

**Livestock Grazing Plan Amendment
Environmental Impact Statement**

ANALYSIS OF THE MANAGEMENT SITUATION



July 2015



**NATIONAL
CONSERVATION
LANDS**

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ACRONYMS AND ABBREVIATIONS

Full Phrase

AIM	assessment, inventory, and monitoring
AMS	analysis of the management situation
AUM	animal unit month
BLM	United States Department of the Interior, Bureau of Land Management
CFR	Code of Federal Regulations
EIS	environmental impact statement
EPA	United States Environmental Protection Agency
FLPMA	Federal Land Policy and Management Act of 1976
Glen Canyon	Glen Canyon National Recreation Area
Glen Canyon GMP	Glen Canyon General Management Plan (1979)
Glen Canyon GzMP	Glen Canyon National Recreation Area Grazing Management Plan (1999)
GSENM	Grand Staircase-Escalante National Monument
IM	instruction memorandum
MFP	management framework plan
MMP	Monument Management Plan (2000)
MMP-A	Monument Management Plan Amendment
NPS	United States Department of the Interior, National Park Service
NRCS	United States Department of Agriculture, Natural Resources Conservation Service
NVCS	National Vegetation Classification System
PFC	proper functioning condition
REA	rapid ecoregional assessment
SRMA	special recreation management area
US	United States
USC	United States Code

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CHAPTER I

INTRODUCTION

The United States Department of the Interior, Bureau of Land Management (BLM), Grand Staircase-Escalante National Monument (GSENM) is preparing a Livestock Grazing Monument Management Plan Amendment (MMP-A) and associated environmental impact statement (EIS) to guide management of BLM-managed lands within GSENM, as well as lands for which GSENM has administrative responsibility for livestock grazing. The BLM manages livestock grazing on the affected lands according to land use decisions set by four regional management framework plans (MFPs) signed in 1981: Escalante (BLM 1981a), Paria (BLM 1981b), Vermilion (BLM 1981c), and Zion (BLM 1981d), a subsequent plan amendment completed in 1999 (BLM 1999), and the US Department of the Interior, National Park Service (NPS), Glen Canyon National Recreation Area (Glen Canyon) Grazing Management Plan (GzMP; NPS 1999).

The GSENM MMP (BLM 2000) did supersede many of the decisions in the four MFPs, but it did not replace the grazing decisions in them. The MMP states, “There are several areas for which major decisions have been deferred. For example, because Monument designation does not affect existing permits or leases for, or levels of, livestock grazing, grazing will ultimately be addressed after the completion of assessment for each grazing allotment and the preparation of new allotment management plans” (BLM 2000, p. 4). Therefore, the four MFPs and the 1999 amendment are the guiding planning level documents for livestock grazing in GSENM.

I.1 PURPOSE OF THE ANALYSIS OF THE MANAGEMENT SITUATION

The BLM has prepared the analysis of the management situation (AMS) to analyze available resource inventory data and other information to characterize the resources undergoing analysis, portray the existing management situation, and identify management opportunities to respond to identified issues. The AMS provides the basis for formulating a reasonable range of alternatives (43 Code of Federal Regulations [CFR] 1610.4-4).

The AMS describes current conditions and trends of the relevant resources and uses/activities in the planning area. The AMS also provides information on existing management practices, including direction from existing plans and agency policy, local resources, and resource uses. The AMS provides sufficient detail to create a platform for resolving planning issues through the

development of alternatives. The information in this AMS reflects the information and data available at the time of its completion. The BLM will refine analyses as needed based on additional compilation and analysis of data throughout the MMP-A/EIS planning process.

This AMS addresses the issues relevant to livestock grazing management; it is not intended to be an exhaustive review of everything known about the resources and uses/activities in the planning area.

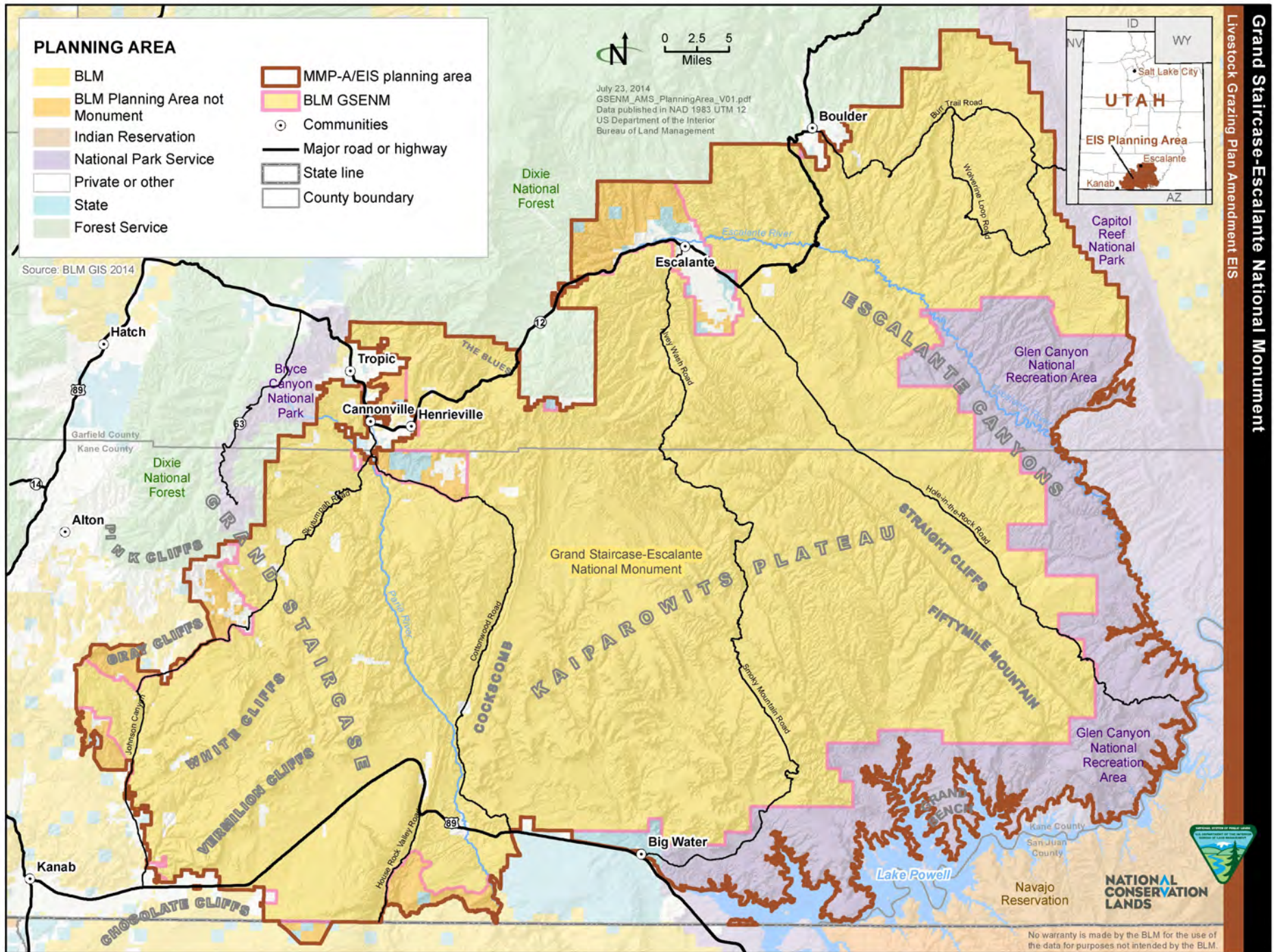
This document addresses the current management situation and is the foundation for the alternatives development process. Alternatives presented in the Draft MMP-A/EIS will draw on the management opportunities identified in this document. Each alternative will include desired outcomes (goals and objectives), and the allowable uses and management actions anticipated to achieve those outcomes.

I.2 DESCRIPTION OF THE PLANNING AREA

The planning area encompasses approximately 2,316,100 acres in Garfield and Kane Counties, Utah, and Coconino County, Arizona. The planning area includes all BLM-managed lands within GSENM and BLM- and NPS-managed lands for which GSENM has livestock grazing administration responsibility. This includes lands within portions of the BLM's Kanab and Arizona Strip Field Offices, as well as NPS-managed lands in Glen Canyon. The planning area is bordered on the west by Bryce Canyon National Park and the BLM Kanab Field Office, on the north by Dixie National Forest, on the east by Capitol Reef National Park and Glen Canyon, and on the south by the BLM Arizona Strip and Kanab Field Offices, Utah State and Institutional Trust Lands, and Glen Canyon. Small areas of state, municipal, and private lands are contained within the planning area (see Figure I-1, Planning Area).

The BLM's decision area for this planning effort includes all BLM-managed lands for which GSENM has livestock grazing administration responsibility, including some lands within the BLM Kanab and Arizona Strip Field Offices. The NPS decision area includes lands within Glen Canyon for which GSENM has livestock grazing administration responsibility. The decision area totals approximately 2,253,700 acres within the planning area and does not include state, municipal, or private lands. Table I-1, Landownership, shows acres by landowner within the planning area and the decision area.

Figure 1-1



Grand Staircase-Escalante National Monument Livestock Grazing Plan Amendment EIS

No warranty is made by the BLM for the use of the data for purposes not intended by the BLM.

**Table I-1
Landownership**

Landowner	Acres
<i>Planning Area</i>	
BLM	1,934,800
NPS	318,900
State	19,900
Private	42,500
Total	2,316,100
<i>Decision Area</i>	
BLM, GSENM	1,866,500
BLM, Kanab Field Office	54,800
BLM, Arizona Strip Field Office	13,500
NPS, Glen Canyon	318,900
Total	2,253,700

Source: BLM GIS 2014a

Note: Acres have been rounded to the nearest 100.

I.3 LIVESTOCK GRAZING ADMINISTRATION IN GLEN CANYON NATIONAL RECREATION AREA

In 1972, Congress passed Glen Canyon’s enabling legislation (Public Law 92-593). The legislation created the recreation area as a unit of the National Park System, managed by the NPS in accordance with the 1916 Organic Act. The purpose of the recreation area, as described in the enabling legislation, is “to provide public outdoor recreation use and enjoyment of Lake Powell and lands adjacent thereto...and to preserve and protect the scenic, scientific, and historic features contributing to public enjoyment of the area.” The values of Glen Canyon are the “scenic, scientific, and historic features” indicated in the recreation area’s enabling legislation of 1972.

The 1979 General Management Plan (GMP) specifically identified the following values and purposes: vegetation, soils, wildlife, water quality, cultural resources (historic and prehistoric), scenic resources, recreation, and paleontology. Grazing, although not a purpose of the recreation area, is a use recognized by Congress in Glen Canyon’s enabling legislation. The enabling legislation specifies that the BLM should administer grazing permits, which it does through four offices. One of these offices administers GSENM, which includes grazing on a portion of the recreation area.

GSENM applies BLM policies for issuing and administering grazing permits, such as the 1934 Taylor Grazing Act (43 US Code [USC], Section 315 et seq.) and the Federal Land Policy and Management Act of 1976 (FLPMA; 43 USC, Section 1701 et seq.). In addition, GSENM administration is subject to Glen Canyon’s enabling legislation. Public Law 92-593 states that “the Secretary shall administer, protect, and develop the recreation area in accordance with the provisions of the (Organic) Act of August 25, 1916 (16 USC 1a et seq.), as amended and supplemented, and with other statutory authority available to him for conservation and management of natural resources to the extent he finds such authority will further the purpose of this Act.” The Redwoods Act of March 27, 1978 states that in areas of the National Park

System, “The authorization of activities...shall not be exercised in derogation of the values and purposes for which these various areas have been established.”

On September 4, 1984, to foster coordination between the two agencies, the directors of the BLM and the NPS signed an umbrella memorandum of understanding for grazing administration in units of the NPS where grazing is authorized. To implement this memorandum of understanding, an interagency agreement was executed in 1993 between Glen Canyon and both the BLM Utah and Arizona state offices. The intent of this agreement is to “conduct a program to coordinate grazing administration activities on [Glen Canyon] which shall be carried out by the respective BLM District Managers of the Arizona Strip, Cedar City, Richfield, and Moab Districts...and in coordination and cooperation with the Superintendent of [Glen Canyon].” This agreement states that the “BLM has expertise in developing, implementing, and analyzing grazing programs” and that “NPS has expertise in determining whether an activity is consistent with the values and purposes of [Glen Canyon].”

Until the Superintendent of Glen Canyon has completed a determination on the potential effects of the proposed action on the values and purposes of Glen Canyon, the BLM will not engage in any of the following:

1. Act on any grazing authorizations, range developments, management plans, management agreements, or resource monitoring and evaluation
2. Approve or act on a change in a grazing permit
3. Change the kind of livestock or the season of use
4. Implement new construction, reconstruction, or major maintenance of existing range developments or improvements
5. Institute a new or modified allotment management plan, grazing system, or resource monitoring or evaluation not covered by an agreed on plan

This process is called a values and purposes determination and it is to ensure that grazing activities do not conflict with the protection of resources, as called for in the 1916 NPS Organic Act or the Glen Canyon GMP (NPS 1979).

To give further clarity to the Glen Canyon values and purposes with respect to grazing practices across the recreation area, a grazing component of the GzMP was developed and signed in 1999 (NPS 1999). This plan was to be a foundational document to give management direction for the future of grazing practices across the recreation area. It was made to be flexible, allowing new data and methods to be incorporated into the determinations of park values and resource conditions and the management of livestock practices.

The 1999 GzMP identifies specific value statements for each fundamental recreation area resource. Resource management goals and 34 resource objectives were also developed with the assistance of local BLM offices. They would comply with the intent of the NPS Organic Act and Glen Canyon’s enabling legislation and would help achieve each resource value. It is against these 34 objectives that approval of any proposed grazing activity across the recreation area, via a values and purposes determination, is based.

I.4 RESOURCES AND RESOURCE USES TO BE ADDRESSED

This AMS focuses on resources and resource uses that provide context for the decisions to be made for livestock grazing in the MMP-A. Those resources and resource uses are livestock grazing, vegetation (including riparian vegetation and nonnative invasive plants), water, soil, and recreation. The EIS for the MMP-A will address a wider range of topics including: air quality, fish and wildlife, special status species, cultural resources, paleontological resources, visual resources, wild and scenic rivers, wilderness study areas, tribal interests, public safety, socioeconomics, and environmental justice. The BLM will also consider climate change trends and the additive effects of climate change coupled with management proposed under the various alternatives in the EIS. The BLM will prepare a separate socioeconomic baseline report that documents the socioeconomic condition in the planning area.

I.5 KEY FINDINGS

The BLM authorizes and manages livestock grazing in the planning area according to land use decisions set by the Escalante, Paria, Vermilion, and Zion regional MFPs signed in 1981 (BLM 1981a, 1981b, 1981c, and 1981d) and a subsequent plan amendment completed in 1999 (BLM 1999). Much has changed at the local, regional, and national levels since the BLM established these land use plan-level decisions for livestock grazing, and existing policies have been revised. These changes are as follows:

1. Establishment of GSENM in 1996
2. Establishment of the Utah BLM Standards for Rangeland Health and Guidelines for Livestock Grazing Management in 1997
3. Acquisition of approximately 175,000 acres of land within the GSENM boundary in 1998
4. Issuance of the Glen Canyon GzMP in 1999
5. Issuance of the MMP in 1999
6. Issuance of new policy and guidance for the National Landscape Conservation System in 2012
7. Increasing substantial and continuing visitation to GSENM and the surrounding BLM- and NPS-managed lands
8. Issuance of state and local plans, such as the Utah Grazing Agricultural Commodity Zones (updated 2015), Garfield County General Management Plan (2007), and Kane County General and Resource Management Plans (updated 2014 and 2015)

In addition, rangeland health evaluations and periodic monitoring has determined that current livestock grazing practices are factors in not achieving one or more rangeland health standards or do not conform to grazing management guidelines. Updated decisions for livestock grazing and rangeland management are needed to address the above changes and integrate with the existing MMP (BLM 2000).

CHAPTER 2

AREA PROFILE

The area profile describes the existing condition of resources and resource uses discussed in this AMS. This chapter incorporates information compiled at multiple levels to provide a context for the resources and their various uses. The BLM will use the information provided here as the basis for the Affected Environment chapter of the EIS.

2.1 LIVESTOCK GRAZING

History

Livestock grazing in the area dates back to the 1860s, with the number of cattle, sheep, and horses increasing rapidly until the early 1900s. Grazing use within the region has substantially decreased from its peak in the early part of the 20th Century. Livestock grazing became a regulated and permitted activity on National Forest System lands in the decade prior to World War I. In contrast, non-forest federal land was treated as a commons in which those who moved their stock onto the range first each season secured the use of new forage growth.

Stock from across the region were brought to graze during the winter, and many animals were left on the range year-round. This period of unregulated use and overgrazing resulted in impacts on rangeland resources and ecological conditions, especially at lower elevations used for winter grazing. The passage of the Taylor Grazing Act in 1934 secured federal control of the winter ranges. During the following years, the federal government established regulations pertaining to operators, allotments, kind and number of livestock, and season-of-use on public land. During the late 1950s and early 1960s, the BLM completed range surveys to determine the capacity of the land for grazing. Following these surveys, the BLM adjudicated decisions on forage and reduced livestock numbers on most allotments.

A federal court order on April 11, 1975, required the BLM to prepare grazing EISs during a 10-year period. To comply with this order, the BLM conducted range suitability analyses and field surveys on grazing capacity between 1975 and 1979. In 1981, the BLM issued the Kanab/Escalante Grazing Final EIS and began making adjustments in number and season-of-use of livestock. The EIS allocated 68,298 animal unit months (AUMs) to livestock initially and 91,444 AUMs upon full implementation of the plan, which was identified as being 24 years later (2005).

The increase in forage production was to be achieved by increasing production of desirable vegetation, improving watershed conditions and wildlife habitat, and with vegetation treatments and rangeland developments such as fences and water developments (BLM 1981). It should be noted that the planning area for the 1981 EIS included lands outside of the decision area for this MMP-A/EIS.

The State of Utah School and Institutional Trust Lands Administration formerly managed approximately 175,000 acres within GSENM. These lands were exchanged between the State of Utah and the federal government in 1998. Most of the former state lands transferred to the BLM are grazed in conjunction with the original BLM allotments through exchange of use agreements. Some of the transferred lands are fenced square miles that are managed as individual allotments. In accordance with the Congressional legislation authorizing the exchange, the BLM managed former state grazing permits under their original (state-issued) terms and conditions until they expired (Utah Schools and Land Exchange Act of 1998; Public Law 105-335).

The BLM authorizes livestock grazing in the decision area via leases and permits. These specify the grazing preference and the terms and conditions under which permittees make grazing use during the term of the lease or permit. Grazing preference is the total AUMs on public lands apportioned to a lease or permit. It includes the active use (the AUMs available for livestock grazing) and suspended use (the AUMs that are not available for livestock grazing). When GSENM was designated in 1996, there were approximately 77,400 active AUMs. Actual use in 1996 was approximately 51,900 AUMs, or 67 percent of active preference.

Range Improvements

Range improvements are physical modification or treatment of rangelands designed to improve forage production; change vegetation composition; control patterns of use; provide water; stabilize soil and water conditions; or restore, protect, and improve the condition of rangeland ecosystems.

There are two categories of range improvements: nonstructural and structural. Nonstructural range improvements are seedings and other vegetation treatments; structural range improvements are fences, corrals, stock trails, cabins, cattle guards, and water developments. In general, the BLM would not authorize a water development without a supporting water right held by the US (Instruction Memorandum [IM] UT-2015-019).

Existing rangeland seedings were originally completed throughout the planning area to provide forage for livestock, to reduce erosion, and to enhance watershed functionality. A rangeland seeding is a type of nonstructural range improvement where a vegetation type or community has been established through the artificial dissemination of seed and via clearing away existing vegetation, typically. The original seedings were typically monocultures of crested wheatgrass or Russian wildrye. Seedings consist of a mixture of native and nonnative species that include shrubs, forbs, and grasses.

In some cases, seedings were established to help improve the management of nearby resources. For example, in order to keep cattle out of riparian areas, some areas have been treated to provide palatable forage outside of the riparian zone. Currently, vegetation treatments in

seedings are primarily intended to restore vegetation communities and habitat or to manage livestock use. The BLM has completed nonstructural range improvements on approximately four percent of the decision area. The BLM maintains these seedings, although some have failed in the Upper Paria, Last Chance, Circle Cliffs, Vermilion, Mollies Nipple, Coyote, Cottonwood, and Headwaters allotments. The BLM has treated some of the failed seedings in order to restore them, with varying levels of success. The BLM bases current forage allocations on the presence and maintenance of these seedings.

The BLM authorizes most range improvements through a cooperative range improvement agreement, as outlined in 43 CFR, Part 4120.3-2. Improvements authorized through such an agreement are permanent range improvements or rangeland developments (structural or nonstructural) needed to achieve management or resource condition objectives. Range improvements authorized under a cooperative range improvement agreement up to August 21, 1995, may be co-owned by the US government and the permittee; those issued after August 21, 1995, are owned by the US government alone. The costs of installing, maintaining, or modifying the improvements may be shared by the US government and the permittee, as specified in the cooperative range improvement agreement.

The BLM also authorizes range improvements through a range improvement permit, as outlined in 43 CFR, Part 4120.3-3. Improvements authorized through such a permit are needed to achieve management objectives for the allotment in which the permit or lease is held. Such improvements are removable or temporary, such as livestock handling facilities (e.g., corrals, creep feeders, and loading shuts) and troughs. The permittee owns range improvements issued under a range improvement permit and is generally responsible for maintaining such improvements.

In Glen Canyon, nonstructural range improvements, land treatments, and new line shacks are not permitted, according to the 1993 Interagency Agreement between the BLM and NPS for grazing management. Other range improvements could be permitted, subject to the NPS Organic Act, the Glen Canyon enabling legislation, and the Glen Canyon GMP. The NPS Superintendent first must complete a determination regarding the potential effects of the proposed action on the values and purposes of Glen Canyon.

Rangeland Health Standards

The regulations at 43 CFR, Part 4180 (developed by the Secretary of the Interior on February 22, 1995) indicate that the BLM must ensure that the following four Fundamentals of Rangeland Health exist on BLM lands:

1. Watersheds are in, or 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, and timing and duration of flow.
2. 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.

3. 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.
4. 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.

The BLM Utah adopted Standards for Rangeland Health and Guidelines for Grazing Management for BLM Lands in Utah in 1997 that are to be applied to all BLM rangelands in Utah. The BLM uses information gathered through rangeland monitoring (i.e. trend), *Interpreting the Indicators of Rangeland Health*, proper functioning condition (PFC) assessments, water quality sampling, and other resource assessments by staff specialists to evaluate whether allotments are meeting the BLM Utah Standards for Rangeland Health. The four rangeland health standards are described below.

Standard 1: Upland soils exhibit permeability and infiltration rates that sustain or improve site productivity, considering the soil type, climate, and landform. As indicated by:

- a) Sufficient cover and litter to protect the soil surface from excessive water and wind erosion, promote infiltration, detain surface flow, and retard soil moisture loss by evaporation.
- b) The absence of indicators of excessive erosion such as rills, soil pedestals, and actively eroding gullies.
- c) The appropriate amount, type, and distribution of vegetation reflecting the presence of 1) the desired plant community, where identified in a land use plan conforming to these Standards, or 2) where the desired plant community is not identified, a community that equally sustains the desired level of productivity and properly functioning ecological conditions.

Standard 2: Riparian and wetland areas are in properly functioning condition. Stream channel morphology and functions are appropriate to soil type, climate, and landform. As indicated by:

- a) Streambank vegetation consisting of, or showing a trend toward, species with root masses capable of withstanding high stream flow events. Vegetative cover adequate to protect streambanks and dissipate stream flow energy associated with high water flows, protect against accelerated erosion, capture sediment, and provide for groundwater recharge.
- b) Vegetation reflecting: desired plant community, maintenance of riparian and wetland soil moisture characteristics, diverse age structure and composition, high vigor, large woody debris when site potential allows, and providing food, cover, and other habitat needs for dependent animal species.
- c) Revegetating point bars; lateral stream movement associated with natural sinuosity; channel width, depth, pool frequency and roughness appropriate to landscape position.

- d) Active floodplain.

Standard 3: Desired species, including native, threatened, endangered, and special status species, are maintained at a level appropriate for the site and species involved. As indicated by:

- a) Frequency, diversity, density, age class, and productivity of desired native species necessary to ensure reproductive capability and survival.
- b) Habitats connected at a level to enhance species survival.
- c) Native species reoccupy habitat niches and voids caused by disturbances unless management objectives call for introduction or maintenance of nonnative species.
- d) Habitats for threatened, endangered, and special status species managed to provide for recovery and move species toward de-listing.
- e) Appropriate amount, type, and distribution of vegetation reflecting the presence of 1) the desired plant community, where identified in a land use plan conforming to these Standards, or 2) where the desired plant community is not identified, a community that sustains the desired level of productivity and properly functioning ecological processes.

