp, Mountain Sheep, and Slide on the USFS lands. Springs located on BLM lands are impacted by cattle."* This is a general statement about springs across the habitat area – it is not specific to Bessie Spring. As explained in Table 6, Bessie Spring flows out of sandstone and water collects in a small slick rock basin; during dry periods, very little water accumulates. Due to the hydrologic characteristics of the site (e.g., lack of consistent water flow or stable water levels, both surface and subsurface; lack of substrate/soil on which riparian-obligate species can establish; and lack of vegetation or physical characteristics reflective of permanent surface or subsurface water influence), the area is not defined as a wetland/riparian area, and livestock are not affecting the spring.
Comment 17: The forage requirements for wildlife are not met except for grasses at Key Area #1 for bighorn. EA at 36, 38. Under the proposed action, there is no indication that forage composition will shift to something more favorable for the wildlife and BLM doesn't see the need to change grazing management under current monitoring data. Therefore, it would follow that the proposed action will cause the allotment to continue to fail to meet wildlife forage needs. This is unacceptable.	Section 4.3.1 discusses this issue in detail. In summary, long-term monitoring has indicated that the key areas are not capable of producing the forage objectives identified in the Arizona Strip Field Office RMP for bighorn sheep habitat or mule deer winter crucial habitat. For example, palatable shrub species at Key Area #1 are unlikely to increase more than the current 16% due to the amount of other deep rooted shrubs that are already present (total shrub/woody species composition is currently 47%). This is also the case at Key Area #2 – this key area contains mostly shrubs which are depressing the few grasses in the interspaces and grasses have given way to more shrubs over time, so a solid grass component does not exist at this site. Key Area #2 has shown a decrease in grasses and an increase in shrubs (primarily blackbrush, which has a strong and deep tap root that will help the plant maintain or increase under a dry climate regime); the frequency of grasses have been depressed by the shrubs which have increased. Due to the high composition of blackbrush – currently at 38% (which is not considered a palatable species for wildlife), it is unlikely that the composition of grasses or palatable shrubs will reach the RMP forage objective at this site (i.e., it is not within the site potential).
Comment 18: The EA says there are no range improvements on the allotment, but that water pockets in rocks throughout the allotment provide water for stock and wildlife. How does this work in low rainfall/snowfall years? Has the BLM considered the viability of these ephemeral water sources under predicted climate changes of warmer and drier conditions in the southwest?	The allotment has many drainages and slick rock pools that catch water from the rains or snowfall events and hold and retain that water is some cases for several days or even weeks at a time. This happens quite frequently during the winter months, whenever there is a precipitation event. It is impossible to predict future weather patterns and how the presence (or absence) of these water sources may be affected. To date, lack of water during the permitted grazing season has not been an issue.

Chapter 6

REFERENCES

Arizona Game and Fish Department (AGFD). 2002. *Falco peregrinus anatum* Peregrine falcon. Unpublished abstract compiled and edited by the Heritage Data Management System, Arizona Game and Fish Department, Phoenix, Arizona.

Arizona Game and Fish Department (AGFD). 2005. *Strix occidentalis lucida* Mexican spotted owl. Unpublished abstract compiled and edited by the Heritage Data Management System, Arizona Game and Fish Department, Phoenix, Arizona.

Arizona Game and Fish Department (AGFD). 2007. *Kanab Creek Desert Bighorn Sheep Supplemental Management Plan*. Written by Buck, T. and J. Sims. September 7, 2007.

Arizona Game and Fish Department (AGFD). 2014. Email from Luke Thompson, Field Supervisor – Arizona Strip, Flagstaff, Arizona.

Arizona Game and Fish Department and U.S. Department of the Interior, Bureau of Land Management (AGFD and BLM). 2010. *Arizona Strip Interdisciplinary Mule Deer Management Plan 2010-2014*. Written by: Thompson, L., R. Price, T. McCall, C. Hadley, T. Denniston, W. Bunting.

Arizona Game and Fish Department (AGFD). 2013. 12A/12BW Bighorn Hunt Recommendations 2013.

Bighorn Sheep Core Team. 2011. *Arizona Strip Desert Bighorn Sheep Management Plan, as Amended.* Prepared for the Bureau of Land Management, U.S. Forest Service and Arizona Game and Fish Department, 18 pp.

Bock, C.E., J.H. Bock, W.R. Kenney, and V.M. Hawthorne. 1984. Responses of birds, rodents, and vegetation to livestock exclosure in a semidesert grassland site. Journal of Range Management 37:239-242.

Bowden, T. S. 2009. Mexican spotted owl reproduction, home range, and habitat associations in Grand Canyon National Park. M.S. thesis. Montana State University. Bozeman. 87 pp.

Cameron, G.N. and D.G. Rainey. 1972. Habitat utilization by *Neotoma lepida* in the Mohave Desert. Journal of Mammalogy 53:251-266.

Desmond, M.J. and J.A. Savidge. 1996. Factors Influencing Burrowing Owl (*Speotyto cunicularia*) Nest Densities and Numbers in Western Nebraska. American Midland Naturalist 136(1):143-148.

Douglas, B.J. A.G. Thomas, and D.A. Derkson. 1990. Downy Brome *(Bromus tectorum*) Invasion into Southwestern Saskatchewan. Canadian Journal of Plant Science 70:1143-1151.

Eakle, W.L. and T.G. Grubb. 1986. Prey Remains from Golden Eagle Nests in Central Arizona. *Western Birds* 17:87-89.

Ganey, J.L., R.P. Balda, and R.M. King. 1993. Metabolic rate and evaporative water loss of Mexican spotted and great horned owls. Wilson Bull. 105:645-656.

Gitay, H. and Noble, I.R. 1997. What are plant functional types and how should we seek them? In: Smith, T.M., Shugart, H.H. and Woodward, F.I. (eds) *Plant Functional Types*. Cambridge niversity Press, Cambridge, pp. 3–19.

Haug, E.A., B.A. Millsamp, and M.S. Martell. 1993. Burrowing Owl (*Speotyto cunicularia*), in the Birds of North America (A. Poole and F. Gill, eds.), no. 61. In *Acad. Nat. Sci., Philadelphia*.

Hockenbary, C. 2011. Occupancy dynamics of Mexican spotted owls in the Canyonlands of Utah. M.S. Thesis. Montana State University.

Hoffmeister, D.F. 1986. The Mammals of Arizona. The University of Arizona Press. 602 pp.

Holechek, J.L. 1981. Livestock Grazing Impacts on Public Lands: A Viewpoint. Journal of Range Management 34(3): 251-254.

Hunter, Richard. 1991. Bromus Invasions on the Nevada Test Site: Present Status of *B. rubens* and *B. tectorum* with Notes on their Relationship to Disturbance and Altitude. Great Basin Naturalist 51(2): 176-182.

Loeser, M.R., T.D. Sisk, T.E. Crews. 2007. Impact of grazing intensity during drought in an Arizona grassland. Conservation Biology 21(1): 87-97.

MacCracken, J.G., D.W. Uresk, and R.M. Hansen. 1985. Vegetation and Soils of Burrowing Owl Nest Sites in Conata Basin, South Dakota. The Condor 87(1):152-154.

McIntyre, S. 1999. Plant functional types: recent history and current developments. In: Eldridge, D. and Freudenberger, D. (eds) *People of the Rangelands. Building the Future. Proceedings of the VI International Rangeland Congress.* VI International Rangeland Congress Inc., Townsville, Australia, pp. 891–893.

Ostermann-Kelm, S., E.R. Atwill, E.S. Rubin, M.C. Jorgensen, and W.M. Boyce. 2008. *Interactions between Feral Horses and Desert Bighorn Sheep at Water*. Journal of Mammalogy, Vol. 89, No. 2, pp. 459-466.

Papouchis, C.M., F.M. Singer, and W.B. Sloan. 2001. *Responses of Desert Bighorn Sheep to Increased Human Recreation*. Journal of Wildlife Management, 65:573-582.

Rinkevich, S.E. and R.J. Gutiérrez. 1996. Mexican spotted owl habitat characteristics in Zion National Park. Journal of Raptor Research 30(2):74-78.

Sheley, R. L. 1995. Integrated Rangeland Weed Management. *Rangelands* 17(6): 222-223.

Sprinkle, J., M. Holder, C. Erickson, A. Medina, D. Robinett, G. Ruyle, J/ Maynard, S. Tuttle, J. Hays Jr., W. Meyer, S. Stratton, A. Rogstad, K. Eldredge, J. Harris, L. Howery, W. Sprinkle.

2007. *Dutchman Butte Revisited – Examining Paradigms for Livestock Grazing Exclusion*. Society for Range Management: Vol. 29, No. 6, pp. 21-34.

Stones, R.C. and C.L. Hayward. 1968. Natural history of the desert woodrat, *Neotoma lepida*. American Midland Naturalist 80:458-476.

U.S. Department of Agriculture, Natural Resources Conservation Service (NRCS). 2013. National Soil Survey Handbook 430-VI-NSSH, Part 649.

U.S. Department of the Interior, Bureau of Land Management (BLM). 1997. *Arizona Standards for Rangeland Health and Guidelines for Grazing Administration*. United States Department of the Interior, Bureau of Land Management, Arizona State Office.

U.S. Department of the Interior, Bureau of Land Management (BLM). 1998. *Riparian Area Management – Process for Assessing Proper Functioning Condition*, Technical Reference 1737-9. Written by: Barrett, H., K. Gebhardt, J. Cagney, Dr. P. L. Hansen, R. Clark, B. Mitchell, J. Fogg, D. Tippy. Denver, CO. pp. 58.

U.S. Department of the Interior, Bureau of Land Management (BLM). 1999a. *Utilization Studies and Residual Measurements*, Technical Reference 1734-3. Written by: Coulloudon, B., K. Eshelman, J. Gianola, N. Habich, L. Hughes, C. Johnson, M. Pellant, P. Podborny, A. Rasmussen, B. Robles, P. Shaver, J. Spehar, J. Willoughby. Denver, CO. BLM/RS/ST-96/004+1730. pp. 174.

U.S. Department of the Interior, Bureau of Land Management (BLM). 1999b. *Sampling Vegetation Attributes*, Technical Reference 1734-4. Written by: Coulloudon, B., K. Eshelman, J. Gianola, N. Habich, L. Hughes, C. Johnson, M. Pellant, P. Podborny, A. Rasmussen, B. Robles, P. Shaver, J. Spehar, J. Willoughby. Denver, CO. BLM/RS/ST-96/002+1730. pp. 171.

U.S. Department of the Interior, Bureau of Land Management (BLM). 2001. *Ecological Site Inventory*, Technical Reference 1734-7. Written by: Habich, E.F. Denver, CO. BLM/ST/ST-01/003+1734. pp. 112.

U.S. Department of the Interior, Bureau of Land Management (BLM). 2005. *Interpreting Indicators of Rangeland Health, Version 4*, Technical Reference 1734-6. Written by: Pellant, M., P. Shaver, D. A. Pyke, and J. E. Herrick. Denver, CO. BLM/ST/ST-01/003+1734. pp. 112.

U.S. Department of the Interior, Bureau of Land Management (BLM. 2007b. *Proposed Resource Management Plan/Final EIS for the Arizona Strip Field Office, the Vermilion Cliffs National Monument, and the BLM Portion of the Grand Canyon-Parashant National Monument.* Bureau of Land Management, Arizona Strip Field Office.

U.S. Department of the Interior, Bureau of Land Management (BLM. 2007a. *Standards for Rangeland Health and Guidelines for Grazing Administration Implementation Project: Allotment Assessment for Kanab Gulch*. Bureau of Land Management, Arizona Strip Field Office.

U.S. Department of the Interior, Bureau of Land Management (BLM). 2008a. *Arizona Strip Field Office Resource Management Plan.* Bureau of Land Management, St. George, Utah.

U.S. Department of the Interior, Bureau of Land Management (BLM). 2008b. *National Environmental Policy Act.* BLM Handbook H-1790-1. Bureau of Land Management, Washington D.C.

U.S. Department of the Interior, Bureau of Land Management (BLM. 2011. *Northern Arizona Proposed Withdrawal Final Environmental Impact Statement.* Bureau of Land Management, Arizona Strip District, St. George, Utah.

U.S. Department of the Interior, Fish and Wildlife Service (USFWS). 1995. Recovery plan for the Mexican spotted owl (*Strix occidentalis lucida*).

U.S. Department of the Interior, Fish and Wildlife Service (USFWS). 2005. Designation of Critical Habitat for the Southwestern Willow Flycatcher (*Empidonax traillii extimus*). *Federal Register* 70:60886-61009.

U.S. Department of the Interior, Fish and Wildlife Service (USFWS). 2012. Recovery plan for the Mexican spotted owl, First Revision. Albuquerque, NM. 414 pp.

University of Idaho, Rangeland Center. 2011. Rangelands – An Introduction to Wild Open Spaces. Prepared in collaboration with the Idaho Rangeland Resource Commission. Moscow, Idaho. pp. 12.

Utah Board of Water Resources (UBWR). 2011. Lake Powell Draft Wildlife Resources Study Report. Accessed at: http://citizensfordixie.org/wp-content/uploads/2012/08/Big-Game.pdf. Accessed March 24, 2014.