Standard 4: The BLM will apply and comply with water quality standards established by the State of Utah (R.317-2) and the Federal Clean Water and Safe Drinking Water Acts. Activities on BLM-managed lands will fully support the designated beneficial uses described in the Utah Water Quality Standards (R.317-2) for surface and groundwater. As indicated by:

- a) Measurement of nutrient loads, total dissolved solids, chemical constituents, fecal coliform, water temperature and other water quality parameters.
- b) Macro-invertebrate communities that indicate water quality meets aquatic objectives.

Assessing Resource Conditions and Evaluating Rangeland Health

Range management is an adaptive process where ongoing grazing is appraised through monitoring, then modified, and then re-appraised. Monitoring to assess whether the level of use is sustainable and whether other resource objectives are being met can assist in determining the effectiveness of a grazing system. Because livestock and wildlife grazing affects vegetation vigor, the BLM monitors vegetative community trend to determine if site-specific vegetative objectives are being met. The level and frequency of monitoring by allotment varies across the planning area. The BLM categorizes allotments into I (Improvement), M (Maintenance), and C (Custodial). Generally, allotments in category I require more frequent monitoring than allotments in the other categories. Since 2000, the BLM has monitored or assessed more than 500 upland sites on approximately 360 miles of streams (i.e., lotic reaches) and at more than 100 seeps/springs (i.e., lentic sites).

Additional assessments are required on NPS-managed lands in Glen Canyon where GSENM administers grazing permits. This is to ensure that park resources remain unimpaired, in accordance with the Organic Act, the Glen Canyon enabling legislation, NPS Management Policies, and the goals and objectives identified in the Glen Canyon GzMP (NPS 1999).

Utilization

Utilization measurements estimate the amount of vegetation removed during a grazing period. The measurements do not indicate whether this use has a negative or positive effect on the forage resource. The BLM measures utilization using key species (referred to as the Key Species Method in Interagency Technical Reference TR-1734-3, Utilization Studies and Residual Measurements [Forest Service and BLM 1996]), which may vary by allotment or pasture.

Trend

The BLM uses two methods to monitor long-term trend within the planning area. One is called the photo plot method and the other is called frequency method. Both methods provide information as to the trend of the observed plant community. In addition, there are two different types of frequency method that have been used in GSENM: the quadrat and nested frequency. Trend is a transition toward or away from management goals or desired plant community. GSENM is currently implementing updated BLM monitoring which combines historic frequency monitoring with the Assessment, Inventory, and Monitoring (AIM) method. The AIM method includes a broader suite of monitoring protocols.

Assessment, Evaluation, Determination

In accordance with BLM Handbook H-4180-1, Rangeland Health Standards (BLM 2001), and IM 2009-007, the BLM, including GSENM, uses the following procedures for evaluating land health, making determinations, and developing appropriate actions that will make significant progress toward achieving land health standards developed in accordance with 43 CFR, Subpart 4180.2(c). For allotments administered by GSENM in Glen Canyon, the NPS is involved in developing and reviewing the evaluation report and determination document. It may take different actions than the BLM in order to meet agency requirements.

The following summary of the evaluation process is primarily meant to describe the process for BLM-managed lands.

Evaluation Report – Assessing Land Health

1. Identify assessment areas to be evaluated for achievement of land health standards. The evaluation should be completed primarily at higher levels such as watersheds, landscapes, and groups of allotments.
2. Prioritize areas for evaluation. Direction for selecting the area to be assessed and evaluated is provided in Chapter III of BLM Handbook H-4180-1, Rangeland Health Standards (BLM 2001).
3. Assemble existing information e.g., monitoring data, inventory data, and actual use information.
4. Evaluate data to ascertain whether land health standards are achieved. If additional information is needed to draw conclusions about the achievement of standards, use Technical Reference 1734-6, Interpreting Indicators of Rangeland Health (Pellant et al. 2005), or collect additional monitoring data.
5. Prepare an evaluation report to document whether land health standards are achieved. The report can be helpful to identify the appropriate action needed to make significant progress toward achieving the standards where they are not met.

NPS also uses long-term quantitative monitoring plot data.

If all land health standards are achieved or the status of some are unknown, no determination document needs to be completed. BLM Handbook H-4180-1 (BLM 2001) gives general guidance for size, compatibility, continuity, and appropriate scale for conducting assessments. It also gives the BLM Authorized Officer discretion in selecting assessment unit boundaries and priorities. There may be a number of small areas that the BLM has not assessed but that the BLM Authorized Officer determined were not significant enough to be assessed. The BLM does not determine whether these areas achieve or do not achieve standards, but they may be included in a larger more significant unit (pasture or allotment) found to be achieving or not achieving land health standards.

Between 1999 and 2006, the BLM completed assessments for approximately 75 percent of the geographic area of each pasture of each allotment. It based these assessments on soil mapping units, ecological site descriptions, or range site descriptions. At the discretion of the interdisciplinary team, the BLM assessed additional areas above the 75 percent level if livestock frequently used those areas.

The evaluation report must clearly state the rationale for finding that standards are achieved. The evaluation report will include identification of the area evaluated, a reference to information sources used in the evaluation, a summary of the data used to ascertain whether standards are achieved, a list of standards and/or objectives evaluated, indicators used to evaluate whether standards are achieved, and conclusions drawn by the interdisciplinary team.

If the evaluation report documents that standards are not achieved in the assessment area, then the BLM Authorized Officer needs to determine significant causes for non-achievement. If existing grazing management practices or levels of grazing use on public land are significant factors, then an appropriate action must be developed and implemented in accordance with 43 CFR, Subpart 4180.2(c).

On NPS-managed lands, modifications to grazing administration may be considered if such changes would help protect park resources and values in response to factors that are beyond management control, such as drought.

The following process is used to determine and document causal factors in assessment areas where land health standards are not achieved and to select the appropriate action to take when existing grazing management or levels of grazing use are significant factors for not achieving the standard(s).

Determination Document – Identifying Causal Factors

1. Review the condition(s) that results in finding that standard(s) are not met.
2. Ascertain whether the trend is toward achievement of the land health standard. If the apparent trend is determined without monitoring data, the interdisciplinary team must document the indicators and rationale for the conclusion on the trend. A conclusion regarding the trend needs to be related to the standard(s) not achieved.

3. Review the uses and levels of use made in the area that is not achieving standards. Review existing grazing management practices for conformance with guidelines developed by BLM state directors in consultation with resource advisory councils, in accordance with 43 CFR, Subpart 4180.2. In order to determine if other activities are significant factors for not achieving land health standards, review other activities for conformance with or deviation from appropriate management practices for those activities.
4. As directed in H-4180-1 Chapters III and VI, coordinate and consult with the permittee(s) and interested parties to identify changes in existing grazing management or other activities that would make significant progress toward achieving land health standards. Several possible actions may produce a desirable outcome; analyze these alternatives in a NEPA document to identify which action is the most helpful. The purpose and need statement in the NEPA document will indicate that the need is to achieve land health standards, and that the purpose of the proposed action and alternatives analyzed is to make significant progress toward achievement of the standard(s).
5. Incorporate this analysis information into the determination document.

Once the determination document is completed, the BLM Authorized Officer issues decisions to change management as necessary. If existing grazing management or levels of grazing use are determined to be significant causal factors for not achieving land health standards, the BLM Authorized Officer will take appropriate action by issuing a decision to modify grazing, construct management facilities, or implement treatments in accordance with 43 CFR, Part 4160. As described in BLM IM 2002-124, "appropriate action" under 43 CFR, Part 4180.2(c) has been taken when the decision to implement the action is issued. If the significant causal factors are a result of BLM-authorized activities other than grazing, the BLM Authorized Officer will take action to correct the situation in accordance with regulations applicable to that activity.

If the causal factor is an activity or event outside of BLM's control, no action is required. However, this may provide an opportunity to coordinate and cooperate to achieve management that will remedy the factors causing the land health standards to not be achieved on public land. In addition, monitor to determine if significant progress toward meeting the standard(s) is occurring. On NPS-managed lands, action would be taken to alleviate unacceptable impacts, even if the causal factor is an activity or event outside of the BLM's or NPS's control.

In summary, a determination document will be completed only where land health standards are documented as "not achieved" in the evaluation report. Determination documents shall not be signed for areas identified as not meeting standards until the causal factor(s) are listed, conformance with grazing administration guidelines or appropriate management practices for other activities have been reviewed, and, where needed, potential appropriate action(s) are identified. Monitoring to determine if actions taken are resulting in significant progress toward achieving the standard(s) is a high priority. Monitoring is related to the indicators that were used to ascertain non-achievement.

Current Condition

There are 95 allotments in the decision area. Of the 95 allotments in the decision area, 19 allotments (approximately 318,800 acres) are wholly or partially within Glen Canyon (see Figure 2-1, Livestock Grazing Allotments). The BLM administers the permits on these allotments per the enabling legislation for Glen Canyon and by means of a memorandum of understanding and interagency agreement between the BLM and the NPS (see Section 5.5, Glen Canyon Enabling Legislation and Values and Purposes).

Twenty-one allotments (65,500 acres) are wholly or partially within the BLM Kanab Field Office. It made allocation decisions related to the availability of the allotments in the 2008 Kanab Field Office RMP (BLM 2008b), but GSENM manages the permits for the allotments. The MMP-A/EIS will not make a decision for the Kanab Field Office allotments because that decision was made in the 2008 Kanab RMP. The Sink Holes allotment (2,300 acres) is partially within the BLM Arizona Strip Field Office. The BLM GSENM has decision-making authority for allocation decisions related to this allotment and also administers the permit. Rock Reservoir and Coyote allotments in GSENM are administered by the BLM Arizona Strip Field Office. See Figure 2-1, Livestock Grazing Allotments.

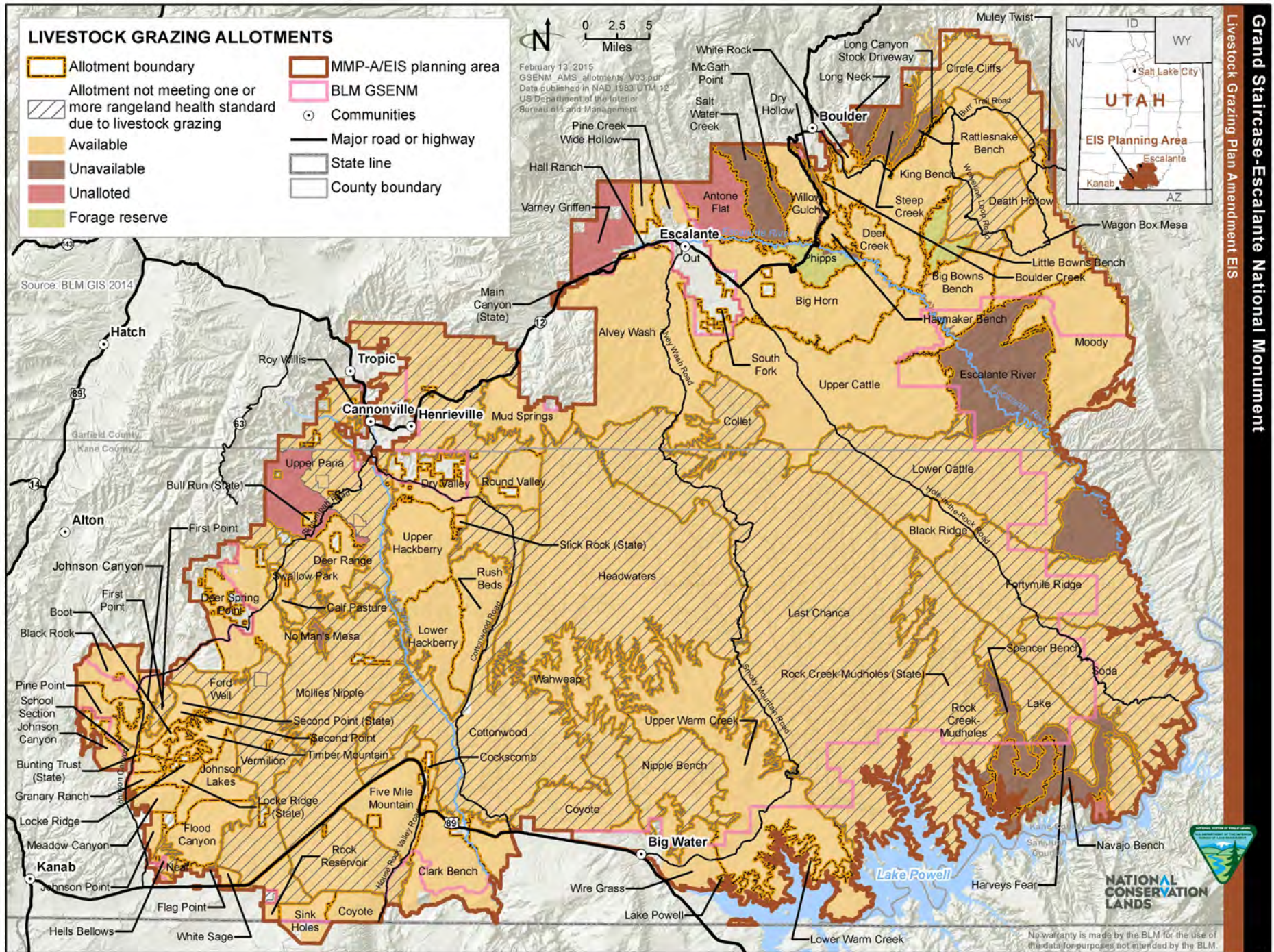
The total grazing preference in the decision area is 106,202 AUMs, which includes 76,957 active AUMs (including from forage reserves) and 29,245 suspended AUMs. See Table 2-1, Summary of Livestock Grazing Allocations, for acres available and unavailable by administrative unit and a summary of AUMs.

Seventeen of the 95 allotments in the decision area, totaling 139,400 acres, are wholly or partially unavailable to livestock grazing. This includes 88,600 acres in Glen Canyon. An additional 32,943 acres are unallotted for livestock grazing, including 1,600 acres in Glen Canyon. Table 2-2, Allotments Unallotted or Unavailable for Livestock Grazing, displays the allotments or the portions of allotments that have no active grazing use.

Of the allotments that are available for livestock grazing, 79 have active permits. There are 91 permittees authorized to graze cattle and horses on the 79 active allotments. Little Bowns Bench allotment (130 AUMs), the Wolverine pasture of the Deer Creek allotment (148 AUMs), and the Phipps pasture of Phipps allotment (140 AUMs) total 14,600 acres designated as forage reserves (BLM 1999) and together can supply up to 418 AUMs in emergency situations. No 10-year permit is issued to a holder of preference for these areas. Four allotments (Antone Flat, Long Canyon Stock Driveway, Varney Griffin, and an area in Glen Canyon) do not have an associated grazing preference. A total of 2,102,900 acres are available for livestock grazing.

Table 2-3, Active Allotments Available for Livestock Grazing and Associated Use, displays the active use, the associated season of use, and the actual use between 1996 (when GSENM was established) and 2013 (the most recent year of data collected and processed) for each of the 79 active allotments available for livestock grazing. Actual use means where, how many, and what kind or class of livestock and how long livestock graze on an allotment or on a portion or pasture of an allotment (43 CFR, Part 4100.0-5). This information is a required submittal by the permittee at the end of the season of use of the allotment.

Figure 2-1



**Table 2-1
Summary of Livestock Grazing Allocations**

Summary of Acres		Acres
Total Acres Available for Livestock Grazing		2,102,900
GSENM		1,804,900
Glen Canyon		230,200
Kanab Field Office		65,500
Arizona Strip Field Office		2,300
Unavailable for Livestock Grazing		139,400
GSENM		50,800
Glen Canyon		88,600
Kanab Field Office		0
Arizona Strip Field Office		0
Summary of AUMs for Decision Area		AUMs
Total Grazing Preference		106,202
Active AUMs		76,957
Suspended AUMs		29,245
Allotments Partially or Wholly in Glen Canyon	Acres in Glen Canyon (Total Acres)	
Big Bowns Bench	4,136 (18,568)	
Escalante River	57,880 (59,292)	
Fortymile Ridge	17,928 (57,905)	
Harveys Fear	2,374(4,293)	
Lake	5,113 (22,741)	
Lake Powell	367 (367)	
Last Chance	22,566 (250,120)	
Lower Cattle	18,466 (81,350)	
Lower Warm Creek	15,920 (15,920)	
Moody	27,142 (43,272)	
Navajo Bench	12,775 (12,935)	
Nipple Bench	492 (30,459)	
Rock Creek-Mudholes	33,720 (76,769)	
Soda	52,146 (70,445)	
Spencer Bench	3,303 (8,544)	
Unalloted (NPS)	1,608 (1,608)	
Upper Cattle	7,504 (92,420)	
Upper Warm Creek	22,384 (77,363)	
Wagon Box Mesa	688 (28,995)	
Wire Grass	12,286 (19,865)	

Source: BLM GIS 2014b

**Table 2-2
Allotments Unallotted or
Unavailable for Livestock Grazing**

Allotment (Pasture)	Acres
Unallotted Allotments	
Antone Flat	15,041
Long Canyon Stock Driveway	1,043
Varney Griffin	15,251
Unallotted (NPS)	1,608
<i>Total</i>	<i>32,943</i>
Unavailable Allotments	
Big Bowns Bench (River pasture* and a portion of Horse Canyon pasture)	1,729
Deer Creek (Cottonwood and River pastures)	5,170
Dry Hollow	1,276
Escalante River*	59,292
Flag Point	322
Harvey's Fear*	4,293
Long Neck	225
McGath Point	3,132
Muley Twist	2,247
Navajo Bench*	12,935
No Man's Mesa	1,464
Phipps (River Pasture)	3,066
Rattlesnake Bench	3,564
Rock Creek-Mudholes (Dry Rock Creek and Middle Rock Creek pastures)*	11,895
Saltwater Creek	12,055
Spencer Bench*	8,544
Steep Creek	7,550
Willow Gulch (Lower Calf Creek Falls pasture)	673
<i>Total</i>	<i>139,432</i>

Source: BLM allotment summaries; BLM GIS 2014b

*Allotment partially or wholly in Glen Canyon

Table 2-3
Active Allotments Available for Livestock Grazing and Associated Use

Allotment	Season of Use	Acres in Decision Area	Active Use (AUMs)	Actual Use ¹ (AUMs)				
				5-year Average			2011-2013 ²	18-year Average (1996-2013)
				1996-2000	2001-2005	2006-2010		
Alvey Wash	May 15 – September 30	60,185	1,424	1,144	746	682	278	761
Big Bowns Bench*	November 1 – March 31	16,839	750	857 ³	Nonuse	Nonuse	Nonuse	190 ³
Big Horn	November 1 – June 15	50,215	3,515	2,426	1,366	1,102 ³	2,298 ³	1,710 ³
Black Ridge	November 1 – May 31	11,657	903	438	390	315	309 ³	372 ³
Black Rock	June 6 – October 16	9,310	408	758	651 ³	153 ³	142 ³	458 ³
Black Rock (State)	June 6 – October 16	1,251	64	<i>(actual use averages are included in the Black Rock section)</i>				
Boot	August 1 – October 31	2,675	45	45	29 ³	42	45	40 ³
Boulder Creek	September 1 – December 31	3,251	80	48 ³	26 ³	8 ³	11 ³	25 ³
Bull Run (State)	July 1 – February 28	631	5	<i>No use of the allotment since acquired by the BLM in 1998.</i>				
Bunting Trust (State)	May 15 – November 30	226	16	10 ³	11	17	13	13 ³
Calf Pasture	June 10 – August 10 <i>(even years)</i> August 10 – October 15 <i>(odd years)</i>	2,775	176	67	34	76	51	58
Circle Cliffs	November 1 – March 31	30,212	1,050	842	43	402	831	476 ³
Clark Bench	November 1 – April 30	25,170	1,238	894	330	344	226	473
Cockscomb	March 1 – May 31	2,753	36	14	18	8	16	14
Collet	June 16 – September 15	16,723	97	95 ³	72	84	57	75 ³
Cottonwood	November 1 – May 31	103,326	3,188	2,656	1,692	2,121	2,347 ³	2,179 ³
Coyote	November 1 – May 31	32,636	2,044	1,594	650	1,331	889 ³	1,156 ³
Death Hollow	November 1 – March 31 April 1 – May 15	19,538	1,057	607	210	541	557 ³	465 ³
Deer Creek	November 1 – February 28	8,991	358	344	103	45	92	152
Wolverine Pasture (forage reserve)	October 1 – March 31	3,816	148				117	
Deer Range	August 1 – October 15	11,107	231	194		42	122	109
Deer Spring Point	June 10 – October 17	24,986	585	499	229	164	229	286
Dry Valley	March 1 – December 31 March 1 – January 31 July 1 – October 31	11,448	699	672	449	576	621	575

Table 2-3
Active Allotments Available for Livestock Grazing and Associated Use

Allotment	Season of Use	Acres in Decision Area	Active Use (AUMs)	Actual Use ¹ (AUMs)				
				5-year Average			2011-2013 ²	18-year Average (1996-2013)
				1996-2000	2001-2005	2006-2010		
First Point	June 1 – December 31	3,015	410	132	69	41	Nonuse	81
Five Mile Mountain	November 1 – April 30	17,848	385	380	51	13	Nonuse	102
Flood Canyon	July 1 – October 31	13,576	148	63	22	30	48	40
Ford Well	June 10 – October 9	9,088	300	256	242	44	254 ³	170
Fortymile Ridge*	October 15 – May 31	57,905	4,290	2,582	1,291	3,713	2,416 ³	2,515 ³
Granary Ranch	July 1 – November 30	1,905	70	7	41	30	45	38
Hall Ranch	March 1 – February 28	34	12	Nonuse ³	Nonuse	11.5 ³	6 ³	6 ³
Haymaker Bench	November 1 – February 28	3,150	100	58	70	61	76 ³	65 ³
Headwaters	November 1 – March 15	154,436	3,469	3,393	1,981	1,991	2,373	2,441
Hells Bellows	May 1 – October 15	2,132	44	44	32	35	42 ³	3
Johnson Canyon	June 1 – November 15	10,121	274	165	111	67	142	119
Johnson Lakes	June 1 – November 30	11,142	347	306	179	112	302	216
Johnson Point	November 1 – March 31	2,344	135	Nonuse	10	Nonuse	Nonuse	3
King Bench	November 1 – March 31	54,328	1,515	1,144	980	311	1,281 ³	867 ³
Lake*	June 1 – September 30	22,741	1,310	1,116	80	485	316	520
Lake Powell*	October 15 – March 15	367	20			Nonuse		
Last Chance*	March 1 – February 28	250,120	4,642	2,672	1,015	967	928	1,448
Little Bowns Bench (forage reserve)	October 1 – March 31	3,422	130				141	
Locke Ridge	December 1 – April 30	4,456	172	118	134	78 ³	91 ³	110 ³
Lower Cattle*	October 1 – April 15	81,350	7,488	4,680	3,514	5,294	4,372 ³	4,481 ³
Lower Hackberry	October 15 – March 15	20,173	435	222	67	152	326	1
Lower Warm Creek*	November 1 – March 31	15,920	225	80	100	Nonuse	13	5
Main Canyon	June 1 – September 30	312	14	8 ³	10	53	5	22 ³
Meadow Canyon	September 1 – November 30	4,681	144	135	103	79 ³	92	108 ³
Mollies Nipple	March 1 – February 28	102,361	3,880	3,785	2,784	2,874	2,778 ³	3,104 ³
Moody*	November 1 – March 31	43,272	909	712	391	270	270 ³	446 ³
Mud Springs	July 15 – October 15	15,652	277	214	200	79	99	153
Neaf	March 1 – November 30	1,287	9	7	Nonuse	2	Nonuse	3

Table 2-3
Active Allotments Available for Livestock Grazing and Associated Use

Allotment	Season of Use	Acres in Decision Area	Active Use (AUMs)	Actual Use ¹ (AUMs)				
				5-year Average			2011-2013 ²	18-year Average (1996-2013)
				1996-2000	2001-2005	2006-2010		
Nipple Bench*	December 1 – April 30	30,459	1,042	349	311	361	376 ³	345 ³
Phipps (Phipps pasture) (forage reserve)	October 1 – March 31	7,365	140				122	
Pine Creek	September 16 – October 31	3,804	144	60	78	7	158 ³	61 ³
Pine Creek (State)	November 1 – January 31	592	27	<i>(actual use averages are included in the Black Rock section)</i>				
Pine Point	June 16 – October 15	8,828	365	245	169	108	171	174
Rock Creek-Mudholes*	March 1 – February 28	64,873	2,173	1,381	<i>Nonuse</i>	954	1,159 ³	823 ³
Round Valley	November 1 – March 31	9,920	522	419	253	316	254	317
Roy Willis	November 1 – March 15	195	9	2	4	4	9	4
Rush Beds	November 1 – April 30	18,765	252	38	126	76	124 ³	81 ³
School Section	May 1 – April 30	753	102	24	37	9	<i>Nonuse</i>	19 ³
Second Point	August 1 – September 30	5,890	98	52	18	19 ³	12	28 ³
Sink Holes	November 1 – April 1	6,589	154	110	<i>Nonuse</i>	8 ³	45 ³	42 ³
Slick Rock (State)	June 1 – June 30	643	24	<i>Insufficient Data</i>	<i>Insufficient Data</i>	15	6	10 ⁴
Soda*	October 1 – May 31	70,445	2,798	1,744	642	2,230	514 ³	1,418 ³
South Fork	March 1 – February 28	118	12	<i>Nonuse</i>	<i>Nonuse</i>	9	8	4 ³
Swallow Park	May 1 – October 31	16,494	1,076	621	509	514	379	520
Timber Mountain	June 16 – October 15	7,662	426	287	223	174	128	211
Upper Cattle*	November 1 – June 15	92,420	8,158	5,606	4,774	7,276	4,220	5,689
Upper Hackberry	November 1 – March 31	22,835	654	472	270	217	190	304
	April 16 – June 15							
Upper Paria	May 1 – June 10	94,347	2,833	2,277	738	1,282	1,429	1,432
	May 1 – September 30							
Upper Warm Creek*	November 1 – May 31	77,363	1,638	364	401	682	490 ³	483 ³

Table 2-3
Active Allotments Available for Livestock Grazing and Associated Use

Allotment	Season of Use	Acres in Decision Area	Active Use (AUMs)	Actual Use ¹ (AUMs)				
				5-year Average			2011-2013 ²	18-year Average (1996-2013)
				1996-2000	2001-2005	2006-2010		
Vermilion	February 16 – February 28, 2014	43,084	2,849	2,080	1,104	416	814 ³	1,155 ³
	March 1 – May 15							
	June 1 – September 15							
	October 1 – January 15							
Wagon Box Mesa*	November 1 – March 31	28,995	637	267	248	201	217 ³	236 ³
Wahweap	December 1 – April 30	17,222	491	361	206	224	372	276 ³
White Rock	December 1 – January 31	1,389	60	55	47	23	Nonuse ³	37 ³
White Sage	May 6 – June 5	2,142	76	64	33	15	Nonuse	33
Wide Hollow	October 1 – December 31	3,779	353	265 ³	118	354	295	253 ³
Willow Gulch	November 1 – March 31	12,214	474	188	22	28	27 ³	73 ³
	December 1 – January 31							
Wiregrass*	November 1 – March 31	19,865	99	342	3	Nonuse	Nonuse	104

Sources: BLM 2014a; BLM allotment summaries

¹Actual use is supplemented with billed use where actual use data is not available.