Willey, D.W. 1993. Home range characteristics and juvenile dispersal ecology of Mexican spotted owls in southern Utah. Unpublished report, Utah Div. Wildl. Resources, Salt Lake City, Utah.

Willey, D. W. 1998. Movements and habitat utilization by Mexican spotted owls in the canyonlands of Utah. Dissertation, Northern Arizona University, Flagstaff, Arizona.

Willey, D.W. 2011. Field Surveys for Mexican Spotted Owls and their Habitat Within Canyons of the Arizona Strip Field Office and Grand Canyon-Parashant National Monument. Unpublished Report, 27 pp.

Willey, D.W. 2012. Field Surveys for Mexican Spotted Owls and their Habitat Within Canyons of the Arizona Strip Field Office and Grand Canyon-Parashant National Monument. Unpublished Report, 22 pp.

Willey, D.W. and D.B. Spotskey. 2000. Field test of a landscape model for Mexican spotted owl breeding habitat in northern Arizona. Arizona Game and Fish Dept.-Heritage Grant Program, Phoenix, Arizona. 22 pp.

Willey, D. W. and C. van Riper III. 1998. Ecology of Mexican spotted owls (*Strix occidentalis lucida*) in the canyonlands of southern Utah and potential relationships to the GSENM. Pages

219-228 *in:* Learning from the past: Grand Staircase – Escalante National Monument Science Symposium Proceedings. USDI Bureau of Land Management. Grand staircase – Escalante National Monument, Kanab, Utah.

Willey, D.W. and R.V. Ward. 2003. Mexican spotted owl distribution and habitat within Grand Canyon National Park. Report, 7 pp.

Willey, D.W. and H.C. Willey. 2010. Ecology of small mammals within spotted owl nest areas in Grand Staircase-Escalante National Monument. In Learning from the Land: Biology and Wildlife pp. 443-460.

Young, J.A. and C.D. Clements. 2007. Cheatgrass and Grazing Rangelands. *Rangelands* 29(6):15-20.

Young, J.A. and R.A. Evans. 1978. Population Dynamics After Wildfires in Sagebrush Grasslands. *Journal of Range Management*, Vol. 31, No. 4:283-289.

Zouhar, K. 2003. Tamarix spp. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available at: http://www.fs.fed.us/database/feis/plants/tree/tamspp/all.html. Accessed April 28, 2014.

Chapter 7

APPENDICES

Appendix 1 – Arizona Standards for Rangeland Health and Guidelines for Grazing Administration

Appendix 2 – Allotment Map

Appendix 3 – Wildlife Data

Appendix 4 – Photos of Bessie Spring

Appendix 5 – Kanab Gulch Land Health Evaluation Update

Appendix 6 – Precipitation Data for Big Jackson Rain Gauge

Appendix 1

ARIZONA STANDARDS FOR RANGELAND HEALTH AND GUIDELINES FOR GRAZING ADMINISTRATION

INTRODUCTION

The Department of the Interior's final rule for Grazing Administration, issued on February 22, 1995, and effective August 21, 1995, requires that Bureau of Land Management (BLM) State Directors develop State or regional standards and guidelines for grazing administration in consultation with BLM Resource Advisory Councils (RAC), other agencies and the public. The final rule provides that fallback standards and guidelines be implemented, if State standards and guidelines are not developed by February 12, 1997. Arizona Standards and Guidelines and the final rule apply to grazing administration on public lands as indicated by the following quotation from the Federal Register, Volume 60, Number 35, page 9955.

> "The fundamentals of rangeland health, guiding principles for standards and the fallback standards address ecological components that are affected by all uses of public rangelands, not just livestock grazing. However, the scope of this final rule, and therefore the fundamentals of rangeland health of §4180.1, and the standards and guidelines to be made effective under §4180.2, are limited to grazing administration."

Although the process of developing standards and guidelines applies to grazing administration, present rangeland health is the result of the interaction of many factors in addition to grazing by livestock. Other contributing factors may include, but are not limited to, past land uses, land use restrictions, recreation, wildlife, rights-of-way, wild horses and burros, mining, fire, weather, and insects and disease.

With the commitment of BLM to ecosystem and interdisciplinary resource management, the standards for rangeland health as developed in this current process will be incorporated into management goals and objectives. The standards and guidelines for rangeland health for grazing administration, however, are not the only considerations in resolving resource issues.

The following quotations from the Federal Register, Vol. 60, No. 35, page 9956, February 22, 1995, describe the purpose of standards and guidelines and their implementation:

> "The guiding principles for standards and guidelines require that State or regional standards and guidelines address the basic components of healthy rangelands. The Department believes that by implementing grazing-related actions that are consistent with the fundamentals of §4180.1 and the guiding principles of §4180.2, the long-term health of public rangelands can be ensured.
>
> "Standards and guidelines will be implemented through terms and conditions of grazing permits, leases, and other authorizations, grazing-related portions of activity plans (including Allotment Management Plans), and through range improvement-related activities.
> "The Department anticipates that in most cases the standards and guidelines themselves will not be terms and conditions of various authorizations but that the terms and conditions will reflect the standards and guidelines.
>
> "The Department intends that assessments and corrective actions will be undertaken in priority order as determined by BLM.

"The Department will use a variety of data including monitoring records, assessments, and knowledge of the locale to assist in making the "significant progress" determination. It is anticipated that in many cases it will take numerous grazing seasons to determine direction and magnitude of trend. However, actions will be taken to establish significant progress toward conformance as soon as sufficient data are available to make informed changes in grazing practices."

FUNDAMENTALS AND DEFINITION OF RANGELAND HEALTH

The Grazing Administration Regulations, at §4180.1 (43 Code of Federal Regulation [CFR] 4180.1), Federal Register Vol. 60, No. 35, pg. 9970, direct that the authorized officer ensures that the following conditions of rangeland health exist:

> (a) Watersheds are in, or are making significant progress toward, properly functioning physical condition, including their upland, riparian-wetland, and aquatic components; soil and plant conditions support infiltration, soil moisture storage, and the release of water that are in balance with climate and landform and maintain or improve water quality, water quantity, and timing and duration of flow.
>
> (b) Ecological processes, including the hydrologic cycle, nutrient cycle, and energy flow, are maintained, or there is significant progress toward their attainment, in order to support healthy biotic populations and communities.
>
> (c) Water quality complies with State water quality standards and achieves, or is making significant progress toward achieving, established BLM management objectives such as meeting wildlife needs.
>
> (d) Habitats are, or are making significant progress toward being, restored or maintained for Federal threatened and endangered species, Federal Proposed, Category 1 and 2 Federal candidate and other special status species.