²2011-2013 actual use averages are for a 3-year period.

³Period includes years with nonuse. Some data for 2013 not available and not included in the averages.

⁴Based on 8-year average.

*Allotment partially or wholly in Glen Canyon

Livestock use is authorized at different times and seasons throughout the year. Season-of-use is largely determined by elevation. Generally, livestock graze the lower elevation allotments during the winter and spring, the mid-elevation allotments are grazed during the spring/fall season, and the high elevation allotments are grazed in the summer. The majority of livestock permittees do not graze in the decision area year-round. Most operators have their livestock on non-BLM-managed lands (such as National Forest System lands, private base property, or state lease) at least part of the year. Those allotments, which do have livestock use permitted year round, include pastures in which the livestock are rotated so livestock are not grazing on the same portion of the allotment yearlong. The annual stocking rate, based on the carrying capacity for each allotment, is typically determined before stock are turned out at the beginning of the season of use for each allotment.

The level of grazing use within the planning area continues to be at or below permitted (active use) levels. Some of the major factors that typically affect or determine the number of grazing livestock on an allotment on any given year are listed below.

1. Precipitation—The timing, intensity, and amount of precipitation received before livestock are turned out determines forage production more than any other factor in this area.
2. Temperature—Temperature can have a positive or negative effect on forage growth rates. For example, a cold, dry spring generally limits growth on cool season grasses. This relates to the concept of range readiness, which is a defined stage of plant growth at which grazing may begin without permanent damage to vegetation or soil.
3. Availability of livestock water or snow—This plays an important role in how long an area is used and when it is used. There can be plenty of forage, but if there is no available water, that area cannot be used.
4. Conservation—Protecting the rangeland is often a choice by permittees, who are familiar with their allotments and often recommend or suggest that an area or allotment should receive less grazing use.
5. Individual permittee's preference in relation to livestock operations—A permittee may decide for a number of reasons that he or she does not want to run allocated numbers in a particular year.
6. Restoration/revegetation work—At times, the BLM has asked that the permittees not graze an area or allotment while restoration work is taking place. This is usually documented in a signed agreement. The minimum lengths of time these areas have been rested is two growing seasons, but they may and have been rested longer, depending on resource objectives and condition.

In 1964, the BLM closed the Lower Calf Creek Falls pasture of the Willow Gulch allotment because of the construction of the Calf Creek recreation site and campground. The trail to the lower falls is used almost daily year-round and often has hundreds of visitors hiking to the falls during the high-use period. This is the highest concentrated recreation use area in GSENM.

The Harvey's Fear, Navajo Bench, and Spencer Bench areas are located on a relatively narrow bench between the top of Fiftymile Mountain and Lake Powell. They surround the southern tip of Fiftymile Mountain. These areas are difficult to access due to cliffs both above and below. Limited access, water, and forage make these areas unsuitable for grazing. The 1980 Grazing EIS and subsequent 1981 MFP both recommend continuing the closure.

The BLM closed the Muley Twist area located in the far northeast corner of the planning area to livestock grazing in 1981 due to management decision associated with Capital Reef National Park (BLM 1981a).

The BLM closed the Dry Rock Creek and Middle Rock Creek pastures (Rock Creek-Mudholes allotment) by decision in the MFP due to slope and topography, lack of access, and limited forage. Dry Rock Creek, the larger pasture, has mostly been cut off from other areas due to the formation of Lake Powell.

The BLM put the Dry Hollow allotment into nonuse through a decision in the 1981 Escalante MFP.

The BLM closed Rattlesnake Bench by decision in the MFP due to suitability issues including access, terrain, limited forage, and lack of water.

The BLM closed the portion of the Big Bowns Bench (698 AUMs), Deer Creek (83 AUMs), and Phipps (140 AUMs) allotments that were located partially in the Escalante River to grazing in the 1999 Escalante MFP amendment (BLM 1999). The BLM also closed the McGath Point, Salt Water Creek, and Steep Creek allotments and the Cottonwood pasture (Deer Creek allotment) to livestock grazing in the 1999 Escalante MFP amendment (BLM 1999). The reason for closure was to eliminate conflicts between recreational users and livestock and also to protect and enhance riparian, wildlife, fisheries, and watershed values of the Escalante River and some tributaries.

Forage Production

The rangeland suitability analyses conducted in the late 1970s in preparation of the Kanab-Escalante Grazing EIS identified lands suitable for livestock use. The BLM defined suitable rangeland as, "forage-producing land which can be grazed on a sustained-yield basis under an attainable management system. Suitable rangeland can be grazed without causing damage to the basic soil resource of the specific or adjacent areas" (BLM 1980, Appendix 9). Unsuitable rangelands were not given a carrying capacity, and no range improvements or actions to attract livestock were taken on unsuitable rangelands (BLM 1980, Appendix 9).

Since that time, the condition of the landscape, landownership patterns, and administrative boundaries have changed. The BLM will estimate forage available for livestock in this EIS based on updated calculations of forage production, as well as existing range monitoring information.

For the EIS, the BLM will consider factors such as distance from water sources, slope, soil erodibility, and potential for vegetation treatments in order to estimate total forage production and forage available for livestock.

Rangeland Health Standards

The BLM completed a GSENM-wide evaluation in 2006 to determine the status of rangeland health in each of the allotments. The BLM determined that 21 allotments were not meeting one or more rangeland health standards due to existing livestock grazing. Table 2-4, Allotments Not Meeting Rangeland Health Standards Due to Livestock Grazing in 2006, depicts which of the standards were not met for each of these allotments.

**Table 2-4
Allotments Not Meeting Rangeland Health Standards¹ Due to Livestock Grazing in 2006**

Allotment	Standard Not Met				Changes to Grazing Management ²	Assessments Since 2006 Determinations
	1	2	3	4		
Circle Cliffs	X	X	X		1. Restoration of the Lampstand, Onion Beds, and Prospect pasture seedings (2,500 acres) 2. Limited grazing use in the Gulch pasture no later than March 15	Riparian assessments 2007, 2012
Collet		X	X		1. Increased use supervision to control unauthorized livestock 2. Coordinated 28 percent voluntary nonuse to meet BLM resource objectives (2007-2013)	Riparian assessments 2012
Cottonwood		X		X ³	1. Upgrade and maintenance of the Coyote well, pipeline, and associated infrastructure 2. Jack Riggs and Butler Valley water systems maintained 3. Voluntary nonuse to limit use of the riparian pasture to trailing and/or emergency use 4. Restoration of the Eight Mile seeding and the associated nonuse agreements (2008-2009) 5. Solar pump installed on Butler Valley well (2012) 6. Two separate rotation systems implemented on an experimental basis	Riparian assessments 2007, 2010, 2014
Coyote	X		X	X ³	1. Restoration of 2,634 acres (2009) 2. Upgrade and maintenance of the Coyote well, pipeline, and associated infrastructure	Restoration monitoring conducted annually for first five years after project completion
Death Hollow		X			1. 100 percent voluntary nonuse to meet BLM resource objectives (1 year 2006-2007). Voluntary nonuse during spring season (April 1-May 15) 2002-2006 and 2012 2. Cleaned and reconstructed stock ponds between Wolverine and Horse Canyon (2008)	Riparian monitoring 2012

Table 2-4
Allotments Not Meeting Rangeland Health Standards¹ Due to Livestock Grazing in 2006

Allotment	Standard Not Met				Changes to Grazing Management ²	Assessments Since 2006 Determinations
	1	2	3	4		
First Point		X			1. Fenced First Point Spring to exclude livestock from the spring (2007) 2. Maintained offsite water at First Point Spring	Riparian assessments 2007
Ford Well		X			1. Fenced Old Corral Spring and Ford Well Spring to exclude livestock from the spring 2. Provided off site water at both springs improving distribution	Riparian assessments 2007
Fortymile Ridge ⁴		X		X ³	1. Coordinated 22 percent voluntary nonuse to meet BLM resource objectives (2006-2012) 2. Maintenance of spring protection fences (2008) 3. Maintenance of the Wilcox Spring protection fence 4. Returned a portion of the Wilcox Spring flow back to spring for recovery of riparian vegetation (2010) 5. Use of supplement to improve livestock distribution (2006 to present)	Riparian assessments 2007, 2014 Upland assessments 2014
Headwaters		X		X ⁵	1. Implemented invasive weed management starting in 2001 2. Changed season of use in 1984 (off on March 15) 3. Limited livestock use in the Wahweap "Box" riparian area	Riparian assessments 2010, 2014
Hells Bellows		X			1. Coordinated 100 percent voluntary nonuse in 2007	Riparian assessments 2007
Lake ⁴		X	X		1. Removed more than 80 feral cattle 2. Pasture and spring protection fences maintained 3. Complete nonuse of the allotment from 2001-2003 and 2007	Riparian assessment 2007
Last Chance ⁴		X		X ⁵	1. Coordinated 76 percent voluntary nonuse to meet BLM resource objectives (2006-2012) 2. Removed feral cattle from the allotment (2003-present) 3. Maintained enclosure fence around Relishen Seep (2005)	Riparian assessments 2010, 2014

Table 2-4
Allotments Not Meeting Rangeland Health Standards¹ Due to Livestock Grazing in 2006

Allotment	Standard Not Met				Changes to Grazing Management ²	Assessments Since 2006 Determinations
	1	2	3	4		
Lower Cattle ⁴		X	X		<ol style="list-style-type: none"> 1. Coordinated 33 percent voluntary nonuse to meet BLM resource objectives (2006-2012) 2. Implemented a voluntary water-controlled, deferred rest rotation grazing system to better manage livestock distribution (2007-present) 3. Maintained stock ponds to improve water availability and distribution. 4. Use of supplement to improve livestock distribution (2006 to present). 5. Water based rotation/distribution 	<p>Riparian assessments 2007, 2014</p> <p>Upland assessments 2014</p>
Mollies Nipple	X	X	X		<ol style="list-style-type: none"> 1. Restoration of three seeded pastures 2. Coordinated 27 percent voluntary nonuse to meet BLM objectives (2006-2012) 3. Adjustments to livestock use due to drought 4. Deferred rest rotation followed and administered 5. Maintenance of Seaman Wash pipeline (2007) 6. Fenced Wildcat Spring (2009). 7. Constructed water developments in the Buckskin pasture (Sink Hole and Buckskin catchments) 8. Maintained two stock ponds in Buckskin pasture 2007 9. Restoration work, fencing of springs 	<p>Riparian assessments 2010</p> <p>Upland assessments 2014</p>
Nipple Bench ⁴		X		X ⁵	Livestock grazing is not the causal factor for not meeting rangeland health standards. Road through riparian area is constricting ability to move toward meeting standards.	N/A
Rock Creek-Mudholes ⁴		X		X	<ol style="list-style-type: none"> 1. Removed more than 65 feral cattle (2006-2008) 2. Permittee removed more than 25 additional feral cattle (2009-present) 3. Maintained four spring fences 4. Maintained pasture fences 5. 100 percent nonuse to meet BLM resource objectives (2001-2006) 	Riparian assessments 2015

**Table 2-4
Allotments Not Meeting Rangeland Health Standards¹ Due to Livestock Grazing in 2006**

Allotment	Standard Not Met				Changes to Grazing Management ²	Assessments Since 2006 Determinations
	1	2	3	4		
					6. Coordinated partial voluntary nonuse (2007-present)	
School Section			X		1. 100 percent voluntary nonuse to meet BLM resources objectives (2007-2010). 2. Coordinated about 70 percent voluntary nonuse (2009-Present)	Upland assessments 2013
Soda ⁴	X	X			1. Removed more than 45 feral cattle (2003-2004) 2. Maintained Cottonwood Spring protection fence (2010) 3. Maintained stock ponds and catchments (2011) 4. Maintained/improved Hole in the Rock well (2008) 5. 100 percent nonuse to meet BLM objectives (2002-2005) 6. Existing rotational grazing system avoids use after March 31 on consecutive years	Riparian assessments 2014 Upland assessments 2014
Swallow Park		X			1. Coordinated voluntary season-of-use restrictions deferring summer use and use during the critical spring growing season in the Bullrush Hollow pasture 2. Partial voluntary nonuse to meet BLM resource objectives (2001-2008)	Riparian assessments 2010
Upper Paria	X	X		X ³	1. Repaired and maintained erosion control structures in the Mudholes pasture (2005) 2. Completed seeding restoration on 300 acres in the Mudholes and Upper Jim Hollow pastures (2005) 3. Coordinated 39 percent voluntary nonuse to meet BLM resource objectives (2003-2013) 4. Installed riparian spring protection fence at Between the Creeks Spring (2008) 5. Repaired and upgraded spring development and spring protection fence at Dick Ott Spring (2006) 6. Maintained and upgraded the Sheep Creek pipeline and cleaned Upper	Riparian assessments 2010

Table 2-4
Allotments Not Meeting Rangeland Health Standards¹ Due to Livestock Grazing in 2006

Allotment	Standard Not Met				Changes to Grazing Management ²	Assessments Since 2006 Determinations
	1	2	3	4		
					Jim stock ponds (2006) 7. Installed 1-acre monitoring enclosure in Mudholes seeding and frequency/cover studies.	
Vermilion	X	X	X	X	1. Maintained Sand, Cole, and Nephi spring protection fences; restored spring boxes (2007) 2. Completed Seeding Restoration in RCA 1, RCA 2, RCA 3, and Fossil Wash pastures (2006) 3. Coordinated 81 percent voluntary nonuse to meet BLM resource objectives (2006- 2012) 4. Completed Sink Holes catchment in Government Reservoir pasture 5. Maintained Fossil Wash stock pond (2007)	Riparian assessments 2014 Upland assessments 2014

Source: BLM 2006

¹Section 2.1 describes rangeland health standards.

²This list is not all-inclusive; it is intended to give the reader an indication of actions taken by the BLM and grazing permittees to make progress toward meeting rangeland health standards.

³Livestock grazing was determined not to be a cause in not meeting Standard 4.

⁴Allotment partially or wholly in Glen Canyon.

⁵Livestock grazing was determined to be a contributing factor in not meeting Standard 4.

For 19 of the 21 allotments not meeting rangeland health standards it was determined that “1) existing grazing management or levels of grazing use are significant factors in failing to achieve the [rangeland health standard(s)] or conform with the guidelines [for livestock grazing management] and 2) existing grazing management needs to be modified to ensure that the fundamentals of rangeland health are met, or making significant progress toward being met” (BLM 2006). While livestock grazing was determined to be part of the problem in not meeting one or more of the land health standards, it was not always the primary causal factor in not meeting all of the standards.

For the remaining two allotments not meeting rangeland health standards due to livestock grazing, existing grazing management or levels of grazing use was not a significant factor in failing to achieve the standards. The significant factors identified were past grazing practices (more than 10 years earlier than the evaluations) and the inability of the rangelands to recover from past grazing management or levels of use. However, in order to meet or make significant progress toward meeting the fundamentals of rangeland health, the BLM determined that existing grazing management should be modified.

Since the 2006 determination, additional PFC assessments have been conducted in the following allotments: Circle Cliffs, Collet, Cottonwood, Ford Well, Fortymile Ridge, Headwaters, Hells

Bellows, Last Chance, Lower Cattle, Mollies Nipple, Soda, Swallow Park, Upper Paria, and Vermilion. Additional upland assessments have been conducted in the School Section allotment. Overall, most of the riparian and wetland sites evaluated show an improvement. Assessments completed and changes to grazing management are described in Table 2-4.

Circle Cliffs Allotment. The actions taken on this allotment, such as the approximately 2,500 acres of vegetation treatments, have improved desired vegetative cover and composition, while reducing soil movement and erosion. This has resulted in progress toward meeting Standards 1 and 3. Limiting spring use in the Gulch has reduced livestock-related impacts, such as trampling and utilization of forage, during the critical spring growing season. This has resulted in progress toward meeting Standard 2 (2007, 2012 PFC assessments).

Collet Allotment. The actions taken on this allotment, such as voluntary nonuse and increased use supervision, have limited grazing impacts on the riparian area in the Right Hand Collet drainage such as trampling and bank shear. These actions have resulted in significant progress toward meeting riparian health standards, as exhibited by riparian vegetation recruitment, increased plant vigor, and bank continuity.

Increased use supervision and management on the Collet allotment is a change from past practices. Improved management practices, including fence maintenance, have assisted in proper livestock control, providing improved riparian management and progress toward meeting standards.

Voluntary nonuse (28 percent) by the permittee has provided for proper levels of use of available forage. Reduced levels of use have improved vegetation conditions (cover, diversity, and vigor) and made progress toward meeting Standard 2 (2012 PFC assessments). In 2012, full numbers were authorized on the allotment, and utilization data for key species was found to be in the Light Use Category (21 to 40 percent). This indicates that current authorized use numbers can provide for the continued recovery and integrity of the biotic community.

Cottonwood Allotment. The actions taken on this allotment have improved cattle distribution and reduced grazing impacts on riparian areas. The BLM has implemented all of the actions identified in the 2006 Rangeland Health Determination plus has installed a solar pump on the Butler Valley well. Project work has provided for rotational grazing and lessened the dependency on the Paria River and Cottonwood drainages as water sources. The BLM has treated 1,174 acres of seeding and sagebrush for rehabilitation. The BLM and permittees actions, such as improving the Coyote pipeline and limiting grazing in the Paria River and Cottonwood Creek riparian corridors, have reduced impacts on riparian areas and increased recovery periods. This has improved resource conditions and made progress toward achieving Standard 2 (2007, 2010, and 2014 PFC assessments). Standard 4 was not met due to natural background geologic and physiographic conditions unrelated to livestock grazing.

Coyote Allotment. The actions taken on this allotment, such as 2,634 acres of vegetation treatment and restoration, have improved desired vegetative cover, composition, and diversity. Soil stability has also been improved, as evident in reduced soil movement and erosion, resulting in progress toward meeting Standards 1 and 3. Standard 4 was evaluated as not being met due to natural geologic sources; this is not an issue that BLM can resolve through management.

Death Hollow Allotment. The BLM has worked with the permittee to rest or defer use in 7 of the last 12 years. Consecutive nonuse for five years (2002 to 2006) has resulted in improved riparian conditions. An additional year of nonuse (2012) has also provided for recovery of the riparian area to maintain its condition. The permittee has agreed to implement a rotational deferment of the spring use on the allotment. Periodic growing season rest (deferment) is a common strategy of grazing systems. It can provide sufficient growth and recovery for systems, while improving or maintaining their condition without eliminating livestock use during the growing season.

The reconstruction of stock ponds has increased their storage capacity and improved livestock distribution and management on the allotment. This has led to reduced use of the riparian areas and subsequent improvement.

First Point Allotment. The action taken on the First Point allotment included fencing First Point Spring and providing off-site water for grazing livestock. Protecting this riparian area has improved riparian conditions, and the area is making progress toward meeting Standard 2.

Ford Well Allotment. Actions taken on the Ford Well allotment are similar to those that occurred on the First Point allotment. Old Corral Spring and Ford Well Spring have both been fenced, and off-site water has been provided for livestock. Riparian conditions have improved, thereby making progress toward meeting Standard 2.

Forty Mile Ridge Allotment. The BLM has completed maintenance of spring enclosure fences. Wilcox spring was modified to maintain riparian vegetation at the spring source. Excluding livestock has improved the vegetation surrounding the springs and has made progress toward meeting Standard 2.

Voluntary nonuse has decreased riparian utilization levels, helping these areas to improve and make progress toward meeting Standard 2. The use of supplement, which draws livestock into less used areas of the allotment and away from riparian areas, has improved livestock distribution. This has further lessened the use of riparian areas and addressed the recommendation to develop and relocate water sources to improve livestock distribution. Standard 4 was not met due to natural background geologic and physiographic conditions unrelated to livestock grazing.

Headwaters Allotment. Although the 2006 Rangeland Health Determination was that the Headwaters allotment did not meet or achieve Standards 2 and 4, past grazing practices were the primary causal factor. Under the current season of use, November 1 to March 15, progress continues to be made toward meeting Standard 2, as indicated by monitoring and PFC assessments. Additionally the BLM has reduced use in riparian areas in the Wahweap drainage. Also, the BLM has coordinated with permittees annually to properly stock the allotment, based on available forage. These actions are expected to improve water quality, making progress toward meeting Standard 4. The 2006 determinations also attributed geological and physiographic conditions as a contributing factor for not meeting Standard 4; this may not be an issue the BLM can resolve through management.

Hells Bellows Allotment. Voluntary nonuse has been the primary action taken by the permittee in coordination with the BLM to improve riparian conditions on this allotment.

Lake Allotment. The modifications identified in the 2006 Rangeland Health Determination have been taken on this allotment; as anticipated, it has improved conditions. Complete nonuse from 2001 to 2006 and partial voluntary nonuse from 2007 to 2013 has resulted in the rest or very light use of Fiftymile Mountain (physical location of the Lake allotment and summer pastures of the Rock Creek-Mudholes allotment). The BLM removed unauthorized feral cattle, resulting in less impact on riparian areas and providing for rest and recovery from livestock impacts. Maintaining spring protection fences and pasture fences has improved riparian conditions.

Last Chance Allotment. The removal of feral cattle and voluntary nonuse take into account the failed seedings and reduced pressure on the riparian areas. The reduced use has led to improved conditions of riparian areas, as anticipated. Maintaining the Relishen Spring protection fence has also improved riparian conditions. Because of these actions, such riparian areas as the Last Chance Creek have exhibited increased vegetation recruitment, vigor, and continuity. This has made progress toward meeting Standard 2. Improved riparian conditions provide for water quality in line with the geologic and physiographic conditions on the allotment; livestock are no longer considered a causal factor in not meeting Standard 4.

Lower Cattle Allotment. The grazing management modifications identified forage availability and the proper distribution and management of livestock (water distribution, development of an allotment management plan, and fencing) as concerns on the allotment. Voluntary nonuse addresses forage availability by adjusting annually the numbers of livestock using the allotment. The water-controlled, deferred rotation of livestock, maintenance of stock ponds, and use of supplements together improve livestock management. This comes about by reducing livestock concentrations, improving recovery periods for key forage species, and shortening grazing periods. As a result, PFC assessments in 2010 indicate the riparian areas are now in PFC, and upland monitoring shows gains in species diversity.