These fundamentals focus on sustaining productivity of a rangeland rather than its uses. Emphasizing the physical and biological functioning of ecosystems to determine rangeland health is consistent with the definition of rangeland health as proposed by the Committee on Rangeland Classification, Board of Agriculture, National Research Council (Rangeland Health, 1994, pg. 4 and 5). This Committee defined Rangeland Health ". . .as the degree to which the integrity of the soil and the ecological processes of rangeland ecosystems are sustained." This committee emphasized ". . .the degree of integrity of the soil and ecological processes that are most important in sustaining the capacity of rangelands to satisfy values and produce commodities." The Committee also recommended that "The determination of whether a rangeland is healthy, at risk, or unhealthy should be based on the evaluation of three criteria: degree of soil stability and watershed function, integrity of nutrient cycles and energy flow, and presence of functioning mechanisms" (Rangeland Health, 1994, pg. 97-98).

Standards describe conditions necessary to encourage proper functioning of ecological processes on specific ecological sites. An ecological site is the logical and practical ecosystem unit upon which to base an interpretation of rangeland health. Ecological site is defined as:

". . . a kind of land with specific physical characteristics which differs from other kinds of land in its ability to produce distinctive kinds and amounts of vegetation and in its response to management" (Journal of Range Management, 48:279, 1995). Ecological sites result from the interaction of climate, soils, and landform (slope, topographic position). The importance of this concept is that the "health" of different kinds of rangeland must be judged by standards specific to the potential of the ecological site. Acceptable erosion

rates, water quality, productivity of plants and animals, and other features are different on each ecological site.

Since there is wide variation of ecological sites in Arizona, standards and guidelines covering these sites must be general. To make standards and guidelines too specific would reduce the ability of BLM and interested publics to select specific objectives, monitoring strategies, and grazing permit terms and conditions appropriate to specific land forms.

Ecological sites have the potential to support several different plant communities. Existing communities are the result of the combination of historical and recent uses and natural events. Management actions may be used to modify plant communities on a site. The desired plant community for a site is defined as follows: "Of the several plant communities that may occupy a site, the one that has been identified through a management plan to best meet the plan's objectives for the site. It must protect the site as a minimum." (Journal of Range Management, 48:279, 1995.)

Fundamentals (a) and (b) define physical and biological components of rangeland health and are consistent with the definition of rangeland health as defined by the Committee on Rangeland Classification, Board on Agriculture, National Research Council, as discussed in the paragraph above. These fundamentals provide the basis for sustainable rangelands.

Fundamentals (c) and (d) emphasize compliance with existing laws and regulation and, therefore, define social and political components of rangeland health. Compliance with Fundamentals (c) and (d) is accomplished by managing to attain a specific plant community and associated wildlife species present on ecological sites. These desired plant communities are determined in the BLM planning process, or, where the desired plant community is not identified, a community may be selected that will meet the conditions of Fundamentals (a) and (b) and also adhere to laws and regulations. Arizona Standard 3 is written to comply with Fundamentals (c) and (d) and provide a logical combination of Standards and Guidelines for planning and management purposes.

STANDARD AND GUIDELINE DEFINITIONS

Standards are goals for the desired condition of the biological and physical components and characteristics of rangelands. Standards:

(1) are measurable and attainable; and
(2) comply with various Federal and State statutes, policies, and directives applicable to BLM Rangelands.

Guidelines are management approaches, methods, and practices that are intended to achieve a standard. Guidelines:

(1) typically identify and prescribe methods of influencing or controlling specific public land uses;
(2) are developed and applied consistent with the desired condition and within site capability; and
(3) may be adjusted over time.

IMPLEMENTING STANDARDS AND GUIDELINES

The authorized officer will review existing permitted livestock use, allotment management plans, or other activity plans which identify terms and conditions for management on public land. Existing management practices, and levels of use on grazing allotments will be reviewed and evaluated on a priority basis to determine if they meet, or are making significant progress toward meeting, the standards and are in conformance with the guidelines. The review will be interdisciplinary and conducted under existing rules which provide for cooperation, coordination, and consultation with affected individuals, federal, state, and local agencies, tribal governments, private landowners, and interested publics.

This review will use a variety of data, including monitoring records, assessments, and knowledge of the locale to assist in making the significant progress determination. Significance will be determined on a case by case basis, considering site potential, site condition, weather and financial commitment. It is anticipated there will be cases where numerous years will be needed to determine direction and magnitude of trend.

Upon completion of review, the authorized officer shall take appropriate action as soon as practicable but no later than the start of the next grazing year upon determining that the existing grazing management practices or level of use on public land are significant factors contributing to failure to achieve the standards and conform with the guidelines that are made effective under 43 CFR 4180.2. Appropriate action means implementing actions that will result in significant progress toward fulfillment of the standards and significant progress toward conformance with guidelines.

Livestock grazing will continue where significant progress toward meeting standards is being made. Additional activities and practices would not be needed on such allotments. Where new activities or practices are required to assure significant progress toward meeting standards, livestock grazing use can continue contingent upon determinations from monitoring data that the implemented actions are effective in making significant progress toward meeting the standards. In some cases, additional action may be needed as determined by monitoring data over time.

New plans will incorporate an interdisciplinary team approach (Arizona BLM Interdisciplinary Resource Management Handbook, April 1995). The terms and conditions for permitted grazing in these areas will be developed to comply with the goals and objectives of these plans which will be consistent with the standards and guidelines.

ARIZONA STANDARDS AND GUIDELINES

Arizona Standards and Guidelines (S&G) for grazing administration have been developed through a collaborative process involving the Bureau of Land Management State S&G Team and the Arizona Resource Advisory Council. Together, through meetings, conference calls, correspondence, and Open Houses with the public, the BLM State Team and RAC prepared Standards and Guidelines to address the minimum requirements outlined in the grazing regulations. The Standards and Guidelines, criteria for meeting Standards, and indicators are an integrated document that conforms to the fundamentals of rangeland health and the requirements of the regulations when taken as a whole.

Upland sites, riparian-wetland areas, and desired resource conditions are each addressed by a standard and associated guidelines.

Standard 1: Upland Sites

Upland soils exhibit infiltration, permeability, and erosion rates that are appropriate to soil type, climate and landform (ecological site).

Criteria for meeting Standard 1:

Soil conditions support proper functioning of hydrologic, energy, and nutrient cycles. Many factors interact to maintain stable soils and healthy soil conditions, including appropriate amounts of vegetative cover, litter, and soil porosity and organic matter. Under proper functioning conditions, rates of soil loss and infiltration are consistent with the potential of the site.

Ground cover in the form of plants, litter or rock is present in pattern, kind, and amount sufficient to prevent accelerated erosion for the ecological site; or ground cover is increasing as determined by monitoring over an established period of time.

Signs of accelerated erosion are minimal or diminishing for the ecological site as determined by monitoring over an established period of time.

As indicated by such factors as:

Ground Cover
- litter
- live vegetation, amount and type (e.g., grass, shrubs, trees, etc.)
- rock

Signs of erosion
- flow pattern
- gullies
- rills
- plant pedestaling

Exceptions and exemptions (where applicable):

none

Guidelines:

1-1. Management activities will maintain or promote ground cover that will provide for infiltration, permeability, soil moisture storage, and soil stability appropriate for the ecological sites within management units. The ground cover should maintain soil organisms and plants and animals to support the hydrologic and nutrient cycles, and energy flow. Ground cover and signs of erosion are surrogate measures for hydrologic and nutrient cycles and energy flow.

1-2. When grazing practices alone are not likely to restore areas of low infiltration or permeability, land management treatments may be designed and implemented to attain improvement.

Standard 2: Riparian-Wetland Sites

Riparian-wetland areas are in properly functioning condition.

Criteria for meeting Standard 2:

Stream channel morphology and functions are appropriate for proper functioning condition for existing climate, landform, and channel reach characteristics. Riparian-wetland areas are functioning properly when adequate vegetation, land form, or large woody debris is present to dissipate stream energy associated with high water flows.

Riparian-wetland functioning condition assessments are based on examination of hydrologic, vegetative, soil and erosion-deposition factors. BLM has developed a standard checklist to address these factors and make functional assessments. Riparian-wetland areas are functioning properly as indicated by the results of the application of the appropriate checklist.

The checklist for riparian areas is in Technical Reference 1737-9 "Process for Assessing Proper Functioning Condition." The checklist for wetlands is in Technical Reference 1737-11 "Process for Assessing Proper Functioning Condition for Lentic Riparian-Wetland Areas."

As indicated by such factors as:

Gradient
Width/depth ratio

Channel roughness and sinuosity of stream channel
Bank stabilization
Reduced erosion
Captured sediment
Ground-water recharge
Dissipation of energy by vegetation

Exceptions and exemptions (where applicable):

Dirt tanks, wells, and other water facilities constructed or placed at a location for the purpose of providing water for livestock and/or wildlife and which have not been determined through local planning efforts to provide for riparian or wetland habitat are exempt.

Water impoundments permitted for construction, mining, or other similar activities are exempt.

Guidelines:

2-1. Management practices maintain or promote sufficient vegetation to maintain, improve or restore riparian-wetland functions of energy dissipation, sediment capture, groundwater recharge and stream bank stability, thus promoting stream channel morphology (e.g., gradient, width/depth ratio, channel roughness and sinuosity) and functions appropriate to climate and landform.
2-2. New facilities are located away from riparian-wetland areas if they conflict with achieving or maintaining riparian-wetland function. Existing facilities are used in a way that does not conflict with riparian-wetland functions or are relocated or modified when incompatible with riparian-wetland functions.

2-3. The development of springs and seeps or other projects affecting water and associated resources shall be designed to protect ecological functions and processes.

Standard 3: Desired Resource Conditions

Productive and diverse upland and riparian-wetland plant communities of native species exist and are maintained.

Criteria for meeting Standard 3:

Upland and riparian-wetland plant communities meet desired plant community objectives. Plant community objectives are determined with consideration for all multiple uses. Objectives also address native species, and the requirements of the Taylor Grazing Act, Federal Land Policy and Management Act, Endangered Species Act, Clean Water Act, and appropriate laws, regulations, and policies.

Desired plant community objectives will be developed to assure that soil conditions and ecosystem function described in Standards 1 and 2 are met. They detail a site-specific plant community, which when obtained, will assure rangeland health, State water quality standards, and habitat for endangered, threatened, and sensitive species. Thus, desired plant community objectives will be used as an indicator of ecosystem function and rangeland health.

As indicated by such factors as:

Composition
Structure
Distribution

Exceptions and exemptions (where applicable):

Ecological sites or stream reaches on which a change in existing vegetation is physically, biologically, or economically impractical.

Guidelines:

3-1. The use and perpetuation of native species will be emphasized. However, when restoring or rehabilitating disturbed or degraded rangelands, non-intrusive, non-native plant species are appropriate for use where native species (a) are not available, (b) are not economically feasible, (c) cannot achieve ecological objectives as well as non-native species, and/or (d) cannot compete with already established non-native species.

3-2. Conservation of Federal threatened or endangered, proposed, candidate, and other special status species is promoted by the maintenance or restoration of their habitats.

3-3. Management practices maintain, restore, or enhance water quality in conformance with State or Federal standards.

3-4. Intensity, season and frequency of use, and distribution of grazing use should provide for growth and reproduction of those plant species needed to reach desired plant community objectives.

3-5. Grazing on designated ephemeral (annual and perennial) rangeland may be authorized if the following conditions are met:

ephemeral vegetation is present in draws, washes, and under shrubs and has grown to useable levels at the time grazing begins;

sufficient surface and subsurface soil moisture exists for continued plant growth;

serviceable waters are capable of providing for proper grazing distribution;