Mollies Nipple Allotment. The actions taken by the BLM and the permittee have improved conditions for riparian areas, soils, and vegetation in the allotment. The permittee's voluntary nonuse has addressed the loss of available forage, and actual use levels have not exceeded the authorized use. Use levels have been adjusted annually for drought conditions. The BLM has treated and restored the vegetation on more than 8,500 acres. The permittee is once again following the deferred rest rotation grazing system, providing for rest and recovery from grazing impacts and improved vegetative conditions. The BLM and permittee have maintained or constructed pipelines, spring developments, protection fences, and water catchments (stock ponds), thereby improving livestock distribution and lessening impacts. Riparian health has also improved as a result of these actions, with increased recovery periods and less overall use. PFC assessments and allotment monitoring have shown significant improvement on the allotment.

Nipple Bench Allotment. The primary reason for not achieving Standard 2 in the 2006 Rangeland Health Determination was that a county road was affecting Nipple Spring; livestock was not a causal factor. The location of the spring and road in a narrow canyon bottom does not allow for practical options for relocating the road. Not meeting Standard 4 was due primarily to natural

background geologic and physiographic conditions, though livestock grazing may be a minor contributing factor.

Rock Creek-Mudholes Allotment. The modifications identified in the 2006 Rangeland Health Determination have been taken on this allotment, and as anticipated improved conditions have resulted. Complete nonuse from 2001 to 2006 and partial voluntary nonuse from 2007 to 2013 have resulted in the rest or very light use of Fiftymile Mountain, as recommended. The BLM has removed unauthorized feral cattle, resulting in less impact on riparian areas and providing for rest and recovery from livestock impacts. Maintaining spring protection fences and pasture fences has improved riparian conditions, thereby minimizing the impact of livestock grazing on Standard 4. This also has addressed the concern that livestock use is a causal factor in not meeting this standard. Natural (geologic and physiographic) conditions also affect whether this standard is met.

School Section Allotment. The BLM acquired this allotment, consisting of one state school section, about the time rangeland health assessments were being conducted. The GSENM issued a BLM grazing permit shortly after acquisition and began managing the area. Following the 2006 Rangeland Health Determination, the BLM implemented four years of rest (100 percent voluntary nonuse from 2007 to 2010). Actual use before the BLM's acquisition is not known. Nonuse has reduced the impacts on upland vegetation and has increased diversity, vigor, and recruitment of desired species. Assessments completed in 2013 indicate improved conditions and significant progress toward meeting land health standards.

Soda Allotment. Yearlong use of this allotment by feral livestock had a major impact on the riparian areas; this use was not identified in the 2006 Rangeland Health Determination for this allotment. Removing feral livestock and maintaining spring exclosures excluding livestock from spring sources have addressed concerns regarding Standard 2. Maintaining and improving the water developments has improved livestock distribution and use supervision; adhering to the existing rotational grazing system has ensured that spring grazing does not occur after March 31 on consecutive years. These actions and the nonuse from 2001 to 2006, which was implemented immediately when the BLM recognized poor range conditions during assessment, have made significant progress toward meeting both Standards 1 and 2.

Swallow Park Allotment. In coordination with permittees, the BLM adjusted the timing of use of the Bulrush Pasture, which has allowed for spring growth and vegetation recruitment in the riparian corridor. Voluntary nonuse based on available forage and range condition has also reduced such impacts as bank shear, utilization, and trampling. The BLM noted Improvement in assessments it conducted in 2010.

Upper Paria Allotment. Voluntary nonuse has resulted in fewer grazing impacts on upland areas, seedings, and riparian vegetation. Maintaining riparian protection fences, pipelines, and stock ponds has protected riparian areas and increased the distribution of cattle throughout the allotment. As a result, those areas with adequate water and less affected by the scouring of high water events and diversion for agriculture have improved and are making significant progress toward meeting Standard 2. Voluntary nonuse has addressed the loss of forage resulting from seedings that are no longer productive. These seedings have crossed a threshold that, without restoration, will continue to not meet Standard 1, despite the substantial nonuse. Where

seeding restoration has occurred, significant progress toward meeting standards has been made, and the BLM intends to conduct additional restoration treatment as funding becomes available. In the meantime, voluntary nonuse continues at levels consistent with forage production. Standard 4 was not being met, due primarily to natural background geologic and physiographic conditions and the influence of irrigation diversion dewatering outside the BLM's control.

Vermilion Allotment. The permittee has implemented voluntary nonuse and the rehabilitation of approximately 3,100 acres of seeding and vegetation restoration work. The intent was to address the upland issues and make significant progress toward meeting Standards 1 and 3. Soil stability, vegetation recruitment, diversity, and desired species have increased. Installing and repairing spring protection fences and constructing water developments has aided livestock distribution throughout the allotment and decreased impacts on riparian areas. Voluntary nonuse has also decreased the impacts from livestock grazing on the riparian areas. These actions have resulted in significant progress toward meeting Standard 2. The improved riparian conditions minimize the impact of livestock grazing on water quality (Standard 4) by filtering sediment, maintaining vegetation that stabilizes the riparian area, and shading the site, thereby reducing evaporation and maintaining water temperatures. Establishing exclosure fences eliminates trampling, compaction, and other impacts on water quality.

Forecast

The BLM forecasts that the demand for livestock forage and livestock permits will continue and will likely increase. Kane and Garfield Counties have indicated they would like to see improved land health and increased grazing levels. Local ranchers have stressed the importance of the GSENM to their ranching operations and the importance of ranching to their families.

Data Gaps

The BLM will calculate total forage production based on ecological site descriptions for the GSENM. The BLM is implementing the AIM strategy. AIM provides a framework for integrated, cross-program assessment, inventory, and monitoring of resources at multiple scales of management. In 2013, AIM surveys began as a pilot program on 2 of the 79 grazing allotments (Death Hollow and Last Chance). During July and August 2013, the BLM sampled 35 plots for assessment, including 21 plots in Death Hollow and 14 plots in Last Chance allotments. In 2014, the AIM sampling strategy was changed from an allotment-focused sampling to a sampling design that included the entire planning area. The change was intended to collect data to better inform the EIS, both in terms of refining forage production calculations and to supplement land health condition data. In 2014, data were collected from 50 plots, representing the full range of ecological site types in the planning area (Great Basin Institute 2014). As more data becomes available, the BLM will be able to better estimate total forage production on GSENM. See Section 2.2, Vegetation (Data Gaps) for more information.

2.2 VEGETATION

Upland Vegetation

Upland vegetation includes those species not associated with rivers, creeks, lakes, springs, wetlands, or other surface or shallow sub-surface water. Upland vegetation comprises the vast majority of vegetation within the planning area. Upland vegetation provides an enormous variety

of functions in an ecosystem, and also provides for a variety of human and animal uses. Upland vegetation stabilizes soils, prevents erosion, uses carbon dioxide, releases oxygen, increases species diversity, and provides habitat and food for animals and resources for human use.

Ecosystems reflect complex sets of interactions between plants, animals, soil, water, air, temperature, topography, fire, and humans. Influences exerted on one component affect other components in the system. Upland vegetation provides many functions within ecosystems. Many of the BLM's land management policies are directed toward managing for healthy upland vegetative communities that support resistant and resilient ecological systems.

Riparian and Wetland Vegetation

Riparian vegetation generally occurs next to rivers, creeks, lakes, springs, and wetlands. Riparian areas are a transition zone between upland and aquatic ecosystems. Riparian areas occur where water is perennial, intermittent, or ephemeral. Riparian areas are defined 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 intermittent flowing rivers and streams, glacial potholes, and the shores of lakes and reservoirs with stable water levels are typical riparian areas (Leonard et al. 1992, p. 7).

Wetlands occur in spaces between terrestrial and aquatic systems where the water table is usually at or near the surface or where shallow water covers the land (Cowardin et al. 1979). Soil, water conditions, and vegetation type distinguish wetlands from all other ecosystems. The US Army Corps of Engineers regulates wetlands, which are defined as “those areas inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas (US Army Corps of Engineers 1987, p. 9).”

Wetlands must have one or more of the following three attributes:

1. At least periodically, the land supports predominantly hydrophytes (plants that grow only in water or very moist soil).
2. The substrate is predominantly undrained hydric soil (soil formed under conditions of saturation, flooding, or ponding).
3. The substrate is not solid, is saturated with water, or is covered by shallow water at some time during the growing season of each year.

Both riparian areas and wetlands are composed of aquatic vegetation with unique soil characteristics that developed under the influence of perennial water. The increased moisture found in these areas produces unique plant communities that differ noticeably from the surrounding upland vegetation.

Noxious Weeds and Nonnative Invasive Plants

In general, weeds disrupt or have the potential to disrupt or alter the natural ecosystem function, composition, or diversity of the site they occupy. These species can complicate the use of local natural resources and may interfere with management objectives for the site.

Invasive plants are either not native to the area where they are growing or, if native, are a minor component of the original plant community or communities. These species have the potential to become a dominant or co-dominant species on the site if their future establishment and growth is not controlled by management interventions. Invasive plants also include noxious weeds. Species that become dominant for only one to several years (e.g., short-term response to drought or wildfire) are not invasive plants (BLM Handbook H-1740-2, Integrated Vegetation Management). Invasive plants are widespread and can damage crops, affect entire industries, and harm the environment and public health. Organisms that have been moved from their native habitat to a new location, especially from a different country, are typically referred to as nonnative.

Noxious weeds are plant species designated by a federal or state law as generally possessing one or more of the following characteristics: aggressive and difficult to manage; parasitic; a carrier or host of serious insects or disease; or nonnative, new, or not common in the US (BLM Handbook H-1740-2, Integrated Vegetation Management). Noxious weeds in the planning area are native or nonnative plants as designated by the Utah Noxious Weed Act of 2008. Although noxious weeds are usually nonnative, this document makes a distinction because native plants can be considered invasive.

Regional Context

The analysis area is within portions of two US Environmental Protection Agency (EPA) level III ecoregions: Colorado Plateau and Arizona/New Mexico Plateau (EPA 2011). The Colorado Plateau ecoregion is located primarily in eastern Utah and western Colorado, with some overlap into northern Arizona and New Mexico. More than 99 percent of the planning area (2,313,700 acres and more than 99 percent of the decision area (2,251,900 acres are within the Colorado Plateau ecoregion. Pinyon-juniper and Gambel oak woodlands as well as saltbrush-greasewood shrublands characterize the ecoregion. Summer moisture from thunderstorms supports warm season grasses. Many endemic plants occur (EPA 2013, p. 5).

The analysis area is also within the ecoregion addressed in the Colorado Plateau Rapid Ecoregional Assessment Report (REA; Bryce et al. 2012). The REA represents a landscape approach to land and resource management in the ecoregion. The REA integrates available scientific data and information from BLM field offices, other federal and state agencies, and public stakeholders to develop shared responses and collaborative management efforts across administrative boundaries. The REA also assess the status of selected ecological resources (conservation elements) at the ecoregional scale and investigates how this status may change in the future. Resources of concern identified in the REA include soil stability, wind erodibility and dust on snow, biological soil crusts, and aquatic resources (Bryce et al. 2012). Vegetation and weeds are discussed as relevant to the resources described above.

The Arizona/New Mexico Plateau ecoregion occurs in northern Arizona, northwestern New Mexico, and reaches into south-central Colorado. It overlaps with the very southern portion of

the planning area and covers 2,500 acres (less than one percent) of the planning area and 1,700 acres (less than one percent) of the decision area. It is a large transitional region between other ecoregions containing semiarid grasslands to the east, shrublands and woodlands to the north and Mojave and Chihuahuan deserts to the west and south (EPA 2013, p. 5).

Indicators

Upland Vegetation

BLM Utah Rangeland Health Standards provide qualitative indicators to help in determining if Standards are being met within the planning area and are appropriate to use at the planning level scale. Standard 3 is the most applicable to upland vegetation and states that desired species, including native, threatened, endangered, and special status species, are maintained at a level appropriate for the site and species involved. Other indicators may be appropriate depending on the scale of the analysis (e.g., project, planning, and landscape levels). As described in Section 2.1, the BLM completed a GSENM-wide evaluation of rangeland health in 2006. Since that time, it conducted additional upland assessments in 2013 and 2014.

Interpreting Indicators of Rangeland Health (Pellant et al. 2005) provides an assessment protocol for qualitative, preliminary evaluation of soil/site stability, hydrologic function, and biotic integrity at the ecological site level. The technical approach provides early warnings of potential problems and opportunities and helps communicate ecological concepts to a wide variety of audiences (Pellant et al. 2005, p. 1). *Interpreting Indicators of Rangeland Health* requires the use of the ecological site concept, which is a classification system that divides landscapes based on the potential of the land to produce distinctive kinds, amounts, and proportions of vegetation. This potential is determined by soils, climate, and topography (Pellant et al. 2005, p. 9). Personnel conducting the assessment evaluate the functional status of 17 qualitative indicators (Pellant et al. 2005, p. 12).

Riparian and Wetland Vegetation

The BLM uses PFC as the indicator for riparian and wetland vegetation. It also uses PFC as a qualitative method for assessing the condition of riparian areas and wetlands. PFC refers to both the assessment process and the on-the-ground condition of riparian areas and wetlands. The assessment process consists of an approach that considers the hydrology, vegetation, and erosion/deposition attributes of the area; the on-the-ground condition refers to how well the physical processes are functioning. This condition is a state of resiliency that allows a riparian area or wetland to hold together during high-flow events with a high degree of reliability. This resiliency allows an area to then produce desired values over time, including fish habitat, neotropical bird habitat, and forage. Riparian areas and wetlands that are not functioning properly cannot sustain these values.

A riparian area or wetland is considered to be in PFC when adequate vegetation and landforms are present to accomplish the following:

1. Dissipate stream energy associated with high water flow, thereby reducing erosion and improving water quality
2. Filter sediment, capture bedload, and aid floodplain development

3. Improve floodwater retention and groundwater recharge
4. Develop root masses that stabilize streambanks against cutting action
5. Support greater biodiversity

If a riparian area or wetland is not in PFC, it is placed into one of the following three categories:

1. **Functional-At Risk**—Riparian areas and wetlands are in functional condition, but an existing soil, water, or vegetation attribute makes them susceptible to degradation.
2. **Nonfunctional**—Riparian areas and wetlands are not providing adequate vegetation or landforms to dissipate stream energy associated with high flows and thus are not maintaining or improving the condition of the area.
3. **Unknown**—Sufficient information on which to make any determination for riparian areas and wetlands is lacking.

The NPS has a lentic assessment process that differs from the BLM's PFC approach. The NPS assesses springs by characterizing the site (e.g., noting wetted area size, geomorphology, and vegetation) and rating the site. The rating is based on biological significance, such as habitat complexity and discharge rates, as well as on threats, such as the presence of exotic plant species and disturbance caused by human development or ungulates. The four potential scores are as follows:

1. Intact, functioning spring, some natural background disturbances occurring
2. Functioning, but potentially at-risk, altered disturbance regimes
3. Degraded, loss of much of function and stability, disturbances leading to erosion and spring loss
4. More or less nonfunctional, severely degraded, to destroyed, without most function, stability, and biotic elements

Utah Rangeland Health Standard 2 states that riparian and wetland areas are in properly functioning condition, stream channel morphology and functions are appropriate to soil type, climate, and landform. Indicators specific to Standard 2 are described in Section 2.1. As described in Section 2.1, the BLM completed a GSENM-wide evaluation of rangeland health in 2006. It conducted additional riparian assessments and monitoring in 2007, 2010, 2012, 2014, and 2015.

Noxious Weeds and Nonnative, Invasive Plants

Indicators of weeds include the presence of a noxious weed or nonnative, invasive plant population, the size of the population, acres of treatment completed to control these populations, and success of the control treatment.

Current Condition

Upland Vegetation

The Colorado Plateau REA (Bryce et al. 2012) includes a discussion of the current condition of upland vegetation within the ecoregion. The REA designates eight upland vegetation types (as defined in the SWReGAP) as REA conservation elements. The upland vegetation types selected represent the regional range in elevation and aridity within the ecoregion.

Seven of the vegetation types are represented in the decision area; acres in the decision area are presented in parentheses in the following: Colorado Plateau Pinyon-Juniper Woodland (comprises 577,600 acres in the decision area), Inter-Mountain Basins Big Sagebrush Shrubland (384,400 acres), Inter-Mountain Basins Montane Sagebrush Steppe (10,900 acres), Rocky Mountain Gambel Oak-Mixed Montane Shrubland (40,700 acres), Colorado Plateau Pinyon-Juniper Shrubland (10,900 acres), Colorado Plateau Blackbrush-Mormon-Tea Shrubland (245,400 acres), and Inter-Mountain Basins Mixed Salt Desert Scrub (139,800 acres; Bryce et al. 2012, p. 12; REA GIS 2012). Table 2-5, Vegetation Types, compares vegetation types described in the REA to the National Vegetation Classification System (NVCS) macrogroups described below. Acres reported above vary from those in Table 2-5 because of the different data sources for the REA vegetative communities and the NVCS macrogroups.

**Table 2-5
Vegetation Types**

REA Conservation Elements	SWReGAP Cover Type	NVCS Macrogroup	NVCS Code	Acres in Planning Area (%)	Acres in Decision Area (%) ¹
Colorado Plateau Pinyon-Juniper Shrubland; Colorado Plateau Pinyon-Juniper Woodland	Colorado Plateau Pinyon-Juniper Shrubland; Colorado Plateau Pinyon-Juniper Woodland	Rocky Mountain Two-Needle Pinyon-Juniper Woodland	M027	970,000 (42%)	946,100 (42%)
Not a REA Conservation Element	Colorado Plateau Mixed Bedrock Canyon and Tableland; Inter-Mountain Basins Active and Stabilized Dune; Inter-Mountain Basins Shale Badland; Inter-Mountain Basins Volcanic Rock and Cinder Land	Intermountain Basin Cliff, Scree, and Rock Vegetation	M118	613,400 (26%)	607,100 (27%)
Colorado Plateau Blackbrush-Mormon-Tea Shrubland	Colorado Plateau Blackbrush-Mormon-Tea Shrubland; Inter-Mountain Basins Semi-Desert Grassland; Inter-Mountain Basins	Great Basin and Intermountain Dry Shrubland and Grassland	M171	362,700 (16%)	355,000 (16%)

**Table 2-5
Vegetation Types**

REA Conservation Elements	SWReGAP Cover Type	NVCS Macrogroup	NVCS Code	Acres in Planning Area (%)	Acres in Decision Area (%)¹
	Semi-Desert Shrub Steppe; Southern Colorado Plateau Sand Shrubland;				
Inter-Mountain Basins Big Sagebrush Shrubland; Inter-Mountain Basins Montane Sagebrush Steppe	Inter-Mountain Basins Big Sagebrush Shrubland; Inter-Mountain Basins Montane Sagebrush Steppe	Great Basin and Intermountain Tall Sagebrush Shrubland and Steppe	M169	191,900 (8%)	182,400 (8%)
Inter-Mountain Basins Mixed Salt Desert Scrub	Inter-Mountain Basins Mat Saltbush Shrubland; Inter-Mountain Basins Mixed Salt Desert Scrub	Great Basin Saltbrush Scrub	M093	98,300 (4%)	96,200 (4%)
Not a REA Conservation Element	Inter-Mountain Basins Greasewood Flat	Cool Semi-Desert Alkali-Saline Wetland	M082	21,800 (1%)	21,400 (1%)
Not a REA Conservation Element	Rocky Mountain Ponderosa Pine Woodland; Rocky Mountain Montane Mesic Mixed Conifer Forest and Woodland;	Northern Rocky Mountain Lower Montane and Foothill Forest	M017	16,400 (1%)	14,700 (1%)
Not a REA Conservation Element	Rocky Mountain Lower Montane Riparian Woodland and Shrubland	Rocky Mountain and Great Basin Flooded and Swamp Forest	M034	8,700 (<1%)	7,100 (<1%)
Not a REA Conservation Element	Invasive Annual Grassland; Invasive Southwest Riparian Woodland and Shrubland; Invasive Annual and Biennial Forbland	Introduced and Semi Natural Vegetation	M332	8,500 (<1%)	8,100 (<1%)
Not a REA Conservation Element	Developed	Recently Disturbed or Modified	M333	7,400 (<1%)	7,000 (<1%)
Not a REA Conservation Element	Rocky Mountain Cliff and Canyon	Rocky Mountain Cliff, Scree and Rock Vegetation	M113	6,300 (<1%)	6,200 (<1%)

**Table 2-5
Vegetation Types**

REA Conservation Elements	SWReGAP Cover Type	NVCS Macrogroup	NVCS Code	Acres in Planning Area (%)	Acres in Decision Area (%)¹
Rocky Mountain Gambel Oak-Mixed Montane Shrubland	Rocky Mountain Gambel Oak-Mixed Montane Shrubland	Southern Rocky Mountain Montane Grassland and Shrubland	M049	5,900 (<1%)	3,500 (<1%)

Sources: SWReGAP GIS 2004; NVCS GIS 2014

¹Acres reported above vary from those previously described for the REA vegetative communities because of the different data sources for the REA vegetative communities and the NVCS macrogroups.

Within the last 50 years in the ecoregion, the large blocks of intact vegetation that characterized the Colorado Plateau have been fragmented or otherwise impacted by nonnative plants, minerals development including oil and gas leasing and uranium mining, recreation, livestock grazing, and rural home development, road building, and expanding off-road vehicle usage (Bryce et al. 2012, p. 45).

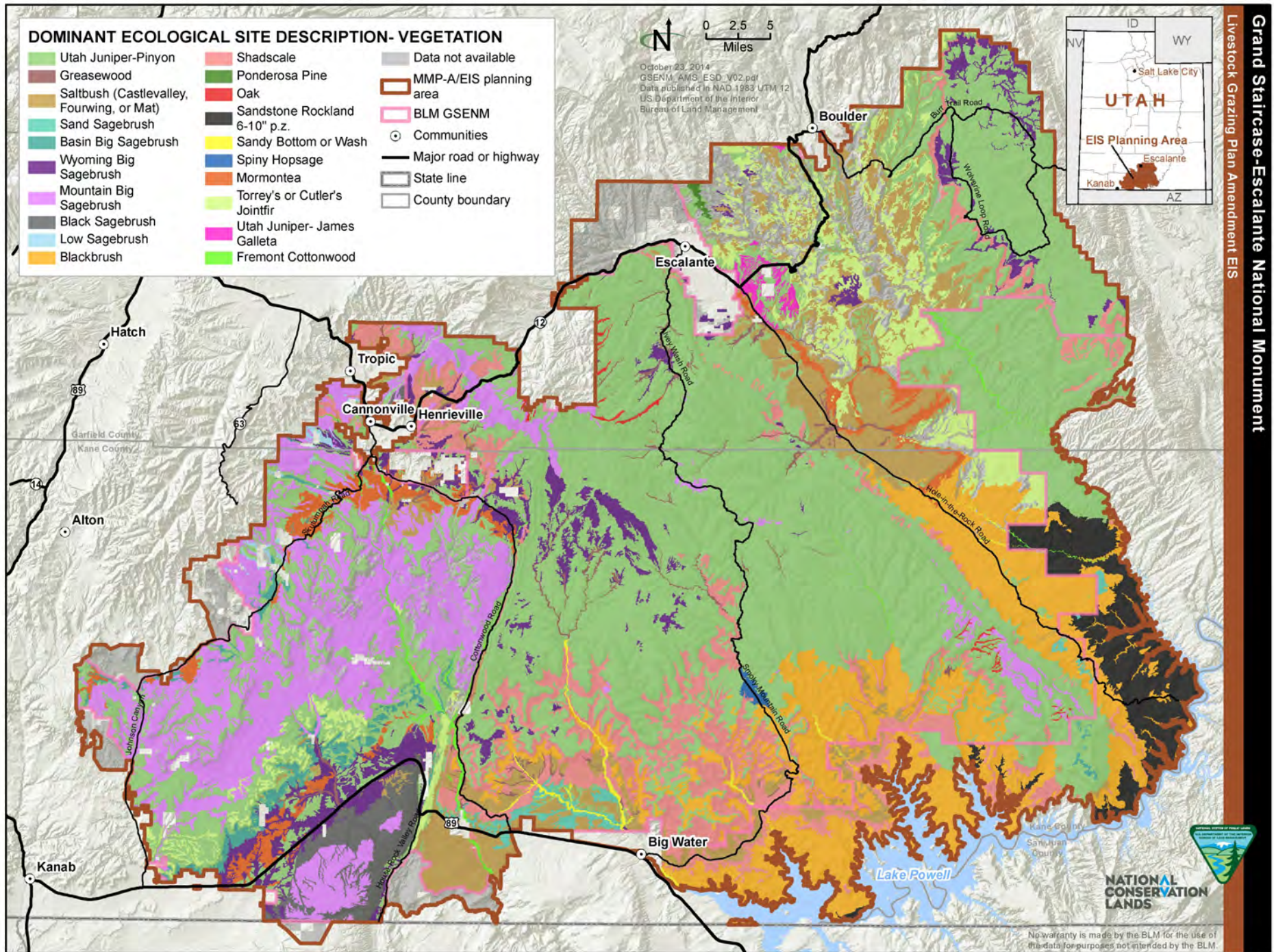
The planning area supports a diversity of existing and potential upland vegetation types. Vegetation types are controlled in large part by site-specific topography, soil type, and climatic conditions. Existing vegetation types in the planning area are described using the NVCS. It identifies 12 major existing vegetation types (macrogroups) in the planning area (Table 2-5). The NVCS macrogroups were identified by using BLM IM 2013-111 to crosswalk from the SWReGAP data (Table 2-5); the macrogroups represent the vegetation types that are present in the planning area.

The NVCS macrogroups do not distinguish between upland and riparian vegetation types. Ten of the vegetation types listed in Table 2-5 are upland vegetation types. Cool Semi-Desert Alkali-Saline Wetland (M082) and Rocky Mountain and Great Basin Flooded and Swamp Forest (M034) are riparian and/or wetland vegetation types and are included in the table for completeness. Riparian and wetland vegetation is discussed in the following section.

While NVCS macrogroups describe the vegetation types that are currently on the ground, ecological site descriptions may be used to describe the potential of a given area to support a certain vegetation community, regardless of what is presently on the site. Ecological site descriptions are a useful tool for evaluating the land's suitability for various land uses, capability to respond to different management activities or disturbance processes, and ability to sustain productivity over the long term (US Department of Agriculture, Natural Resources Conservation Service [NRCS] 2014).

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" (NRCS 2003, Glossary-17). There are 62 recognized ecological sites within the planning area, though many of these sites contain similar vegetation types. Figure 2-2, Dominant Ecological Site Description – Vegetation Type, shows the ecological sites within the planning area. For display

Figure 2-2



purposes, the figure groups the ecological sites by dominant vegetation type. Ecological site descriptions provide information on:

1. Site characteristics, including physiographic, climate, soil, and water features
2. Plant communities, including plant species, vegetation states, and ecological dynamics
3. Site interpretations, including management alternatives for the site and its related resources
4. Supporting information, such as relevant literature, information, and data sources (NRCS 2014)

The same ecological site will be found on the landscape wherever the same prevailing climate, topographic, and soil characteristics occur (Busby and Green 2006, p. 205). Information provided by ecological site descriptions can be used to interpret how a given site may respond to management actions when compared with other sites in the area. Ecological site descriptions also help to inform management over large areas that include many sites with different soils, topography, climate, and expected plant community composition, production, and disturbance regimes (Busby and Green 2006, p. 219).

Over a three-year period, *Interpreting Indicators of Rangeland Health* was used to evaluate the status of three ecosystem attributes (soil/site stability, hydrologic function, and biotic integrity) at over 500 locations in and adjacent to the planning area. The assessment results indicate that big sagebrush ecological sites with relatively high production potential had high frequencies of assessments with low ratings for all three ecosystem attributes; in contrast, shallow-soil ecological sites with relatively low production potential and the presence of Utah juniper and Colorado pinyon had low frequencies of assessments and low ratings for all three attributes (Miller 2008, p. 260).

The following factors were attributed to the low ratings:

1. Potential primary production and long-term exposure to production-dependent land-use activities such as livestock grazing
2. The presence of unpalatable woody plants that have the capacity to increase and become persistent site dominants due to selective herbivory, absence of fire, or succession
3. Soil texture through effects on hydrologic responses to grazing, trampling, and other disturbances
4. Past management that resulted in high livestock use of ecological sites with sensitive fine-loamy soils following treatments designed to increase forage availability (Miller 2008, p. 260)

Riparian and Wetland Vegetation

Within the ecoregion, many riparian ecosystems have been lost or degraded since Euro-American contact. Causes of this decline include direct conversion to other uses; changes in the natural flow regimes and suppression of fluvial processes; livestock grazing; and invasive species

invasion (Bryce et al. 2012). The mechanism by which this degradation occurs varies, depending on the threat. For example, livestock grazing has the potential to alter streamside morphology, increases sedimentation, degrades riparian vegetation through trampling and consumption and causes nutrient loading to the system. In contrast, invasive plant species, such as tamarisk (*Tamarix* spp.) or Russian olive (*Elaeagnus angustifolia*), change riparian areas by successfully outcompeting native riparian species. Species such as tamarisk produce seeds multiple times in a year and are more tolerant of drought and flow alterations than native species (Bryce et al. 2012). Russian olive is considered to be of greater concern in the planning area than tamarisk due to its tendency to alter stream hydrology and nutrient cycling and to substantially lower habitat quality for migratory bird species (Zouhar 2005).

In addition, while the BLM considers tamarisk a significant change agent in the ecoregion, the species has been declining. This is due to the tamarisk leaf beetle (*Diorhabda carinulata*), which the US Department of Agriculture, Agricultural Research Service in Lovelock, Nevada, released in 2001 as a biocontrol agent for tamarisk. The beetle's range quickly expanded, and there are a number of sites in Utah where it has been released since 2004. Since then, the beetle has spread and has destroyed tamarisk in the planning area. Studies have shown that defoliation can destroy tamarisk in three to five years (Clements et al. 2012).

The BLM has conducted PFC assessments on 192 lotic sites and 142 lentic sites in the planning area. This was part of the GSENM-wide rangeland health evaluations between 2000 and 2013 (Table 2-6, PFC Assessment Results for Lentic Sites, and Table 2-7, PFC Assessment Results for Lotic Sites). When the BLM issued the 2006 Rangeland Health Determinations, sites were determined to meet Standard 2 if they were rated functioning at risk with upward trend or PFC. Sites with other ratings were not considered to meet Standard 2. Since the 2006 rangeland health determinations, additional assessments have been conducted and assessment results have been updated.

As shown in Table 2-6, 68 lentic sites (48 percent of all sites assessed) were in PFC as of the latest assessment. In addition, 23 sites (16 percent) were functioning at risk with an upward trend, while 44 sites (31 percent) were functioning at risk with either no apparent trend or a downward trend, and 7 sites (5 percent) were nonfunctional. As presented in Table 2-7, 93 lotic sites (49 percent of all sites assessed) were in PFC as of the latest assessment. In addition, 32 sites (17 percent) were functioning at risk with an upward trend, while 47 sites (24 percent) were functioning at risk with either no apparent trend or a downward trend, and 20 sites (10 percent) were nonfunctional.

Springs and seeps also occur in the planning area. Springs occur where water flows from an underground aquifer to the surface and usually emerge from a single point. Seeps are similar to springs, though they generally have a lower flow rate than springs and emerge over a larger area, having no well-defined origin. Due to their higher volume, springs have the potential to form a stream and create riparian habitat (US Fish and Wildlife Service, undated). Springs are important components of the desert ecosystem for a number of reasons. Historically, springs were the only reliable source of water for humans and animals, other than perennial streams, which are limited in the planning area. Springs are biodiversity hotspots that support a large proportion of the aquatic and riparian species in arid regions (Sada and Pohlman 2002).

Table 2-6
PFC Assessment Results for Lentic Sites

ID	Riparian/Wetland Area	Year Assessed	Rating¹	Trend
LE0001	Sand Spring	2000	FAR	DOWNWARD
		2013	PFC	
LE0002	Cole Spring	2000	NF	
		2013	PFC	
LE0003	Nephi Spring	2000	NF	
		2013	FAR	
LE0004	Brown Spring	2000	FAR	NOT APPARENT
		2013	PFC	
LE0005	Unnamed Spring (on private)	2000		
LE0006	Fin Little Spring	2000	NF	
		2007	FAR	
LE0007	Jenny Clay Hole Spring	2000	FAR	DOWNWARD
		2010	NF	
		2013	FAR	UPWARD
LE0008	Wildcat Spring	2001	FAR	DOWNWARD
		2013	PFC	
LE0009	Box Elder Canyon Spring	2001	NF	
		2010	FAR	UPWARD
		2014	FAR	UPWARD
LE0010	Kitchen Corral Spring	2001	FAR	DOWNWARD
		2007	PFC	
LE0011	Unnamed Spr. N of Kitchen Corral Spring	2001	NF	
		2007	FAR	NOT APPARENT
LE0012	Rockhouse Spring	2001	FAR	DOWNWARD
		2007	PFC	
LE0013	NE Spring	2001	NF	
		2010	FAR	NOT APPARENT
LE0014	Whitehouse Spring	2001	PFC	
LE0015	Calf Spring	2001	FAR	UPWARD
LE0017	Lake Cove Spring	2001	NF	
		2007	NF	
LE0018	Round Valley Seep	2001	NF	
		2007	PFC	
LE0019	Fourmile Water	2001	PFC	
LE0020	No Name Spring	2001	NF	
LE0021	Wiregrass Spring	2001	FAR	DOWNWARD
LE0023	John Henry Spring	2002	PFC	
LE0024	Clints Canyon Spring	2002	PFC	
LE0025	Gunsight Spring	2002	PFC	
LE0026	Water Canyon Spring	2002	FAR	NOT APPARENT

Table 2-6
PFC Assessment Results for Lentic Sites

ID	Riparian/Wetland Area	Year Assessed	Rating¹	Trend
LE0027	Warm Creek Spring	2002	PFC	
LE0028	Joe Perdence Spring	2002	FAR	NOT APPARENT
		2010	PFC	NOT APPARENT
LE0029	Harris Wash Corral Spring	2002	PFC	
LE0030	Upper Cattle	2002	PFC	
LE0031	Circle Spring	2002	FAR	NOT APPARENT
LE0032	Wild Rose Spring	2002	FAR	UPWARD
LE0033	Horse Spring	2002	PFC	
LE0034	Lower Trail Spring	2002	PFC	
LE0040	Slickrock Water	2002	PFC	
LE0041	25 Mile Corral Spring	2002	PFC	
LE0042	Kent Spring	2002	FAR	NOT APPARENT
		2010	PFC	
LE0043	Lake	2002	PFC	
LE0044	Cougar Spring	2002	PFC	
LE0045	Quakie Spring	2002	PFC	
LE0046	Georgie Hollow Spring	2002	FAR	UPWARD
LE0047	Llewlyn Spring	2002	FAR	NOT APPARENT
		2004	FAR	DOWNWARD
		2007	FAR	UPWARD
LE0048	Mudholes Spring	2002	FAR	DOWNWARD
		2004	FAR	DOWNWARD
		2007	FAR	UPWARD
LE0049	Pocket Hollow Spring	2002	NF	
		2002	FAR	DOWNWARD
		2004	FAR	DOWNWARD
LE0050	Lower Coyote Spring	2001	NF	
		2007	PFC	
LE0051	Cane Bench Well	2002	PFC	
LE0052	Cliff Spring	2002	FAR	NOT APPARENT
LE0053	Emigrant Spring	2002	PFC	
LE0059	Center Knoll Spring	2003	PFC	
LE0500	Pump Canyon	2014	FAR	UPWARD
LE0501	Gratuitous Spring	2001	FAR	DOWNWARD
		2007	FAR	NOT APPARENT
		2014	PFC	
LE0502	Pump House Spring	2001	PFC	
LE0503	Unnamed Spring	2001	PFC	
LE0504	Unnamed Spring	2001	FAR	NOT APPARENT
LE0505	Rock Springs	2001	FAR	DOWNWARD

Table 2-6
PFC Assessment Results for Lentic Sites

ID	Riparian/Wetland Area	Year Assessed	Rating¹	Trend
LE0510	Tibbet Spring	2001	FAR	DOWNWARD
		2007	FAR	UPWARD
LE0511	Unnamed Spring	2001	FAR	DOWNWARD
		2007	FAR	UPWARD
LE0512	Unnamed Spring	2001	FAR	NOT APPARENT
LE0514	Unnamed Spring	2001	FAR	DOWNWARD
LE0515	Brinkerhoff Spring	2002	FAR	DOWNWARD
LE0516	Unnamed	2002	NF	DOWNWARD
LE0518	Unnamed	2002	FAR	DOWNWARD
LE0519	Unnamed	2002	FAR	DOWNWARD
LE0521	Calf Creek Headspring	2002	PFC	
LE0522	Unnamed	2002	FAR	DOWNWARD
LE0523	Calf Creek	2002	PFC	
LE0524	Lower Calf Creek	2002	PFC	
LE0525	Artesian Well	2002	PFC	
LE0527	Henrieville Spring	2002	PFC	
LE0529	Fortymile Spring	2002	FAR	DOWNWARD
		2007	FAR	NOT APPARENT
		2010	FAR	NOT APPARENT
		2014	FAR	UPWARD
LE0530	Willow Gulch Spring	2002	FAR	DOWNWARD
		2007	PFC	
LE0531	Unnamed Spring in Sooner Gulch	2002	NF	
		2007	FAR	DOWNWARD
		2010	PFC	NOT APPARENT
LE0532	Soda Spring	2002	FAR	DOWNWARD
		2007	NF	
		2010	FAR	DOWNWARD
		2014	FAR	DOWNWARD
LE0533	East 50-mile Spring	2002	NF	NOT APPARENT
		2007	NF	
		2010	FAR	UPWARD
		2014	FAR	UPWARD
LE0536	Upper Hurricane # I	2002	FAR	NOT APPARENT
		2007	PFC	
LE0537	Upper Hurricane II	2002	FAR	DOWNWARD
		2010	PFC	
		2014	PFC	
		2007	FAR	NOT APPARENT

Table 2-6
PFC Assessment Results for Lentic Sites

ID	Riparian/Wetland Area	Year Assessed	Rating¹	Trend
LE0538	Upper Hurricane III	2002	NF	
		2010	PFC	UPWARD
LE0540	Wilcox Spring	2002	NF	
		2007	FAR	NOT APPARENT
LE0545	Little Red Rock Spring	2002	FAR	DOWNWARD
		2002	FAR	DOWNWARD
		2010	PFC	NOT APPARENT
		2014	PFC	
LE0546	Little Red Rock Sp. II	2002	FAR	DOWNWARD
		2010	PFC	NOT APPARENT
		2014	PFC	
LE0550	Upper Reese Seep	2002	FAR	DOWNWARD
		2010	PFC	
LE0551	Cat Spring	2002	FAR	DOWNWARD
		2010	PFC	
LE0552	Glasseye Spring	2002	PFC	
LE0553	Neaf Spring	2002	FAR	DOWNWARD
LE0554	Unnamed (Varney-Griffin)	2002	PFC	
LE0556	Natural Tank		PFC	
LE0557	Sandstone Tank I	2002	PFC	
LE0558	Sandstone Tank 2	2002	PFC	
LE0559	Sandstone Tank 3	2002	PFC	
LE0560	Calf Spring	2003	FAR	NOT APPARENT
LE0567	Below Harry Cowles Spring		FAR	NOT APPARENT
LE0604	West End Spring	2002	FAR	DOWNWARD
LE0605	West End Spring	2002	NF	
LE0900	Harry Cowles Spring	2002	FAR	DOWNWARD
LE0901	Trib. Spencer	2002	FAR	NOT APPARENT
LE0903	Gates Spring	2002	NF	
		2004	NF	
LE0905	Releshen Seep	2002	NF	
LE0905	Releshen Seep	2010	FAR	
LE0906	Pocket Hollow Spring	2002	NF	
		2002	FAR	DOWNWARD
LE1000	Headquarters Spring	2009	FAR	DOWNWARD
LE1001	Headquarters Spring 2	2001	FAR	DOWNWARD
LE1002	Headquarters Spring I	2001	FAR	DOWNWARD
LE1003	Spring below rockfall on Hackberry	2001	FAR	NOT APPARENT

**Table 2-6
PFC Assessment Results for Lentic Sites**

ID	Riparian/Wetland Area	Year Assessed	Rating¹	Trend
LEI200	Sheep Creek Above Dam at Skutumpah Road X'ing	2001	FAR	UPWARD
LEI201	Sheep Creek Below Dam	2001	PFC	
LEI202	Sheep Creek Below Dam	2001	FAR	DOWNWARD
LEI203	Glass Eye Canyon	2002	PFC	
LEI204	Salt Spring	2002	NF	
		2007	FAR	UPWARD
LEI205	Old Corral Spring	2002	FAR	DOWNWARD
		2007	FAR	No Apparent Trend
LEI206	First Point Spring	2002	FAR	DOWNWARD
		2007	FAR	UPWARD
LEI207	Adams Spring	2002	PFC	
		2012	PFC	
LEI208	Corral Draw Spring	2002	FAR	NOT APPARENT
		2012	FAR	
LEI210	Unnamed Spring	2002	PFC	
LEI250	Unnamed – West Moody	2003	PFC	
LEI251	Middle Moody Spring	2003	PFC	
LEI253	Beauty Spot	2003	PFC	
LEI254	Cottonwood Spring	2003	PFC	
LEI501	Rock Springs	2002	FAR	UPWARD
LEI502	Mossy Dell Spring	2002	FAR	DOWNWARD
LEI503	Cockscomb Spring	2002	PFC	
LEI504	Wire Spring	2002	FAR	DOWNWARD
		2007	FAR	UPWARD
LEI505	East End Spring	2002	FAR	DOWNWARD
		2007	FAR	UPWARD
LEI506	Unnamed Cliff Spring	2002	FAR	DOWNWARD
		2007	PFC	
LEI507	Maple Spring	2002	NF	
		2007	FAR	NOT APPARENT
LEI508	Trail Hollow Seep	2002	FAR	DOWNWARD
		2007	FAR	NOT APPARENT
LEI509	Bull Ridge Cliff Spring	2002	FAR	DOWNWARD
LEI510	Burn Spring	2002	FAR	DOWNWARD
		2007	FAR	UPWARD
LEI511	Buck Ridge	2002	NF	
LEI512	Oak Springs	2002	PFC	
LEI513	Sooner Water	2002	FAR	NOT APPARENT
		2007	PFC	

Table 2-6
PFC Assessment Results for Lentic Sites

ID	Riparian/Wetland Area	Year Assessed	Rating¹	Trend
LEI514	Upper Cottonwood Spring	2002	FAR	DOWNWARD
		2007	FAR	DOWNWARD
		2014	FAR	UPWARD
LEI515	Pole Well Spring	2002	FAR	DOWNWARD
		2007	FAR	NOT APPARENT
LEI516	Unnamed Seep	2002	PFC	
LEI518	Ford Well Spring	2002	FAR	DOWNWARD
LEI700	Llellyn Spring	2002	PFC	
LEI701	Grand Bench Spring	2002	NF	
LEI702	Cane Seep	2002	PFC	
LEI703	Seep/Hanging Garden	2002	PFC	
LEI704	Cave Spring	2002	PFC	
		2007	FAR	NOT APPARENT
		2014	PFC	
LEI710	Unnamed below Old Corral Spr	2007	FAR	NOT APPARENT
LEI711	Tang Spring	2007	PFC	
LEI712	Unnamed on Buck Ridge	2007	FAR	NOT APPARENT
LEI713	Unnamed Buck Ridge no.2	2007	FAR	UPWARD
LEI714	Lower Cottonwood Spring	2007	PFC	
LEI716	Willow Tank	2007	FAR	NOT APPARENT
LE2000	Buckskin Gulch Spring	2004	FAR	DOWNWARD
		2010	FAR	NOT APPARENT

Source: BLM GIS 2014a

PFC: proper functioning condition

FAR: functioning at risk

NF: non-functional

Table 2-7
PFC Assessment Results for Lotic Sites

ID	Riparian/Wetland Area	Year Assessed	Rating¹	Trend	Miles
LO0001	Harris	2001	FAR	NOT APPARENT	1.333
		2010	FAR	UPWARD	1.333
LO0002	Harris	2001	FAR	NOT APPARENT	5.732
LO0003	Harris	2001	PFC		4.707
LO0004	25 Mile	2001	FAR	NOT APPARENT	0.574
		2010	FAR	UPWARD	0.574
LO0005	25 Mile	2001	NF		3.031

Table 2-7
PFC Assessment Results for Lotic Sites

ID	Riparian/Wetland Area	Year Assessed	Rating¹	Trend	Miles
LO0006	25 Mile	2001	FAR	UPWARD	2.477
		2010	PFC		2.477
LO0007	Cottonwood	2001	FAR	NOT APPARENT	1.244
		2007	FAR	UPWARD	1.244
LO0008	Cottonwood	2001	FAR	DOWNWARD	1.259
		2007	FAR	UPWARD	1.259
LO0009	Cottonwood	2001	PFC		0.769
LO0009A	Upper Box Elder Spring	2014	PFC		0
LO0010	Cottonwood	2001	FAR	NOT APPARENT	1.635
		2014	PFC		1.635
LO0011	Cottonwood	2001	NF		1.299
LO0012	Cottonwood	2001	FAR	DOWNWARD	3.198
		2007	FAR	UPWARD	3.198
LO0013	Aspen Patch	2002	PFC		0.659
LO0014	Cottonwood	2001	FAR	UPWARD	2.91
LO0015	Paria	2001	FAR	DOWNWARD	1.934
LO0016	Paria	2001	FAR	UPWARD	1.518
		2012	PFC		1.518
LO0017	Paria	2001	FAR	UPWARD	2.53
		2012	FAR	UPWARD	2.53
LO0018	Paria	2001	FAR	NOT APPARENT	4.982
LO0019	Paria	2001	FAR	DOWNWARD	2.185
LO0020	Paria	2001	FAR	NOT APPARENT	4.827
LO0021	Paria	2001	FAR	UPWARD	4.374
LO0025	Alvey Wash	2001	FAR	UPWARD	4.832
LO0026	Willow Gulch	2001	FAR	DOWNWARD	0.602
		2010	PFC		0.602
LO0028	25 Mile	2001	FAR	NOT APPARENT	10.68
LO0029	Phipps	2001	PFC		2.72
LO0032	Left Hand Collet	2001	NOT RATED		0
		2010	PFC		0
LO0033	Horse Canyon	2001	FAR	UPWARD	3.681
LO0034	Horse Canyon	2001	FAR	NOT APPARENT	0.873
LO0035	Horse Canyon	2001	FAR	NOT APPARENT	0.898
LO0036	Dry Hollow	2001	PFC		5.747
LO0037	Harris	2001	FAR	UPWARD	2.804
LO0038	Harris	2001	PFC		8.675
LO0039	Paradise R-I (E. Fork)	2001	NF		1.842
		2014	NF		1.842

Table 2-7
PFC Assessment Results for Lotic Sites

ID	Riparian/Wetland Area	Year Assessed	Rating¹	Trend	Miles
LO0040	Paradise (Mainstem) R2	2001	FAR	DOWNWARD	1.15
LO0041	Paradise (Mainstem) R3	2001	FAR	DOWNWARD	4.087
		2014	PFC		4.087
LO0042	Last Chance (junction of Paradise with Escalante Canyon)	2001	FAR	DOWNWARD	4.592
		2014	NOT RATED		4.592
LO0043	Pine Creek	2002	PFC		2.685
LO0044	Pine Creek	2002	FAR	DOWNWARD	3.741
LO0045	Coyote Gulch	2002	PFC		7.812
LO0046	Coyote Gulch	2002	FAR	UPWARD	5.359
LO0047	Last Chance Reach 5	2002	FAR	DOWNWARD	4.998
		2010	FAR	UPWARD	4.998
		2014	PFC		4.998
LO0048	Last Chance Reach 6	2002	FAR	NOT APPARENT	18.759
		2014	PFC		18.759
LO0050	Boulder Draw	2002	PFC		0.954
LO0051	Spencer Canyon	2002	FAR	DOWNWARD	0.525
LO0052	Spencer Canyon	2002	FAR	UPWARD	0.273
LO0053	Harry Cowles	2002	FAR	DOWNWARD	0.322
LO0054	Indian Gordens	2002	FAR	DOWNWARD	0.64
LO0055	Spencer Canyon	2002	FAR	DOWNWARD	0.728
LO0056	Spencer Canyon	2002	FAR	UPWARD	1.286
LO0057	Pocket Hollow	2002	NF		0.924
LO0058	Gates Draw	2002	NF		0.38
LO0059	Little Valley Creek	2002	NF		1.28
LO0060	Upper Little Valley	2002	NF		0.646
LO0062	Drip Tank	2002	FAR	UPWARD	2.072
		2014	PFC		2.072
LO0063	Wesses	2002	FAR	UPWARD	1.963
LO0064	John Henry	2002	FAR	DOWNWARD	1.682
LO0065	Clints Canyon	2002	FAR	UPWARD	1.251
LO0066	Clay Gorge	2002	FAR	DOWNWARD	0.499
LO0067	Allens Creek	2002	FAR	DOWNWARD	0.868
LO0068	North Creek	2002	PFC		5.784
LO0069	Davis Gulch	2002	PFC		3.156
LO0070	Llewellyn Canyon	2002	PFC		1.395
LO0071	Varney Creek	2002	PFC		2.572
LO0072	Varney Creek	2002	PFC		2.87
LO0073	Scorpion Gulch	2002	PFC		0.595
LO0074	Scorpion Gulch	2002	PFC		1.975