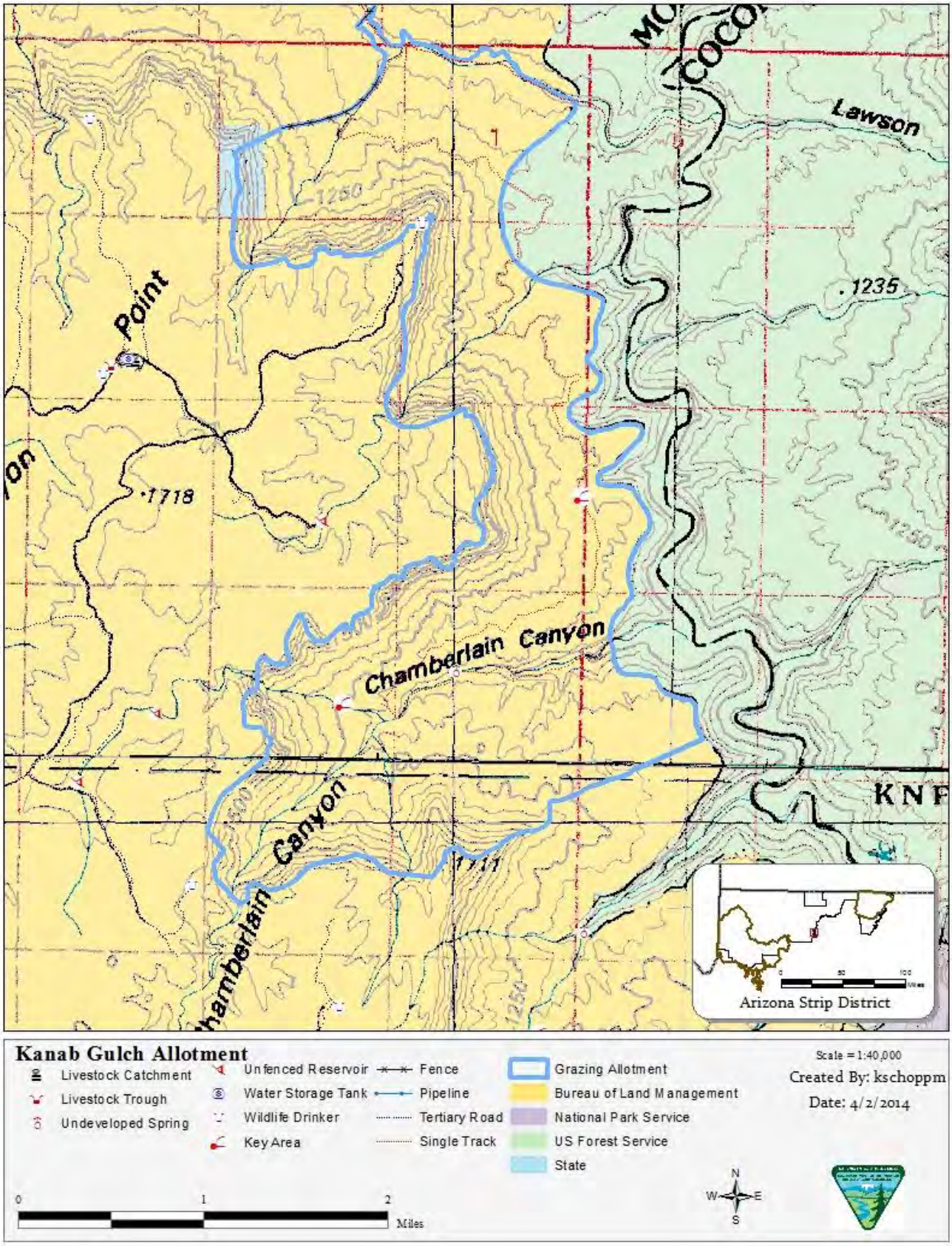
sufficient annual vegetation will remain on site to satisfy other resource concerns, (i.e., watershed, wildlife, wild horses and burros); and

monitoring is conducted during grazing to determine if objectives are being met.

3-6. Management practices will target those populations of noxious weeds which can be controlled or eliminated by approved methods.

3-7. Management practices to achieve desired plant communities will consider protection and conservation of known cultural resources, including historical sites, and prehistoric sites and plants of significance to Native American peoples.

Appendix 2


Lawson
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Chamberlain Canyon
Chamberlain Canyon
Arizona Strip District
Kanab Gulch Allotment
Livestock Catchment
Livestock Trough
Undeveloped Spring
Unfenced Reservoir
Water Storage Tank
Wildlife Drinker
Key Area
Fence
Pipeline
Tertiary Road
Single Track
Grazing Allotment
Bureau of Land Management
National Park Service
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Appendix 3

Arizona Game & Fish Unit 13A Mule Deer Population Counts			
Year	**Number of Animals Surveyed**	**Bucks / 100 does**	**Fawns / 100 does**
1989	86	52	39
1990	44	10	27
1991	15	29	57
1992	Insufficient Data		-
1993	9	0	13
1994	43	42	84
1995	51	29	35
1996	55	42	69
1997	No Survey		-
1998	59	8	44
1999	108	23	31
2000	170	27	33
2001	165	36	68
2002	57	28	50
2003	148	39	59
2004	140	40	75
2005	136	38	84
2006	230	43	61
2007	145	54	38
2008*	97	50	42
2009*	68	14	70
2010	125	33	48
2011	243	39	78
2012	113	31	104
2013	182	38	99

Arizona Game & Fish Unit 13A Desert Bighorn Sheep Population Counts								Population Estimate
Year	**Total Rams**	**Ewes**	**Lambs**	**Yearling Male**	**Yearling Female**	**Unclassified**	**Total**	
2006	25	38	4	0	5	0	72	174
2007	36	93	17	14		0	160	192
2008	34	44	8	0	0	0	86	136
2009	No surveys conducted							
2010	No surveys conducted							
2011	34	87	18	9		0	113	148

* Surveys were minimal in 2008 and 2009 due to AGFD wildlife manager position in this unit being vacant.

Appendix 4

Bessie Spring (in Chamberlain Canyon) – May 2010

Kanab Creek Wilderness (Kanab Gulch Allotment), Arizona

Appendix 5

Land Health Evaluation Update for the Kanab Gulch Allotment - #5224

The Kanab Gulch Allotment land health evaluation was completed on January 19, 2007. That evaluation determined all applicable standards for rangeland health on the allotment were being met. This update constitutes a re-evaluation of the 2007 assessment determination by considering and analyzing new monitoring data.

DPC Objectives

The DPC objectives for the allotment have been revised based upon a more accurate description of the ecological site guides for the key areas – it has been determined that the ecological site for both key areas is Breaks 10-14" p.z. The DPCs have also been revised to reflect functional groups rather than specific plant species. Plant functional types are sets of plants exhibiting similar responses to environmental conditions and having similar effects on the dominant ecosystem processes (Gitay and Noble, 1997). It is very difficult to manage large areas (such as a grazing allotment) for specific species because variations within such a large area can be quite dramatic (even within a single ecological site). By contrast, managing by functional groups allows range managers to study patterns of vegetation responses from plant groups that have similar life history strategies and responses to environmental stress and disturbance (McIntyre, 1999), which is more useful on the allotment scale.

The revised DPCs for the Kanab Gulch Allotment are:

Key Area#1 (Breaks 10"-14" p.z.)
- Maintain the perennial grass composition between 15-40%.
- Maintain the shrub/browse composition between 25-45%.
- Maintain the forb composition between 1-10%.

Ecological Condition: 60% similar to PNC (Late Seral)

Key Area#2 (Breaks 10"-14" p.z.)
- Maintain the perennial grass composition between 2-10%.
- Maintain the shrub/browse composition between 25-45%.
- Maintain the forb composition between 1-10%.