Table 2-7
PFC Assessment Results for Lotic Sites

ID	Riparian/Wetland Area	Year Assessed	Rating¹	Trend	Miles
LO0075	Birch Creek	2002	FAR	UPWARD	2.305
LO0076	Birch Creek	2002	FAR	DOWNWARD	3.608
LO0077	Left Hand Varney Creek	2002	FAR	UPWARD	0.994
LO0078	Hurricane Wash	2002	PFC		1.632
LO0100	4 Mile	2001	FAR	DOWNWARD	0.916
LO0102	4 Mile	2001	PFC		0.999
LO0103	4 Mile	2001	FAR	NOT APPARENT	1.801
LO0104	Tommy Smith	2001	FAR	UPWARD	4.194
LO0106	Wahweap	2001	FAR	UPWARD	2.978
LO0107	Headquarters Cabin Wash	2001	NF		0.361
LO0108	Hackberry	2001	PFC		1.882
LO0109	Hackberry	2001	PFC		1.588
LO0110	Hackberry	2001	FAR	NOT APPARENT	0.826
LO0111	Hackberry	2001	FAR	UPWARD	0.903
LO0112	Hackberry	2001	PFC		2.744
LO0113	Hackberry	2001	PFC		1.83
LO0114	Willis	2001	NF		2.886
LO0115	Willis	2001	NF		2.09
LO0116	Willis	2001	FAR	DOWNWARD	0.202
LO0117	Willis	2001	NF		1.173
LO0118	Paria	2001	FAR	UPWARD	9.263
LO0119	Paria	2001	NF		1.374
		2007	NF		1.374
LO0120	Paria	2001	FAR	NOT APPARENT	0.883
		2007	FAR	UPWARD	0.883
LO0121	Sheep Creek	2001	FAR	UPWARD	0.828
LO0122	Heward Creek	2001	FAR	NOT APPARENT	0.426
LO0123	Heward Creek	2001	PFC		0.18
LO0127	Henrieville	2001	FAR	UPWARD	2.842
LO0128	Henrieville	2001	FAR	NOT APPARENT	2.664
LO0129	Henrieville	2001	PFC		1.843
LO0130	Little Creek	2001	PFC		2.529
LO0131	Little Creek	2001	PFC		1.482
LO0135	Bullrush Hollow	2001	NF		1.198
LO0137	North Canyon	2001	FAR	NOT APPARENT	2.618
LO0138	Henrieville	2001	FAR	NOT APPARENT	2.024
LO0139	Henrieville	2001	NF		0.361
LO0140	Little Creek	2001	NF		1.619

Table 2-7
PFC Assessment Results for Lotic Sites

ID	Riparian/Wetland Area	Year Assessed	Rating¹	Trend	Miles
LO0141	Gulch	2001	PFC		6.997
LO0142	Gulch	2001	FAR	NOT APPARENT	1.091
LO0143	Boulder Creek	2001	PFC		4.185
LO0144	Boulder Creek	2001	PFC		1.214
LO0145	Gulch	2001	PFC		1.13
LO0146	Unnamed	2001	PFC		0.45
LO0147	Gulch	2001	FAR	DOWNWARD	4.418
		2007	FAR	NOT APPARENT	4.418
		2012	NOT RATED		4.418
LO0148	Unnamed	2001	PFC		0.363
LO0149	Gulch	2001	PFC		1.236
LO0150	Water Canyon	2001	PFC		1.455
		2012	PFC		1.455
LO0151	Boulder Creek	2001	FAR	NOT APPARENT	5.869
LO0152	Gulch	2001	FAR	DOWNWARD	2.736
		2007	PFC		2.736
LO0153	Gulch	2001	FAR	NOT APPARENT	2.208
		2007	FAR	DOWNWARD	2.208
LO0154	Unnamed (Laminite Arch)	2001	FAR	NOT APPARENT	1.485
		2007	FAR	NOT APPARENT	1.485
LO0155	Deer Creek	2001	PFC		3.634
LO0157	Hot Canyon Reach I	2002	PFC		0.648
LO0158	Hot Canyon	2002	FAR	NOT APPARENT	1.358
LO0159	Slickrock Canyon	2002	PFC		2.855
LO0160	Cottonwood	2002	PFC		4.429
LO0161	Deer Creek	2002	PFC		1.762
LO0162	Pleasant Grove	2002	FAR	DOWNWARD	0.453
		2007	FAR	UPWARD	0.453
LO0163	S. tributary to Pleasant Grove	2002	PFC		0.239
LO0164	Pinto Mare	2002	PFC		0.417
LO0165	Glass Eye	2002	PFC		0.219
LO0166	Seaman	2002	PFC		0.271
LO0167	Seaman	2002	PFC		0.118
LO0168	Seaman	2002	FAR	DOWNWARD	0.127
LO0169	Steer	2002	FAR	UPWARD	0.934
LO0170	Unnamed I (tributary to Blackburn Canyon)	2002	FAR	DOWNWARD	0.715
LO0171	Unnamed	2002	PFC		0.231

Table 2-7
PFC Assessment Results for Lotic Sites

ID	Riparian/Wetland Area	Year Assessed	Rating¹	Trend	Miles
LO0173	Rock	2002	FAR	NOT APPARENT	0.147
LO0174	Rock	2002	PFC		0.38
LO0175	Boulder Creek	2002	PFC		4.175
LO0176	Deer Creek	2002	FAR	NOT APPARENT	1.762
LO0177	Boulder	2002	PFC		0.979
LO0178	Snake	2002	FAR	NOT APPARENT	0.504
LO0179	Snake	2002	PFC		0.544
LO0180	Calf Creek	2002	PFC		2.912
LO0181	Calf Creek	2002	PFC		1.019
LO0182	Deer Creek	2002	PFC		2.412
LO0183	Deer Creek	2002	PFC		3.342
LO0184	Sand Hollow	2002	PFC		0.835
LO0186	Hog Eye	2002	PFC		0.842
LO0187	Kitchen Canyon	2002	FAR	NOT APPARENT	1.32
LO0190	Lower Reese Canyon	2002	PFC		1.174
LO0196		1997	PFC	NOT APPARENT	12.39
LO0197	Escalante River	1997	PFC	NOT APPARENT	7.223
LO0198	Escalante River	1997	PFC	NOT APPARENT	14.481
LO0199	Escalante River	1997	PFC	NOT APPARENT	5.893
LO0200	Escalante River	2003	PFC	NOT APPARENT	7.356
LO0202	Death Hollow	2003	PFC	NOT APPARENT	13.913
LO0203	Willow Patch	2003	PFC	NOT APPARENT	2.562
LO0204	Escalante River	2003	PFC	NOT APPARENT	6.729
LO0205	Sand Creek	2003	PFC	NOT APPARENT	13.103
LO0206	Butler Valley Seeps	2003	PFC	NOT APPARENT	0.282
LO0207	Upper Valley	2003	NF	NOT APPARENT	7.346
LO0208	Upper Valley	2003	NF	NOT APPARENT	0.401
LO0210	Sweetwater	2003	PFC	NOT APPARENT	1.79
LO0211	Forty Mile Gulch	2003	PFC	NOT APPARENT	1.048
LO0212	Forty Mile Gulch	2003	PFC	NOT APPARENT	1.951
LO0213	Willow Gulch	2003	PFC	NOT APPARENT	1.454
LO0214	Willow Gulch	2003	PFC	NOT APPARENT	0.528
LO0215	Fifty Mile Gulch	2003	PFC	NOT APPARENT	2.217
LO0404	Flood Canyon Mouth	1999	FAR	NOT APPARENT	0
		2007	FAR		0
LO0406	Lower Bullrush	1999	NF	NOT APPARENT	0
		2010	FAR	UPWARD	0
LO0407	Upper Bullrush Hollow	1999	NF	DOWNWARD	0
LO0408	Bullrush Hollow	1993	NF		1.198

Table 2-7
PFC Assessment Results for Lotic Sites

ID	Riparian/Wetland Area	Year Assessed	Rating¹	Trend	Miles
LO0501	Stone Donkey	2001	FAR	UPWARD	0.12
LO0502	Stone Donkey	2001	PFC		0.106
LO0503	Rush Beds	2001	PFC		0.119
		2014	FAR	UPWARD	0.119
LO0504	Pump Canyon	2001	NF		0.095
		2014	FAR	UPWARD	0.095
LO0505	N/A	2001	FAR	NOT APPARENT	0.237
		2014	PFC		0.237
LO0506	N/A	2001	PFC		0.277
LO0507	Nipple Spring	2001	FAR	DOWNWARD	0.412
		2007	FAR	UPWARD	0.412
LO0508	Cottonwood Gulch	2002	PFC		0.862
LO0510	East Spencer Draw	2003	PFC		0.309
LO0511	Lake Draw	2003	PFC		0.746
LO0512	Rogers Canyon	2003	FAR	DOWNWARD	0.68
LO0513	Croton Canyon	2003	FAR	NOT APPARENT	0.503
LO1000	Lake	2002	PFC		0.52
LO1001	Lake	2002	PFC		0.601
LO1002	Long Valley Canyon	2001	FAR	NOT APPARENT	0.327
LO1003	Long Valley Canyon	2001	PFC		1.382
LO1004	Long Valley Canyon	2001	FAR	DOWNWARD	0.417
LO1005	Camp Spring/R. Hand Collet	2003	NF		0.789
		2012	FAR	NOT APPARENT	0.559
LO1006	Middle R. Hand Collet	2003	NF		0.463
		2012	NOT RATED		0.463
LO1007	Sarah Anne	2001	NF		0.275
		2012	FAR	NOT APPARENT	0.275
LO1008	Lower R. Hand Collet	2003	FAR	NOT APPARENT	3.205
		2012	PFC		2.707
LO1009	Left Hand Collet	2003	FAR	NOT APPARENT	0.88

Source: BLM GIS 2014a

PFC: proper functioning condition

FAR: functioning at risk

NF: non-functional

Noxious Weeds and Nonnative, Invasive Plants

Invasive plants are found in the planning area, particularly in areas disturbed by surface activities. These plants displace native plant communities and degrade wildlife habitat. Table 2-8, Utah Noxious Weeds Occurrence, lists the Utah designated noxious weeds that may occur in the region, the current management classes for each species, and their occurrence in the planning area. In addition, Russian olive (*Elaeagnus angustifolia*), camelthorn (*Alhagi pseudalhagi*), and Ravenna grass (*Saccharum ravennae*) occur in Glen Canyon.

Table 2-8
Utah Noxious Weeds Occurrence

Common Name	Scientific Name	Class	Occurrence ¹
Bermudagrass	<i>Cynodon dactylon</i>	B	X
Canada thistle	<i>Cirsium arvense</i>	C	
Dalmatian toadflax	<i>Linaria dalmatica</i>	B	
Diffuse knapweed	<i>Centaurea diffusa</i>	A	
Dyers woad	<i>Isatis tinctoria</i>	B	
Field bindweed	<i>Convolvulus arvensis</i>	C	X
Hoary cress	<i>Cardaria</i> spp.	B	X
Houndstongue	<i>Cynoglossum officinale</i>	C	
Johnsongrass	<i>Sorghum halepense</i>	A	X
Musk thistle	<i>Carduus nutans</i>	B	
Perennial pepperweed	<i>Lepidium latifolium</i>	B	
Poison hemlock	<i>Conium maculatum</i>	B	X
Purple loosestrife	<i>Lythrum salicaria</i>	A	
Quackgrass	<i>Elytrigia repens</i>	C	X
Russian knapweed	<i>Acroptilon repens</i>	B	X
Tamarisk (salt cedar)	<i>Tamarix</i> spp.	C	X
Scotch thistle	<i>Onopordum acanthium</i>	B	X
Spotted knapweed	<i>Centaurea biebersteinii</i>	A	
Squarrose knapweed	<i>Centaurea virgate</i>	B	
Yellow starthistle	<i>Centaurea solstitialis</i>	A	

Sources: Utah Weed Control Association 2014; Belliston et al. 2009

¹Includes species that occur or have occurred in or near the planning area.

Class A weeds have a relatively low population size within the state and are of highest priority; they are considered an *Early Detection Rapid Response* weed.

Class B weeds have a moderate population throughout the state and generally are thought to be controllable in most areas.

Class C weeds are found extensively in the state and are thought to be beyond control. Statewide efforts would generally be toward containment of smaller infestations.

In the Colorado Plateau ecoregion, cheatgrass (*Bromus tectorum*) has been identified as a significant change agent; the species can alter ecosystem processes, such as fire regimes, has the potential to expand in distribution in spite of human and natural disturbances, and adapts and shifts its range in response to climate change (Bryce et al. 2012, p. 96). However, cheatgrass is

not considered as much of a threat in the planning area compared to other parts of the ecoregion.

The BLM has inventoried and mapped some of the planning area to determine the extent of invasive plants. In 2012, the BLM inventoried more than 4,600 acres in the Alvey Wash watershed, focusing on Russian olive and tamarisk. Other targeted species included hoary cress, Russian knapweed, and perennial pepperweed, though no infestations of these species were identified. Within the inventoried area, biologists detected nearly 150 acres of Russian olive and more than 200 acres of tamarisk (Edvarchuk and Ransom 2012, p. 39). Rangeland health assessments found that tamarisk (found at 68 percent of riparian sites), yellow clover (37 percent), and cheatgrass (32 percent) were common at riparian sites assessed between 2000 and 2003 (BLM 2006). Cheatgrass is the predominant nonnative, invasive species in upland sites, having been found in 54 percent of sites assessed; cheatgrass was a dominant species in over 20 percent of those sites (BLM 2006).

Trends

Upland Vegetation

Vegetation communities in the Colorado Plateau ecoregion and within the planning area have historically been affected primarily by invasive species conversion and uncharacteristic native vegetation (such as pinyon-juniper expansion). REA data show that the largest changes within the planning area occur in mixed mountain shrubland, where over 85 percent has been affected by uncharacteristic native vegetation, likely pinyon-juniper expansion. Pinyon-juniper shrubland has also experienced substantial changes, with over 20 percent affected by invasive grasses. Disturbances, such as fire and particularly mechanical treatments, have also affected vegetation communities in the planning area. The greatest effects from disturbances have occurred in the big sagebrush shrubland community, with 10 percent of the vegetation community affected (BLM GIS 2014a; REA GIS 2012). Other influences in the ecoregion include urbanization and roads, agriculture, and fire, though these have had less of an effect in the planning area (Bryce et al. 2012, p. 86; BLM GIS 2014a; REA GIS 2012). Depending on the characteristics of the plant community and the type and intensity of grazing, livestock grazing has also had effects on vegetation, such as changes in plant species composition, aboveground primary productivity, and root and soil attributes (Milchunas 2006).

Rangeland health assessments and range monitoring indicate trends and issues in different vegetation communities. These trends are not always in agreement with the larger-scale REA data. This is because the rangeland health assessments are site specific, evaluating on-the-ground conditions. Most oak woodland and pinyon-juniper communities evaluated during rangeland health assessments had none to slight departure from reference conditions (BLM 2006). Many of the blackbrush, sagebrush grassland seedings, desert shrub, and grassland and meadow sites showed moderate, moderate to extreme, and extreme departures from reference conditions (BLM 2006).

Departures from reference conditions for upland vegetation identified in Rangeland Health Assessments are as follows (BLM 2006):

- I. Blackbrush—Soil erosion, exotic invasion, and loss of species composition

2. Desert shrub—Shifts in species composition, exotic invasion, soil loss, and soil erosion
3. Sagebrush grassland seedings—Reduction in biological soil crust, shift in functional/structural groups, increased soil erosion, and bare ground
4. Seedings—Soil stability, desirable species composition, seeded species die-off, and increased cover of exotic annual plants, such as cheatgrass and scotch thistle

In addition, desert and semidesert sand ecological sites, originally a shrub-steppe type composed of *Atriplex canescens*-bunchgrass (*Achnatherum* and *Hesperostipa*) show some of the greatest departures from historical conditions. This appears to be due primarily to overgrazing in the past, possibly before World War II. This eliminated biological soil crusts and grass cover, followed by wind mobilization of sands, especially during periods of drought (personal communication with NPS 2015).

Pinyon-juniper woodlands have expanded over the last century into grassland and shrubland ecosystems throughout the western US. Livestock grazing, changes in fire regimes, and increasing atmospheric carbon dioxide concentrations are thought to be more recent drivers of pinyon-juniper woodland distribution. However, one study suggests that past climate has been more important than livestock grazing in influencing pinyon-juniper persistence in the planning area (Barger et al. 2009, p. 536). Further, many old (over 200 years) pinyon pines were found within the planning area, indicating that pinyon pines have long been established within the planning area (Barger et al. 2009, p. 537). As such, juniper is likely the predominant species that expanded in the planning area.

Riparian and Wetland Vegetation

Riparian systems throughout the Colorado Plateau ecoregion have experienced substantial changes due to direct conversion to other uses, changes in the natural flow regimes and suppression of fluvial processes, livestock grazing, and invasive species (e.g., tamarisk) (Bryce et al. 2012, p. 88). Given their productivity and importance to animals, riparian areas have a greater potential to be impacted by livestock grazing compared with adjacent less productive communities, but also potential for more rapid recovery from disturbance because of faster growth rates of the vegetation (Milchunas 2006, p. 80).

In the planning area, PFC assessments noted impacts from heavy use by livestock of riparian and wetland areas, such as increased sloughing and erosion of banks from hoof action and trampling of vegetation near springs, in many of the allotments assessed. Other impacts noted included dewatering, loss of riparian and wetland vegetation, poor recruitment of native species, and replacement of native species by tamarisk, Russian olive, and annual grasses and forbs. In many areas, a change to existing grazing administration was identified as needed to meet or make significant progress toward meeting the rangeland health standard for riparian and wetland areas (BLM 2006). To address these issues, the BLM and permittees have taken a variety of measures, as presented in Table 2-4, Allotments Not Meeting Rangeland Health Standards Due to Livestock Grazing in 2006, including coordinating voluntary nonuse, removing feral cattle, fencing springs and seeps, repairing existing infrastructure, and changing season of use.

Since 2000, monitoring has occurred on approximately 360 miles of streams (i.e., lotic reaches) and at more than 100 seeps or springs (i.e., lentic sites). The BLM has conducted additional PFC assessments in the Circle Cliffs, Collet, Cottonwood, Ford Well, Fortymile Ridge, Headwaters, Hells Bellows, Last Chance, Lower Cattle, Mollies Nipple, Soda, Swallow Park, Upper Paria, and Vermilion allotments since those assessments done for the 2006 rangeland health determinations (see Tables 2-6 and 2-7).

In 2013, Garfield County contracted riparian PFC assessments on all riparian areas in the Cottonwood, Death Hollow, Lower Cattle, Mollies Nipple, and Soda allotments. These allotments are part of a group of 18 allotments found to be not meeting Standard 2 in the 2006 rangeland health determinations for GSENM.

The results of these assessments indicated that the BLM management actions to correct riparian issues associated with livestock grazing improved rangeland health. The report by the Garfield County contractor (Stager's Environmental Consulting 2014) concludes that Cottonwood, Death Hollow, and Lower Cattle allotments are likely meeting land health standards as a result of BLM management. The report also concludes that Mollies Nipple and Soda allotments are likely not meeting land health standards due to livestock grazing, but that the BLM has made measureable progress toward meeting standards since the 2006 determination (Stager's Environmental Consulting 2014). Overall, most of the riparian and wetland sites evaluated show an improvement.

Noxious Weeds and Nonnative, Invasive Plants

As ground disturbance and human visitation increase in areas of known populations, the likelihood that noxious weeds and invasive plants would move into this disturbance also increases. Another source of potential noxious weed and invasive plant infestations is routine monument operations, such as road maintenance, firefighting, and even weed control operations (Edvarchuk and Ransom 2012, p. 41). Focused efforts have limited the spread and reduced the size of invasive plant populations in areas. Such efforts include spot treatment of noxious weeds; pre-emergent herbicide application prior to seeding (targeting cheatgrass); mowing or Dixie harrowing and seeding; prescribed fire use; and follow-up seeding with native species post-treatment.

Over a six-year study in the planning area, researchers identified the following patterns across the landscape related to invasive plants:

1. Native and nonnative plant species thrive in rare, mesic habitats that are high in soil fertility, moisture, and foliar cover.
2. Highly disturbed habitats, such as post-burn areas, have exceedingly high levels of plant invasions related to the destruction of soil crusts and local displacement of native species by nonnative species.
3. More common xeric habitats are high in endemic species and have considerably lower nonnative species and cover.
4. Plant species life history can be an important predictor of successful invasion because it integrates specific environmental variables (Stohlgren et al. 2006, p. 282).

Forecast

Upland Vegetation

Climate change may affect vegetation particularly as temperature increases interact with water limitations. In many vegetation communities, canopy cover of perennial plants has been shown to be sensitive to temperature, whereas canopy cover of annual plants responds to cool season precipitation (Munson et al. 2011, p. 1). REA models predict increasing temperatures in all seasons. For 2015 to 2030, reductions in both the winter and summer precipitation (reduction in the monsoon) are expected; for 2045 to 2060, a slight increase in annual precipitation is expected, particularly during winter.

Winter precipitation is critical to perennial native plants and it enhances annual productivity for certain species (Bryce et al. 2012, p. 145). If both winter and summer precipitation is reduced, trees, especially pinyon pine, and grasses may be reduced (Schwinning et al. 2008 in Bryce et al. 2012, p.145; Munson et al. 2011, p. 1; Barger et al. 2009, p. 537), while shrubs are likely to continue to expand (Munson et al. 2011, p. 1). For woody species, drought-induced water stress has been linked to bark beetle infestations leading to die-off (Breshears et al. 2005, p. 15147). However, interspecific competition may play a role in mediating the effects of climate change (Derner et al. 2003, p. 458).

The REA model predicts the contraction of some of the drier shrublands (sagebrush in particular), savanna pinyon-juniper, and some evergreen forest, by 2060, while grasses are expected to expand in the ecoregion (Bryce et al. 2012, p. 145). Within the planning area, the REA predicts a 26 percent reduction in evergreen tree savanna, such as ponderosa pine, and 17 percent reduction in evergreen shrub savanna, such as sagebrush and saltbrush. The largest expansions are predicted in grasslands, such as those composed of sandhill muhly and blue grama, with up to a twenty-fold predicted increase (BLM GIS 2014a; REA GIS 2012). For both the 2015 to 2030 and 2045 to 2050 periods, the seasonality and intensity of precipitation will be a key factor. If the trend is toward wetter winters or springs, the invasive grasses, such as cheatgrass, will spread and burn in the summer and fall, reinforcing their persistence over larger areas. If multiple wet years occur, grasses may have the advantage over shrubs in establishment and survival (Peters 2011 in Bryce et al. 2012, p. 145).

Riparian and Wetland Vegetation

Based on recent PFC assessments, the condition of riparian and wetlands is improving on the allotments assessed (BLM PFC assessments; Stager's Environmental Consulting 2014). As the BLM makes additional management adjustments for livestock grazing on these and other allotments not meeting Standard 2, the overall riparian and wetland condition will improve.

Given the presence of the tamarisk leaf beetle, it is expected that tamarisk will reduce in density. Depending on future management, this could allow for the natural recolonization of native riparian vegetation, or other exotic species may become established.

Noxious Weeds and Nonnative, Invasive Plants

The BLM expects noxious weeds and nonnative, invasive plant species to continue to spread in many areas. The REA predicts an 85 percent increase in invasive species distribution within the planning area by 2025 (BLM GIS 2014a; REA GIS 2012). In some areas, control efforts will

eradicate species locally. The degree to which these species spread is directly correlated to human activities and control efforts in the area. Some of these species are very invasive and readily transported to uninfested areas. Surface-disturbing activities and vehicular travel mainly contribute to weed proliferation, although natural elements, such as wind and wildlife, will likely also contribute. Range animals, such as livestock and feral and domesticated horses, will also increase the opportunities for invasive plant species to spread and become established through transfer or if improper grazing management practices occur through overgrazing.

Noxious weeds and nonnative, invasive plants will be more likely to establish in newly disturbed areas, especially near existing populations. Since management in the planning area discourages development, these areas are likely to be localized and easily treated.

While it is difficult to predict future introductions of noxious weeds and nonnative, invasive species, the most likely areas for introduction are those where new disturbances occur. Historic evidence indicates that new weed species introduced to the planning area will establish if not eradicated immediately.

Control of noxious weeds and nonnative, invasive plants would depend on the cost and feasibility of available treatment methods. Resource management strategies are in place that would contribute to maintaining current levels or reducing the expansion of these species. Examples of these strategies are minimizing surface disturbance and surface-disturbing activities, requiring prompt reclamation of these disturbed areas, reducing traffic through infested areas, and using fire suppression tactics. Research continues to develop new herbicide formulations and test the effectiveness of biological agents, including pathogens, as tools to control weed species.

Key Features

The Proclamation establishing GSENM identifies the following objects related to vegetation: hanging gardens, tinajas, rock crevice, canyon bottom, and dunal pocket floristic communities; endemic plants and their pollinators; relict plant communities, including No Man's Mesa; pinyon-juniper communities with up to 1,400 year old trees; and riparian corridors (see Section 5.4, GSENM Proclamation and Objects).

Utah has one of the highest rates of endemism¹ in the US and Kane and Garfield Counties have the highest rate of endemism in Utah. Many endemic species are also rare due to their restricted range. There are about 125 species of plants in GSENM that occur only in Utah or on the Colorado Plateau and 11 species of plants in GSENM are found nowhere else (Belnap 1997).

Relict plant communities are areas that have persisted despite the climate changes that have occurred in the west over the last few thousand years (Betencourt 1984 in BLM 2000, p. 25) and/or have not been influenced by settlement and post-settlement activities (such as domestic livestock grazing). This isolation, over time and from disturbance, has created unique areas that can be used as a baseline for gauging impacts occurring elsewhere in GSENM and on the Colorado Plateau (BLM 2000).

¹ When a species occurs exclusively in a defined geographic location

Hanging gardens occur where groundwater surfaces along canyon walls from perched water tables or from bedrock fractures. The existence of hanging gardens is dependent on a supply of water from these underground water sources. The geologic and geographic conditions for hanging gardens exist throughout southern Utah (Welsh and Toft 1981 in BLM 2000, p. 25), including in GSENM. Due to the conditions of isolation produced in hanging gardens, there is a potential for unique species in these areas (BLM 2000).

Data Gaps

GSENM has been implementing the BLM-wide assessment, inventory, and monitoring (AIM) strategy for land health assessment since 2013. Its purpose is to provide scientifically sound and technically defensible multi-scale monitoring of multiple resource conditions to support management and decision-making. The BLM does this partly through improved probabilistic sampling design and standardized inventory, assessment, and monitoring methods. Initially, it has applied the strategy to assess and monitor land health for both land use planning (large scale) and grazing administration (smaller, allotment scale). Applications are as follows:

1. Determining plant community composition (to allow spatially explicit estimates of forage availability using ecological site descriptions)
2. Evaluating options for integrating AIM's probabilistic sampling design into the existing key area-based monitoring framework, while preserving the utility of historic data to establish trends in vegetation condition and plant community structure

Results compare forage production estimates from ecological site descriptions based on the determination of state and community phase from AIM data with those determined from rangeland health monitoring. Resampling and simulation modeling of existing nonprobabilistic data provide estimates of the temporal and spatial representativeness of those data and allow comparison with those from AIM sampling. Evaluations of allotment condition for grazing management based on existing, key area-based data can be supplemented with AIM data.

In 2013, the BLM collected AIM data on one complete allotment (Death Hollow) and part of another (Last Chance). In 2014, it revised the sampling design away from individual allotments to the entire GSENM in order to more quickly demonstrate the utility of AIM data. The sampling design is a stratified random sampling, where strata are based on ecological sites lumped by precipitation class (desert, semidesert, and upland) and by potential vegetation, then weighted by area-wide potential production. More high-production sites are sampled than low-production sites; this is based on the belief that 1) they are likely more heterogeneous and 2) their condition will have a greater effect on planning and administering use. Over 5 years, 500 points will be sampled, balanced spatially and across strata each year. By sampling across all ecological sites found in the plan area and sampling across all strata each year, the BLM is gathering data representative of the entire plan area from the first year. The dataset will become a progressively more accurate representation with each subsequent year.

The BLM is also conducting a research project with Northern Arizona University. It will evaluate options for integrating AIM's probabilistic sampling design into the existing key area-based

monitoring framework, while preserving the utility of historic data to establish trends in vegetation condition and plant community structure.

Two years of data have been collected, but it should not yet be used to make conclusions about trends. As previously mentioned, the sampling design changed between 2013 and 2014 so that representative points of all strata are sampled in a given year, as opposed to focusing on allotments. While this change in design will allow the dataset to become a progressively more accurate representation of the Monument each year, more sample years are needed to improve the confidence in extrapolating the data to represent the Monument.

The BLM does not have site-specific surveys for noxious weeds and nonnative, invasive plants.

2.3 WATER

Regional Context

The planning area is within the Colorado Plateau ecoregion, which is an erosional landscape with wind and water working on layers of sedimentary rock. The Colorado Plateau receives winter precipitation from the Pacific Ocean and variable amounts of summer rain, such as monsoons. Human activities cover urban and industrial development, surface and groundwater extraction, recreation, agriculture, grazing, and the introduction of invasive plants. Across the ecoregion, variability in geology, physiography, elevation, aspect, ground and surface water availability, and soil (texture, depth, and water-holding capacity) is reflected in patterns of vegetative cover. The *Current Condition* section below describes the condition of specific water resources for the planning area.

Indicators

Indicators of the condition of water resources are the following:

1. State and federal water quality standards
2. Water uses
3. BLM Utah's Standards for Rangeland Health and Guidelines for Grazing Management

Current Condition

Precipitation

In general, the average annual precipitation for the planning area is 10 to 20 inches, with areas around Lake Powell receiving less than 10 inches and areas north-northeast of Kanab, Utah, receiving 20 to 30 inches (Utah Division of Water Resources 2014). Escalante, Utah, has an average annual precipitation of 11 inches (Western Regional Climate Center 2014).

Surface Water Sources

Although water shaped much of the terrain of the planning area, there are limited sources of surface water. All the water in this region flows into the Colorado River (whether above or below Glen Canyon Dam).

The Escalante River system, the main stem and many tributaries of which are perennial, flows from the Aquarius Plateau into the upper portions of Lake Powell. Above the town of Escalante, most of the river's flow is diverted seasonally to Wide Hollow Reservoir for irrigation of agricultural lands.

Last Chance Creek and Wahweap Creek are the primary tributaries off the Kaiparowits Plateau, flowing into the main body of Lake Powell. Wahweap Creek and Last Chance Creek are perennial only along portions of their length.

The Paria River sub-basin (including Hackberry Creek and Cottonwood Creek) extends from the Bryce Canyon-Bryce Valley area, terminating below Glen Canyon Dam near Lee's Ferry. The Paria River subbasin is perennial from below the town of Cannonville downstream to below the confluence of Cottonwood Creek, and then becomes intermittent to the Colorado River. The upper reaches of the Paria River are intermittent and often diverted for irrigation of agricultural lands in the Tropic/Cannonville area.

On the west side of the planning area, the Kanab Creek sub-basin (including Johnson Wash and its tributaries) drains into the Grand Canyon. There are approximately 8,285 miles of streams and washes (BLM GIS 2014a). Approximately 96 percent of these are intermittent or ephemeral. Figure 2-3, Surface Water, shows the locations of surface water sources in the planning area.

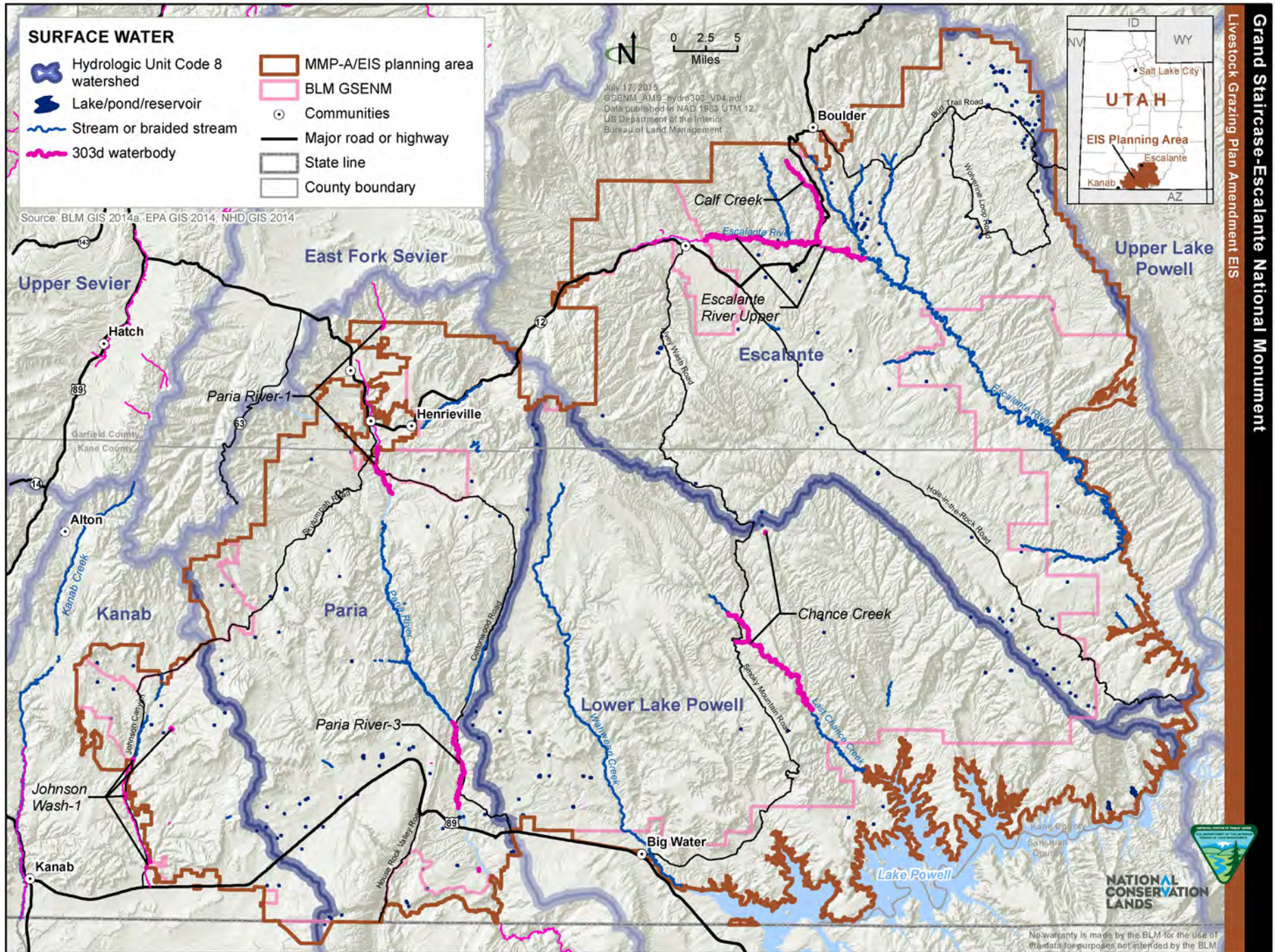
Groundwater Sources

The Colorado Plateau aquifers underlie the planning area (Robson and Banta 1995). The Colorado Plateau aquifers underlie an area of approximately 110,000 square miles in western Colorado, northwestern New Mexico, northeastern Arizona, and eastern Utah. In general, the aquifers in the Colorado Plateau area are composed of permeable, moderately to well-consolidated sedimentary rocks. Much of the land in this sparsely populated region is underlain by rocks that contain aquifers capable of yielding usable quantities of water of a quality suitable for most agricultural or domestic use. Groundwater quantity and quality in the Colorado Plateau aquifers are extremely variable.

There are several aquifer systems underlying GSENM. The major aquifer system is within the Navajo Sandstone and underlying sandstones that exist in most parts of GSENM. This system is part of a regional aquifer system that encompasses parts of Colorado, Arizona, and Utah and is now called the Glen Canyon aquifer. This aquifer is recharged partly by precipitation that infiltrates the Navajo Sandstone where it crops out in the northeastern and southwestern parts of GSENM, and partly by snowmelt and rainfall that infiltrate the higher plateaus to the north and the Kaiparowits Plateau where the water must move down through overlying strata before it reaches the Glen Canyon aquifer. The Glen Canyon aquifer sustains part of the base flow in Johnson Creek, the Paria River, and the Escalante River and its tributaries (Freethey 1997).

Other regional aquifers exist under GSENM. The Kaiparowits Plateau includes the Mesa Verde, the Dakota, the Morrison, and the Entrada-Preuss aquifers that overlie the Glen Canyon aquifer. Carbonate aquifers of Paleozoic age underlie all of GSENM, but are largely inaccessible because of depth. Direction of groundwater movement, estimated from water levels from a few wells and from knowledge about the nature of recharge to aquifers, is from the northwest to the

Figure 2-3



southeast, toward Lake Powell. From meager data sites, it is thought that, locally, groundwater moves toward and discharges into the deepest canyons. Thickness of these regional aquifers ranges from 200 feet for the Dakota aquifer to 2,200 feet for the Glen Canyon aquifer (Freethey 1997).

Water Quality

Every other year, the Utah Department of Environmental Quality, Division of Water Quality compiles all readily available data and conducts analyses to determine whether water quality is sufficient to meet the beneficial uses assigned to waters in Utah (Utah Department of Environmental Quality 2014). The 303(d) List is a list of impaired waters that fail to meet water quality standards or are biologically impaired. Table 2-9, Utah 303(d) Listed Waters for Reporting Year 2010, identifies the waters in the decision area that are on the 303(d) List and their reason for being on the list, and Figure 2-3, Surface Water, shows the locations of the waters in the decision area that are on the 303(d) List. An updated water quality assessment and 303(d) list has been submitted to the EPA for approval. Data reported here are from the 2010 reporting year.

According to the 303(d) report, the probable sources contributing to impairment are largely unknown; however, where known they do not include livestock (grazing or feeding operations), grazing in riparian or shoreline zones, or rangeland grazing. In some cases, livestock grazing may contribute to water quality impairment, whether by direct effects, such as those of animal waste on dissolved oxygen or nutrients (nitrogen or phosphorus), or by indirect effects, such as by increasing erosion, which increases sediment loading (turbidity), total dissolved solids, and associated metals. Such effects may also impair benthic macroinvertebrate and fish habitat and result in low observed/expected bioassessments.

The following livestock grazing allotments contain waters in the decision area that are on the 303(d) List:

Johnson Canyon	Granary Ranch	Hells Bellows
Upper Paria	Cottonwood	Wide Hollow
Headwaters	Willow Gulch	Haymaker Bench
Phipps	Last Chance	

Water quality management plans exist for the Escalante River and Paria River watersheds (Millennium Science & Engineering, Inc. undated[a] and undated[b]). The primary potential source of water temperature alteration within GSENM is from livestock grazing (Millennium Science & Engineering, Inc. undated[a]). Water temperature alteration can still occur even if it is not severe enough to create impaired waters that fail to meet water quality standards. The BLM has worked with permittees to gradually reduce the potential effect of livestock grazing. The BLM closed livestock grazing allotments along the main stem Escalante River, in Sand and Death Hollow watersheds in 1999, primarily to improve riparian and wildlife habitat and reduce livestock recreation conflicts. The BLM has implemented projects since adoption of the plan to restore altered watersheds and improve conditions (Millennium Science & Engineering, Inc. undated[a]).

**Table 2-9
Utah 303(d) Listed Waters for Reporting Year 2010**

Water Body Name	Water Body ID	Location	Cause of Impairment	Cycles Listed	Size	Probable Source Contributing to Impairment
Calf Creek	UT14070005-007_00	Calf Creek and tributaries from confluence with Escalante River to headwaters	Temperature, Water	2008, 2010	8 miles	Unknown
Escalante River Upper	UT14070005-012_00	Escalante River from Boulder Creek confluence to Birch Creek confluence	Benthic Macro-invertebrates Bioassessments	2008, 2010	19 miles	Unknown
Last Chance Creek	UT14070006-004_00	Last Chance Creek and tributaries from Lake Powell to headwaters	Benthic Macro-invertebrates Bioassessments	2008, 2010	17 miles	Unknown
Paria River-1	UT14070007-001_00	Paria River from start of Paria River Gorge to headwaters	Benthic Macro-invertebrates Bioassessments Temperature, Water Total Dissolved Solids	2008, 2010 2008, 2010 2000, 2002, 2004, 2006, 2008, 2010	4 miles	Unknown Drought-Related Impacts Agriculture, Natural Sources
Paria River-3	UT14070007-005_00	Paria River and tributaries from Arizona-Utah state line to Cottonwood Creek confluence	Benthic Macro-invertebrates Bioassessments	2008, 2010	9 miles	Unknown
Johnson Wash-1	UT15010003-004_00	Johnson Wash and tributaries from Utah-Arizona state line to Skutumpah Canyon confluence	Total Dissolved Solids	2008, 2010	1.5 acres	Agriculture

Sources: BLM GIS 2014a; EPA 2012

Various public organizations and government entities conduct measures to control woody invasive plants. This work, principally on Russian olive, has been conducted in the Escalante watershed. In addition, tamarisk has been removed. Woody invasive plants are removed through passive or active revegetation with native species; this provides nonpoint source reduction through both bank stabilization and restoration/enhancement of the riparian community and associated hydrologic, sediment trapping, and biogeochemical processes (Utah Department of Environmental Quality 2013 and Woody Invasive Control Committee 2010).

Rangeland Health Standards

The BLM Utah developed Standards for Rangeland Health and Guidelines for Grazing Management in accordance with 43 CFR, Part 4180 to provide for conformance with the

Fundamentals of Rangeland Health. Through conformance and attainment of Utah's Standards and Guidelines, BLM Utah ensures that the Fundamentals of Rangeland Health are met. According to Standard 4, the BLM Utah and GSENM will apply and comply with water quality standards established by the State of Utah (R.3172) and the Federal Clean Water and Safe Drinking Water Acts (BLM 1997). See Section 2.1 for Standard 4 indicators.

The BLM coordinates monitoring water quality activities with other federal, state, and technical agencies. Livestock grazing allotments in the decision area that do not meet Standard 4 due to livestock grazing are Rock Creek-Mudholes and Vermilion. Grazing was a contributing factor but not the sole causal factor, for Standard 4 not being met in the Headwaters, Last Chance, and Nipple Bench allotments. Standard 4 was not met for the Cottonwood, Coyote, Fortymile Ridge, and Upper Paria allotments, but this was due to factors other than livestock grazing (BLM 2006).

There are three additional allotments in the decision area that did not meet Standard 4 due to natural conditions and geology. Because the factors for not meeting Standard 4 are not issues that the BLM can resolve through management, the allotments were considered to meet rangeland health standards. Those allotments are Deer Springs Point, Wahweap, and Wiregrass (BLM 2006). The criteria and water sources assessed for 303(d) listing and Standard 4 are not necessarily identical.

Range Improvements Involving Water

There are two types of range improvements: nonstructural and structural (BLM 2014c). Seedings or prescribed burns are examples of nonstructural range improvements. Fences or facilities, such as wells or water pipelines, are examples of structural improvements. Structural range improvements involving water in the decision area include dams/reservoirs, earthen check dams, detention dams, retention dams, erosion control dams, dikes/diversions, guzzlers, storage tanks, wells, improved and developed springs, troughs, rain gauges, water sources, and pipelines. Many structural improvements are considered permanent.

Flash Floods

A flash flood is a rapid rise of water (generally within six hours) along a stream or low-lying area after a heavy rainfall or from the failure of a dam, levee, or ice jam. Flash floods occur in the planning area, such as in canyons and washes. The National Weather Service Salt Lake City office produces a product called the Flash Flood Potential Rating for areas such as Glen Canyon and GSENM that is issued twice daily during the summer and fall seasons, approximately mid-May to late October (National Oceanic and Atmospheric Administration 2013). The Flash Flood Potential Rating provides a rating for the potential for flash flooding over the next two days.

Flash floods can affect livestock grazing and water resources. They can damage fences or water-related range improvements, and increase the potential for erosion by stripping vegetation and other soil stabilizing agents from the landscape. This is more likely to occur where vegetation has already been degraded. They can also alter drainage patterns and deposit unusually high volumes of sediment or pollutants in water resources. The longevity of impacts from flash floods varies depending on a variety of factors, including the location, intensity, and duration of the flash flood, the integrity of land surface conditions prior to the flash flood, and the type and location of structures.

Trends

Total dissolved solids are a water quality problem in GSENM. This is due to erosion and the composition of the local geology. Temperature, total phosphorus, and benthic macroinvertebrate bioassessments are also water quality problems. Based on limited data, these water quality problems are believed to be consistent and are not worsening.

Section 319 funding is awarded each year to the State of Utah through a grant from the EPA in accordance with Section 319 of the Clean Water Act. Section 319(h) funds are distributed at the local level to help address water quality issues resulting from nonpoint source pollution. In 2012, Utah BLM continued to implement a Healthy Lands and Watershed Restoration program, focused on improving habitat, vegetation, and improving water quality by reducing erosion from BLM-managed lands. These efforts included many watershed improvement projects that will contribute to improved land health and long-term reduction of erosion and sediment loading, which will also reduce total dissolved solids (salinity). GSENM efforts included the Escalante River Watershed Partnership, which involved woody invasive control, restoration, and inventory projects. Woody invasive control also occurred in Glen Canyon. GSENM efforts also included watershed improvement projects and riparian projects. Glen Canyon efforts included water quality monitoring, grazing management, dreissenid mussel prevention, riparian restoration, and special projects related to OHVs, Lake Powell, bonytail chub reintroduction, and bank erosion on the Colorado River (Utah Department of Environmental Quality 2013).

For the Colorado Plateau ecoregion, creeks, streams, and rivers have experienced diminished in-stream flow and altered flow regimes created by dams, channelization, canal systems, and water diversions (Bryce et al. 2012). River flow regulation, channelization, levees, and dikes have eliminated spring flooding in some cases.

New diversions and water rights occur occasionally. Although water uses are relatively static, use of Wide Hollow Reservoir has increased slightly, and Henrieville water use has also increased. Livestock water uses have remained fairly static.

Since 2006, the BLM, in coordination with permittees, has made changes in the Vermilion and Rock Creek-Mudholes allotments, which failed to meet Standard 4 due to livestock grazing. Such changes include voluntary nonuse, removing feral cattle, maintenance or installation of spring and pasture fencing, and new water developments. As a result of these changes, areas that did not meet standards are now making progress toward doing so, based on recent PFC assessments. See Table 2-4, Allotments Not Meeting Rangeland Health Standards Due to Livestock Grazing in 2006, for more information.

Utah's weather is prone to extremes, from severe flooding to multiyear droughts (Wilkowske et al. 2003). Five major floods occurred during 1952, 1965, 1966, 1983, and 1984, and six multiyear droughts occurred during 1896-1905, 1930-36, 1953-65, 1974-78, 1988-93, and 1999-2002. During 2002, some areas of Utah experienced record-low stream flows. The areal extent of floods is generally limited in size from one to several watersheds. Droughts generally affect most or all of the state.

The BLM issued IM 2013-094, Resource Management During Drought, to provide general guidance regarding BLM program management in the face of drought. It also provides specific

livestock grazing program guidance. Although this guidance is centered on the biological resource programs that have direct impacts on the long-term health of rangelands, the communication and coordination principles apply to many other resource programs as well. The procedures outlined in the IM provide guidelines for line managers regarding their approach to formulating and implementing actions to mitigate the effects of BLM authorized uses on drought-stressed resources. Not all procedures will be applicable to all situations and where necessary, these may be adapted or modified to suit local circumstances. This policy is supplemental to standard BLM program procedures and is intended to be used as a tool to help address and mitigate the impacts of drought (IM 2013-094).

Forecast

The BLM is beginning to make changes to its water quality monitoring plan to ensure there are enough monitoring sites and sufficient data for 303(d) streams in order to identify ways to improve water quality management. The BLM is also working to compile more comprehensive information through monitoring of other aquatic resources.

For the decision area, the BLM assumes populations in nearby communities will remain constant or increase. Increasing populations are expected to place greater demands on recreation opportunities in GSENM and Glen Canyon. Therefore, demand for water supplies to support the public and water-based recreation activities would experience a corresponding increase. New diversions and water rights are anticipated to occur occasionally. Use of Escalante Reservoir is anticipated to increase, and Henrieville water use is also anticipated to increase. Livestock water uses is anticipated to remain fairly static.

There is unallocated water outside of GSENM. There has been some development in areas around Escalante to Boulder, which will increase water use.

The number of allotments failing to meet Standard 4 due to livestock grazing is expected to decrease or remain the same. Improvements in riparian areas, such as fencing out livestock and providing alternate water sources, are expected to improve previous water-related problems. This would decrease the number of allotments not meeting Standard 4 (or at least, the number would remain the same).

Key Features

Key water resource features that guide land use allocation or management decisions involve surface and groundwater. Surface water may be ephemeral, intermittent, or perennial. With respect to livestock grazing, surface water involves streams, springs, ponds, and lakes. It also involves riparian areas and wetlands, which are discussed in Section 2.2. With respect to livestock grazing, groundwater involves aquifers that discharge to surface water and wells. Water sources are identified as one of the Monument objects in the Proclamation (see Section 5.4, GSENM Proclamation and Objects).