Ecological Condition: 52% similar to PNC (Late Seral)

Rationale for these objectives: DPC objectives were developed that would ensure the biodiversity, health, and sustainability of wildlife species indigenous to this area; protection of ecological functions (including hydrological processes); and sustainability of diverse vegetative communities. These objectives are set according to the ecological site guide (developed by the NRCS) – to determine what was within the site potential for each key area – and the current composition at

each site. It should be noted that the site guides are just that ("guides"). Long-term monitoring indicates what a particular site is actually capable of producing. For example, although both key areas in the allotment are in the Breaks 10-14" p.z., and the site guide predicts 5-10% cover in trees, none exist at either key area. In addition, long-term monitoring has shown that Key Area #2 is a shrub-dominated site (current composition of shrubs is 92%, versus the 20-40% predicted by the site guide) that is not capable of producing a high grass composition such as occurs at Key Area #1. These DPC objectives therefore reflect the actual potentials of the sites.

The Arizona Strip Field Office RMP identifies forage objectives for bighorn sheep habitat (at least 20% grasses, 20% forbs, and 20% palatable shrubs) and mule deer winter crucial habitat (at least 30% palatable shrubs), where consistent with site potential. As described above, long-term monitoring of the Kanab Gulch Allotment has shown that the key areas do not have the potential to meet these objectives (with the exception of grasses at Key Area #1).

The objectives were created with a "range" to account for fluctuations in plant populations due to factors such as drought and wet periods; this range also represents an achievable percentage given the ecological site guide potentials. It was determined that the DPC objectives identified above would result in healthy and diverse plant communities, which in turn would provide for the habitat needs (both forage and cover) of wildlife, protection for soils and hydrologic functions, and forage for livestock. While DPCs were established for forbs, it should be noted that their composition is highly variable and is influenced by spring and summer precipitation.

Monitoring

Trend monitoring data collected in 2011 is intended to supplement existing data found in the 2007 assessment. This new monitoring data is summarized below.

A field inspection, compliance and monitoring trip to the Kanab Gulch Allotment was made by David O. Johnson (permittee), Whit Bunting (Range Team Lead), Kevin Schoppmann (Rangeland Management Specialist) and Rokelle Reeve (Monitoring Research Technician) on May 24, 2011. Observations and data collected from the trip to Kanab Gulch Allotment indicates that winter use by horses has resulted in widely dispersed grazing. The snow and water pockets provide good distribution throughout the allotment. Utilization at both key areas has been slight or light and the general appearance of the forage and range conditions look very good.

Two key areas were read for Pace-Frequency, trend and dry weight rank (DWR). Frequency at Key Area #1 increased from 53% to 79% composition of key species; percent live basal vegetative cover is 7%. Based on the frequency data, trend is upward at Key Area #1. Key area #2 key species have been declining. The frequency of key species decreased from 90 in 1982 to 25 in 2011. However, this is a shrub dominated site with black brush and cactus being the dominant species and good ground cover present, while the grass and key species present are struggling to remain, especially as the drought intensified. In the early 1980s when this key area was established, the site was receiving 12 to 16 inches of rain per year, whereas much of the 2000s received 7 to 9 inches. The shrubs are continuing to increase into a dense stand, thus crowding out the key species. Utilization data at Key Area #2 shows slight to very light use by livestock.

The Kanab Gulch Allotment would be managed to achieve the DPC (desired plant community) objectives listed above. This allotment evaluation update lists and evaluates achievement of the allotment's DPC objectives.

Table A-1. Desired Plant Community Objectives Determination

Key Area #1 **Ecological site: Breaks 10"-14" p.z.**			
Plant Group (or Ground Cover)	**Current Composition**	**Desired Plant Composition**	**Objective Met or Not Met**
Perennial Grass	49%	15-40%	Met (exceeds)
Galleta	1%		
Needle-n-thread	9%		
Desert needlegrass	4%		
Three-awn	trace		
Black grama	24%		
Slim tridens	11%		
Shrubs / Browse	47%	25-45%	Met (exceeds)
Fourwing saltbush	4%		
Blackbrush	5%		
Hedgehog cactus	1%		
Button brittlebush	1%		
Mormon tea	12%		
Snakeweed	13%		
Prickly pear	9%		
Purple sage	1%		
Yucca	1%		
Forbs	4%	1-10%	Met
Key Area #2 **Ecological site: Breaks 10"-14" p.z.**			
Perennial Grass	5%	2-10%	Met
Black grama	3%		
Sand dropseed	1%		
Low woollygrass	1%		
Shrubs / Browse	92%	25-45%	Met (exceeds)
Blackbrush	38%		
Hedgehog cactus	1%		
Button brittlebush	4%		
Mormon tea	16%		
Snakeweed	1%		
Prickly pear	25%		
Yucca	9%		
Forbs	4%	1-10%	Met

Standard 1 (Upland Sites)

If Standard 1 is achieved, the health of the rangelands is not at risk (i.e., the rangelands do not show signs of accelerated soil erosion by wind or water).

If Standard 1 is not achieved, the health of the ecological site is at risk because of clear evidence of soil loss and hydrological function. Ground cover and signs of erosion are surrogate measures for hydrologic function, nutrient cycles, and energy flow. At risk rangelands show evidence of soil movement and there is clear evidence of soil degradation and transport of nutrients, water, and organic matter off the site.

X Meeting the Standard.

Rationale:

This means that the watershed units currently are in satisfactory erosion condition but susceptible to wind and water erosion following disturbance. In addition, these soils have a low productivity rate, can be susceptible to compaction, and are moderately alkaline due to the slight leaching of salts.

Ground cover was measured at both key areas; plants, litter, and rock are present in pattern, kind, and amount sufficient to prevent accelerated erosion. At Key Area #1 the ground cover increased from the base year. Ground cover at Key Area 2 is slightly downward. Ground cover data collected (1982 to 2011) compared to similar years from a key area located within an area noted to be the "Type" (reference area) for the Breaks 10-14" ecological site showed similar results. Based on this comparison, the amount of ground cover is appropriate at each study site. Ecological status data indicates both key areas are in late seral stage. The determination for both key areas is that they are functioning properly and meeting Standard #1.

Standard 2 (Riparian-Wetland Sites)

There are no riparian/wetland areas on federal lands within the Kanab Gulch Allotment.

Standard 3 (Desired Resource Conditions)

If Standard 3 is achieved, ecological sites contain productive and diverse communities of native species, resulting in proper ecosystem function. Under Standard 3, when Desired Plant Community (DPC) objectives for wildlife habitat are being achieved, the site is producing desirable forage, cover and soil protection. For wildlife this means "healthy" rangeland should provide the necessary food and cover to sustain the species.

If Standard 3 is not achieved, the soil conditions and ecosystem function described in Standard 1 are at risk and may not be providing forage and habitat for threatened, endangered and sensitive wildlife species.

X Meeting the Standard at Key Areas 1 and 2

Rationale:

BLM's determined that the area was meeting Standard #2 for rangeland health. The plant composition was such that it met the desired plant community objectives.

At Key Area #2, relative criteria for meeting standards, and indicators of rangeland health, resulted in a recommendation that the area was partially meeting Standard #3, because of the low composition of grasses. Long-term monitoring has shown that Key Area #2 is a shrub-dominated site that is not capable of producing a high grass composition such as occurs at Key Area #1. The low grass composition at the key area was not of great concern due to the natural variation that occurs across the same ecological site. – based on the complete ecological site inventory the group agreed that when looking at the entire Breaks 10-14" site across the allotment, Standard #3 would be met.

Summary:

After considering all available data, the interdisciplinary assessment team (composed of various resource specialists – including rangeland management specialists, wildlife biologist, and soil scientist) is recommending that the Kanab Gulch Allotment meets all applicable standards for rangeland health.

Appendix 6

Historical Precipitation Report

Field Office 100 **Rain Gauge Name:** Big Jackson **Rain Gauge Number:** 04

	Seasonal Precipitation Amounts					Annual Average					Percent of Normal				
Year	Fall	Winter	Spring	Summer	Annual	Fall	Winter	Spring	Summer	Annual	Fall	Winter	Spring	Summer	Annual
1977	0.90	0.80	1.94	2.10	5.74	1.82	2.90	2.24	4.81	11.76	49%	28%	87%	44%	49%
1978	1.04	5.84	4.25	1.34	12.47	1.82	2.90	2.24	4.81	11.76	57%	202%	190%	28%	106%
1979	5.19	5.99	3.72	1.66	16.56	1.82	2.90	2.24	4.81	11.76	285%	207%	166%	35%	141%
1980	1.15	6.08	4.25	2.87	14.35	1.82	2.90	2.24	4.81	11.76	63%	210%	190%	60%	122%
1981	1.65	1.45	3.36	9.52	15.98	1.82	2.90	2.24	4.81	11.76	91%	50%	150%	198%	136%
1982	3.05	3.01	2.23	6.30	14.59	1.82	2.90	2.24	4.81	11.76	168%	104%	100%	131%	124%
1983	3.19	2.61	3.24	6.80	15.84	1.82	2.90	2.24	4.81	11.76	175%	90%	145%	141%	135%
1984	3.14	1.23	0.42	7.93	12.72	1.82	2.90	2.24	4.81	11.76	173%	42%	19%	165%	108%
1985	1.60	3.61	2.56	3.34	11.11	1.82	2.90	2.24	4.81	11.76	88%	125%	114%	69%	94%
1986	3.21	1.06	3.31	4.60	12.18	1.82	2.90	2.24	4.81	11.76	176%	37%	148%	96%	104%
1987		2.20	2.41	4.58		1.82	2.90	2.24	4.81	11.76		76%	108%	95%	
1988	4.15	1.39	4.37	2.55	12.46	1.82	2.90	2.24	4.81	11.76	228%	48%	195%	53%	106%
1989	0.47	2.35	0.92	1.79	5.53	1.82	2.90	2.24	4.81	11.76	26%	81%	41%	37%	47%
1990	0.46	1.38	2.05	8.05	11.94	1.82	2.90	2.24	4.81	11.76	25%	48%	92%	167%	102%
1991	0.46	2.75	1.95	2.03	7.19	1.82	2.90	2.24	4.81	11.76	25%	95%	87%	42%	61%
1992	0.81	2.92	6.84	7.10	17.67	1.82	2.90	2.24	4.81	11.76	45%	101%	305%	148%	150%
1993	1.30	7.65	1.95	2.35	13.25	1.82	2.90	2.24	4.81	11.76	71%	264%	87%	49%	113%
1994	2.00	1.95	2.05	2.70	8.70	1.82	2.90	2.24	4.81	11.76	110%	67%	92%	56%	74%
1995	1.81	5.19	4.19	6.69	17.88	1.82	2.90	2.24	4.81	11.76	100%	179%	187%	139%	152%
1996	0.81	3.13	0.44	3.37	7.75	1.82	2.90	2.24	4.81	11.76	45%	108%	20%	70%	66%
1997	1.00	2.50	2.13	9.06	14.69	1.82	2.90	2.24	4.81	11.76	55%	86%	95%	188%	125%
1998	1.13	2.18	2.69	8.63	14.63	1.82	2.90	2.24	4.81	11.76	62%	75%	120%	180%	124%
1999	2.13	1.64	2.00	5.23	11.00	1.82	2.90	2.24	4.81	11.76	117%	57%	89%	109%	94%
2000	0.10	1.53	1.47	4.90	8.00	1.82	2.90	2.24	4.81	11.76	5%	53%	66%	102%	68%
2001	3.88	2.62	2.00	5.00	13.50	1.82	2.90	2.24	4.81	11.76	213%	90%	89%	104%	115%
2002	0.38	1.50	0.25	1.87	4.00	1.82	2.90	2.24	4.81	11.76	21%	52%	11%	39%	34%
2003	1.13	2.12	1.38	4.37	9.00	1.82	2.90	2.24	4.81	11.76	62%	73%	62%	91%	77%
2004	1.00	2.81	1.57	4.52	9.90	1.82	2.90	2.24	4.81	11.76	55%	97%	70%	94%	84%
2005	6.10	6.65	2.75	4.00	19.50	1.82	2.90	2.24	4.81	11.76	335%	230%	123%	83%	166%
2006	1.63	0.60	2.25	4.88	9.36	1.82	2.90	2.24	4.81	11.76	90%	21%	100%	102%	80%
2007	1.63	0.87	1.25	3.38	7.13	1.82	2.90	2.24	4.81	11.76	90%	30%	56%	70%	61%
2008	0.20	4.80	0.25	4.35	9.60	1.82	2.90	2.24	4.81	11.76	11%	166%	11%	90%	82%
2009	1.60	2.13	1.37	4.60	9.70	1.82	2.90	2.24	4.81	11.76	88%	74%	61%	96%	82%
2010	0.18	7.00	1.72	2.88	11.78	1.82	2.90	2.24	4.81	11.76	10%	242%	77%	60%	100%
2011	5.00	4.25	1.88	4.37	15.50	1.82	2.90	2.24	4.81	11.76	275%	147%	84%	91%	132%
2012	1.88	1.87	0.81	7.44	12.00	1.82	2.90	2.24	4.81	11.76	103%	65%	36%	155%	102%
2013	0.44	1.81	0.65	10.73	13.63	1.82	2.90	2.24	4.81	11.76	24%	63%	29%	223%	116%
2014	1.50	0.56				1.82	2.90	2.24	4.81	11.76	82%	19%			