Data Gaps

There are inventory gaps in the characterization of water sources, such as springs. Also, there are few stream gages in GSENM and Glen Canyon. Stream gages are used to monitor streams. They provide information about, for example, stream flow and volume. It is important to better understand groundwater-surface water interactions because many of the surface water sources

are groundwater dependent, including springs and most, if not all, streams. Fundamental information on stream flow is an important component of water management and is presently very limited. Without understanding the magnitude and daily/seasonal/inter-annual variation in stream flow, it is difficult to manage all water uses and to ensure adequate protection of all aquatic resources.

2.4 SOIL

Regional Context

The planning area is within the Colorado Plateau ecoregion, which is in portions of Utah, Colorado, New Mexico, and Arizona. The Colorado Plateau REA (Bryce et al. 2012) describes the ecoregion. The ecoregion is an erosional landscape with wind and water working on layers of sedimentary rock. Soils of the ecoregion are relatively undeveloped, having formed in residuum from sedimentary rocks weathering-in-place. Across the ecoregion, the pattern of vegetative cover reflects the variability in geology, physiography, elevation, aspect, ground and surface water availability, and soil (texture, depth, and water-holding capacity).

Geologic and climatic features of Colorado Plateau drylands have produced weakly developed soils (Miller 2005). The physical and chemical characteristics of the soils closely match the shales, sandstones, limestones, and igneous materials from which they were derived. Geomorphic processes, such as erosion and deposition, have built upon this to generate abrupt or gradational juxtapositions of landforms and soils differentiated based on soil depth, particle size distributions, mineralogy, and degree of profile development. Effects of human activities and aeolian dust inputs also influence soil characteristics. Additionally, wind can have important effects on the structure and functioning of dryland ecosystems. Wind strongly affects evapotranspiration rates and, therefore, can modify the energy and water balances of plants and soils. Similar to water, wind is an important force driving the redistribution of soil resources both within and among ecosystems.

Semi-arid and arid landscapes with sparse vegetation and biological soil crust cover lack redundancy in function (Bryce et al. 2012). In other words, when crust is eliminated, so too are the essential functions it provides: nitrogen fixation, carbon storage, the capture of dust and airborne nutrients, moisture retention, and the provision of microsites for native plant germination.

Soils in arid and semiarid regions are particularly critical to sustaining ecosystems because they are more vulnerable to degradation from a number of natural and artificially induced disturbances. Management practices may affect the ability of the various soils to maintain productivity by influencing such disturbances as displacement, compaction, erosion, alteration of organic matter, and soil organism levels. When soil degrades in semiarid regions, natural processes are slow to restore site productivity. Soil bulk density (mass per unit volume), porosity, organic matter content, hydraulic conductivity, moisture content, nutrient content, and soil temperature are affected to various degrees by surface disturbance. In turn, these factors affect soil-water interactions, productivity, nutrient cycling, water holding capacity, and soil erosion rates.

Indicators

Indicators of the condition of soil resources are the following:

1. Soil health, specifically the ability of soils to support vegetation and biological soil crusts representative of particular ecological site (e.g., vegetation type, diversity, density, and vigor)
2. Soil vulnerability to impacts (i.e., fragile or sensitive soils; Bryce et al. 2012, Section 4.1.3.1)
3. BLM Utah's Standards for Rangeland Health and Guidelines for Grazing Management
4. Land disturbance

Current Condition

Soil Characteristics

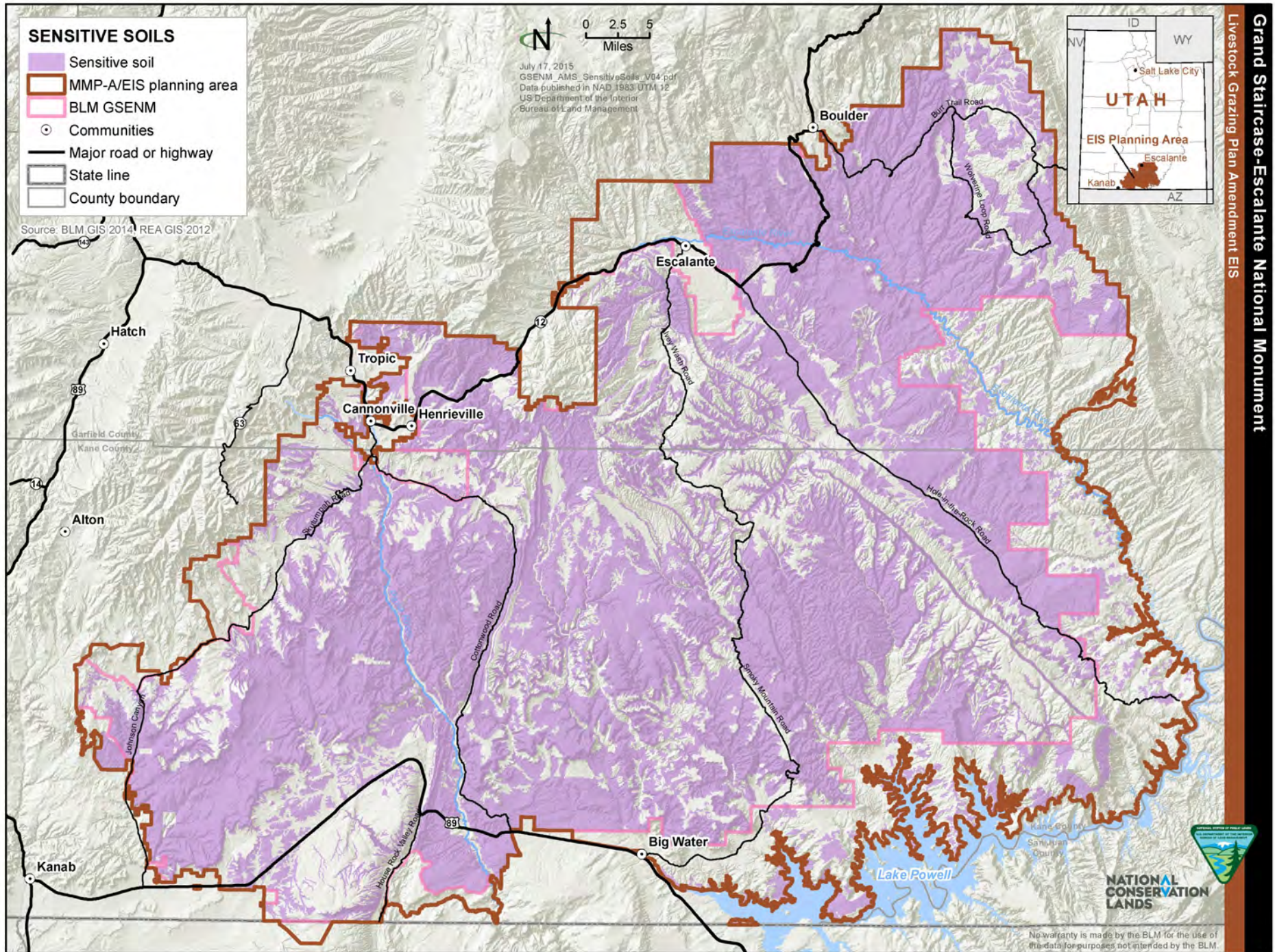
Most of the soils in the planning area are semiarid, young, and poorly developed. Chemical and biological soil development processes, such as rock weathering, decomposition of plant materials, accumulation of organic matter, and nutrient cycling, proceed slowly in this environment. In many areas, natural or geologic erosion rates are too fast to develop distinct, deep soil horizons. Most soils are less than 0.5 meter deep to bedrock. The deeper soils are formed in recent alluvium. Almost all of the local soils are derived from sedimentary rock. The dominant topographic features are structural benches, mesas, valley floors, valley plains, alluvial fans, stream terraces, hills, cuestas, and mountainsides. The NRCS has completed soil surveys for the BLM and NPS in GSENM and Glen Canyon (NRCS 2007, 2010).

Dominant soil orders in the decision area are aridisols (desert soil), entisols, and mollisols. Aridisols are dry soils that have low organic content. They are sparsely vegetated by drought- or salt-tolerant plants and, therefore, erosion is severe both by wind and water. Entisols are soils that have little development, and most are basically unaltered from their parent material. Many different parent materials contribute to varied soil properties of entisols, and they are often found in very dry or cool locations. Mollisols form in semi-arid to semi-humid areas and are characterized by a significant accumulation of humus in the surface horizon. These mineral soils are typically under native grass vegetation and are highly arable. In the decision area, approximately 828,300 acres are aridisols, 1,410,400 acres are entisols, and 14,900 acres are mollisols (BLM GIS 2014a). In general, mollisols are more capable of forage production than aridisols and entisols.

Sensitive Soil

Soils that have characteristics that make them extremely susceptible to impacts and difficult to restore or reclaim are considered sensitive soils. Figure 2-4, Sensitive Soils, is from the REA (Bryce et al. 2012) and shows all classes of sensitive soils, including droughty (marked by little or no precipitation or humidity), shallow, hydric (soils permanently or seasonally saturated by water), gypsiferous (soils containing sufficient quantities of gypsum [calcium sulphate] to interfere with plant growth), salty, and high calcium carbonate (calcareous). The REA does not include data for all sensitive soils in the ecoregion.

Figure 2-4



Biological Soil Crust

Technical Reference 1730-2, *Biological Soil Crusts: Ecology and Management*, contains a description of biological soil crust distribution and factors influencing species composition, ecological roles, response to natural and human actions, management techniques, and monitoring methods (US Department of the Interior 2001). It also explains various ecological roles of biological soil crusts.

Biological soil crusts are comprised of cyanobacteria, fungi, and lichen growing in a symbiotic relationship on the soil surface (Bryce et al. 2012). Soil crusts serve as intermediaries between soil and vegetation. Crusts on fine-textured soils often appear dark, rough, and pinnacled. Those on sand usually do not develop pinnacles and instead appear as a dark, two-dimensional layer on the surface.

Biological soil crusts aggregate surface soil and regulate the water runoff-infiltration balance (Bowker et al. 2006). Crust organisms enhance the nutrient status of soils via nitrogen fixation, carbon fixation, entrapment of aeolian silts and clays, and chelation of metals, all of which affect vascular plant performance. Disturbance due to livestock grazing is the most widespread stressor of crust communities throughout their range. Depending on livestock grazing intensity, livestock disturbance of soil crusts generally results in a reduction of lichen and moss components, diminishing ecosystem functions, and services provided by crusts. Estimates of recovery time from such disturbances are usually measured in decades.

Biological soil crusts are an important component of ecosystems in semiarid areas and may represent up to 70 percent of the living cover (Belnap 1995, p. 179). Research has shown that biological soil crusts provide important contributions to soil stabilization, hydrologic processes, nutrient cycling, and biological diversity in rangeland ecosystems (Miller 2008, p. 251). Biological soil crusts have a stronger direct effect on surface soil stability than plants or mycorrhizal fungi (Chaudhary et al. 2009, p. 116). Biological soil crusts are susceptible to damage by compression caused by grazing or off-road driving and can be negatively affected by fire. Researchers have developed models to facilitate the comparison between actual and potential cover and composition of biological soil crusts. This is so that sites in poor condition can be identified and management changes can be implemented (Miller 2008, p. 251; Bowker et al. 2006, p. 519).

Due to the importance of biological soil crusts in rangeland health, biological soil crust integrity was also assessed in the planning area (Miller 2008). Quantitative data on biological soil crust composition, abundance, and distribution were compared to reference areas; ratings were informed by preliminary results from a concurrent project to develop a spatial predictive model of biological soil crust cover in GSENM (Bowker et al. 2006). The study found that fine-loamy soils associated with the semidesert loam ecological site had high potential to support biological soil crust development (Miller 2008, p. 259). This ecological site corresponds to the Wyoming Big Sagebrush, Saltbush, Blackbrush, Spiny Hopsage, Black Sagebrush, Torrey's Jointfir, Utah Juniper – James Galleta, and Utah Juniper-Pinyon sites shown in Figure 2-2, *Dominant Ecological Site Descriptions – Vegetation Type*. Given the sensitivity of soils and high biological soil crust potential of these sites, and the importance that biological soil crusts play in soil stabilization and other rangeland health factors, the functional significance for biological soil crusts in these sites is particularly high (Miller 2008, p. 259).

Soil crusts are useful ecological indicators of desert condition because they are not only sensitive to disturbance but they respond to disturbances in predictable and quantifiable ways (Bryce et al. 2012). Maps of potential crust abundance indicate the *potential* quantitative cover of biological crusts and major crust constituents (mosses, lichens, dark cyanobacterial crusts) across the Colorado Plateau (Figures 2-5, Potential Early Successional Soil Crust, and 2-6, Potential Late Successional Soil Crust). Comparisons of observed crust distribution with potential distribution can serve as a surrogate for reference condition.

Soil crusts may take decades to recover from disturbance. Therefore, they are not good short-term indicators of the appropriateness of current management actions.

Rangeland Health Standards

Utah's Standards for Rangeland Health and Guidelines for Grazing Management were developed in accordance with 43 CFR, Part 4180 to provide for conformance with the Fundamentals of Rangeland Health. Through conformance and attainment of Utah's Standards and Guidelines, Utah BLM assures that the Fundamentals of Rangeland Health are met. According to Standard I, upland soils exhibit permeability and infiltration rates that sustain or improve site productivity, considering the soil type, climate, and landform (see Section 2.1 for Standard I indicators).

There are six livestock grazing allotments in the decision area that do not meet Standard I, and livestock grazing was determined to be the causal factor for not meeting on all six allotments. The six allotments are: Circle Cliffs, Coyote, Mollies Nipple, Soda, Upper Paria, and Vermilion (BLM 2006). To address issues related to Standard I, the BLM recommended a variety of changes to grazing management specific to each allotment, including suspension of use, deferred rotation grazing systems, alternating seasons of use, adjusting season of use, restoration, subdivision of pastures, new water sources, and adjustments to authorized use during drought periods.

Land Disturbance

The primary sources of land disturbances in GSENM and Glen Canyon are from livestock grazing and recreation. Livestock grazing and recreation are discussed in Sections 2.1 and 2.5, respectively.

Trends

Persistent wind and both wind and water erosion of soil are natural phenomena in desert ecosystems. However, human activities, including past mining, recreation, and grazing, all disturb the soil surface, affecting protective crusts and vascular plants and exposing underlying soils to wind and water erosion (Bryce et al. 2012).

Six allotments did not meet Standard I in the 2006 Rangeland Health Determinations. Since 2006, the BLM, in coordination with permittees, has made changes in the Circle Cliffs, Coyote, Mollies Nipple, Soda, Upper Paria, and Vermilion allotments, which failed to meet Standard I due to livestock grazing. Such changes include seeding restoration, restricting season of use, maintenance of range improvements, voluntary nonuse, and removal of feral cattle. As a result of these changes, many areas that did not meet standards are now making progress toward doing so, based on recent upland assessments. See Table 2-4, Allotments Not Meeting Rangeland Health Standards Due to Livestock Grazing in 2006, for more information.

Figure 2-5

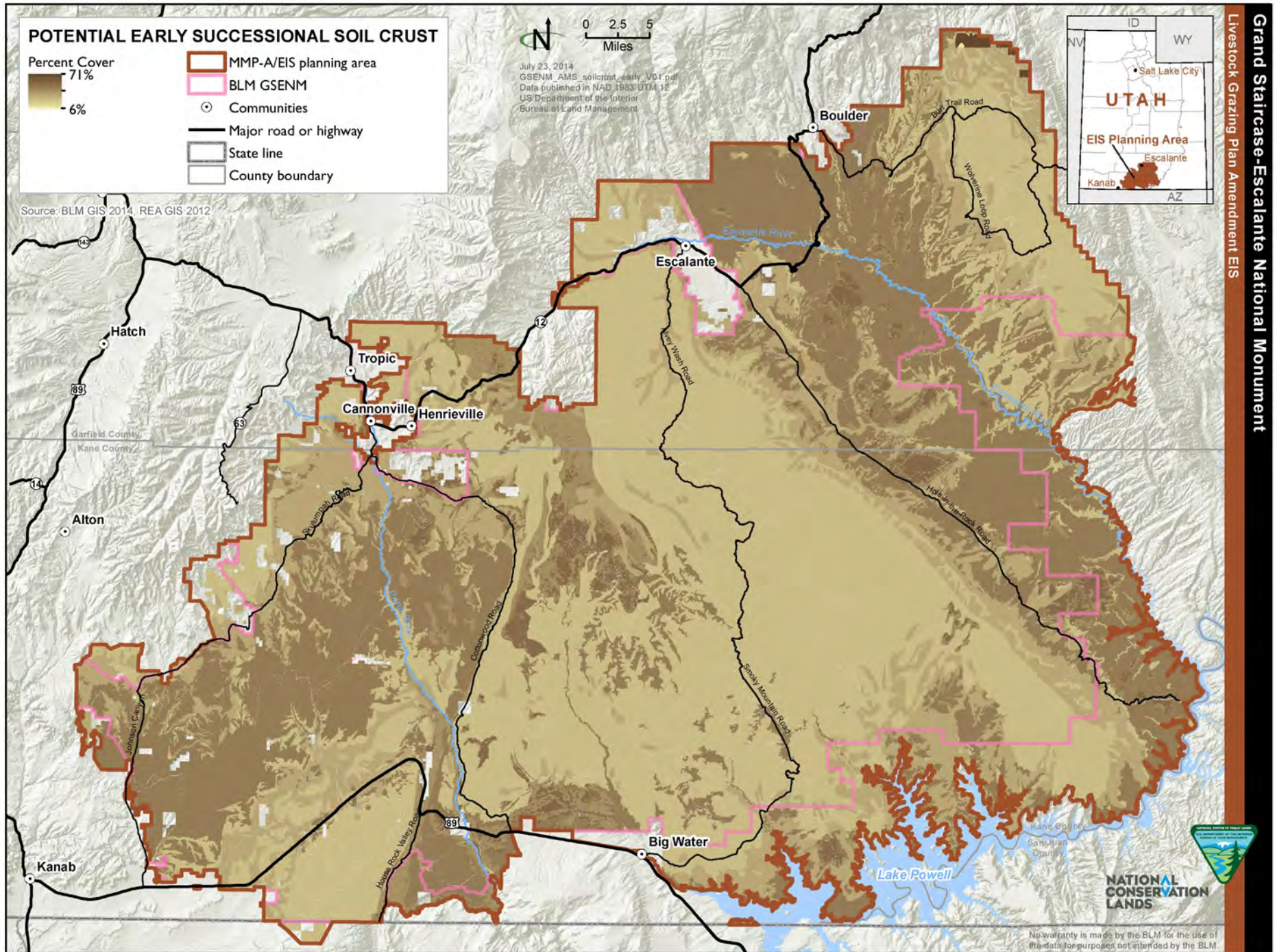
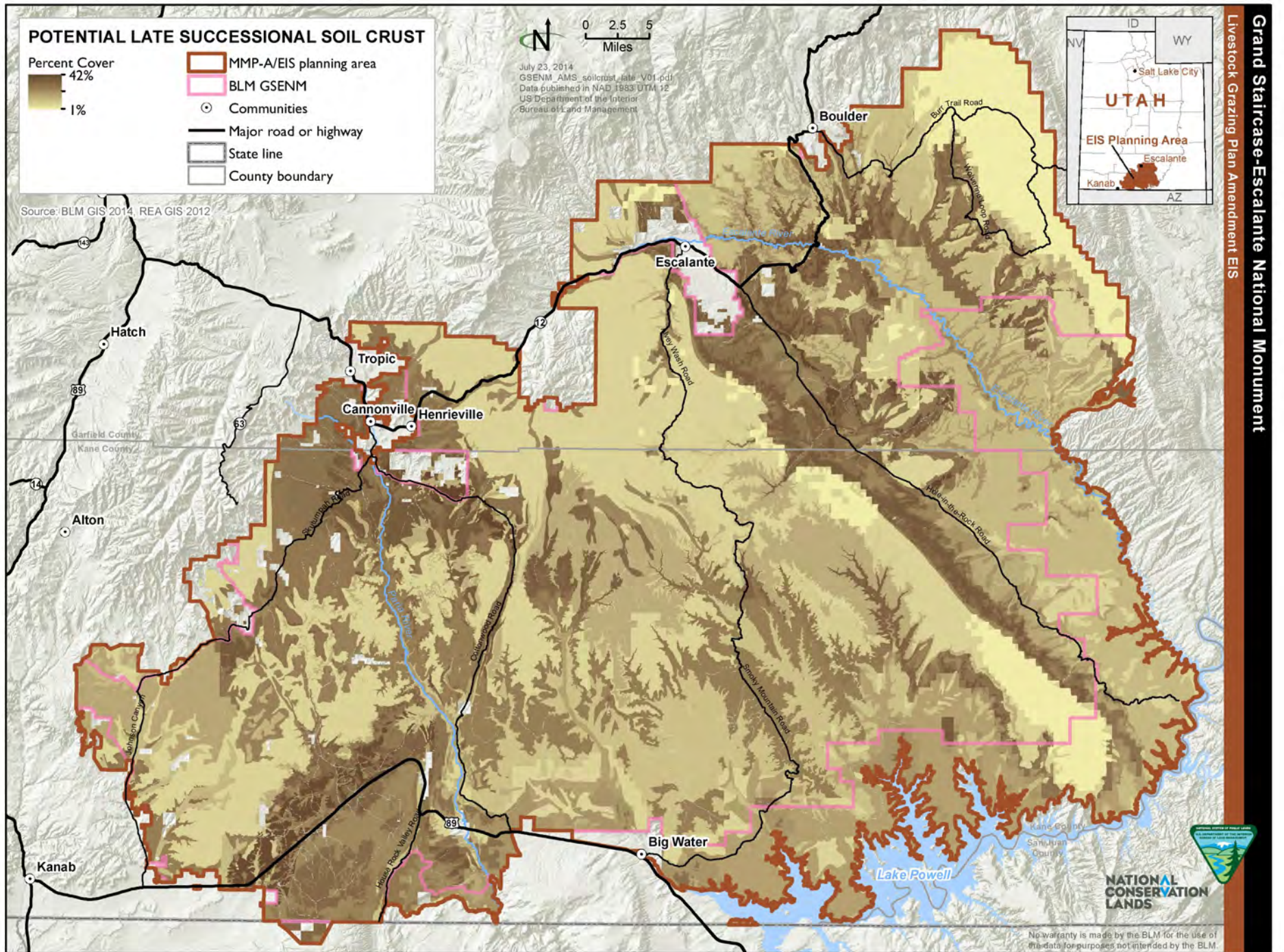


Figure 2-6



As mentioned in *Vegetation Trends* in Section 2.2, issues identified in rangeland health assessments in sagebrush grassland seedings were a reduction in biological soil crust, a shift in functional/structural groups, increased soil erosion, and bare ground (BLM 2006).

Forecast

The BLM expects human activities to continue to disturb the soil surface, thereby affecting soil crusts, and exposing underlying soils to wind and water erosion.

Key Features

According to the REA, biological soil crust is a key conservation element (Bryce et al. 2012). Biological soil crusts are also identified as a Monument object, along with unusual and diverse soils (see Section 5.4, GSENM Proclamation and Objects).

Data Gaps

Soil crusts have not been inventoried across the entirety of the Monument. However, the BLM does have a predictive model of soil crust developed from the NRCS soil survey (Bowker et al. 2006). The BLM also has site-specific information related to soil crust.

2.5 RECREATION

Recreation is a major and growing use of BLM- and NPS-managed lands within the planning area. The planning area's unique geologic, historic, and scenic features create a desirable setting for outdoor recreational enthusiasts. The types of recreation in the planning area include camping, fishing, hiking, backpacking, hunting, mountain biking, kayaking, OHV use, and driving for pleasure. Other popular recreation destinations in the region are Grand Canyon, Zion, Bryce Canyon, and Capitol Reef National Parks, and the Dixie National Forest. Proximity to these areas allows visitors to access GSENM and Glen Canyon.

The increasing popularity of the planning area's unique waterways and other areas for motorized, mechanized, equestrian, and nonmotorized recreation raises the potential for conflict with ongoing livestock grazing practices; at the same time, it presents challenges for the continued use of the area for livestock grazing. A conflict between recreation and grazing results from any real or perceived reduction in the viability, efficiency, and safety of either or both uses.

Recreation users report such conflicts as degraded stream channels and underlying or adjacent trails, dust from livestock herding, and livestock droppings or carcasses obstructing recreation. Recreation users also report conflicts with livestock grazing due to vegetation and soil crust damage and soil trampling, predator control activities (trapping and poisoning), livestock odors, biting flies, safety concerns with cattle on roadways, damage to road infrastructure, and degraded wildlife habitat.

At the same time, recreation users can disrupt grazing, for example, by leaving gates open or causing livestock to move into slot canyons. Impacts on grazing from recreation can subsequently intensify or expand impacts on recreation from grazing. While the frequency and intensity of conflicts is greatest in high-use recreation areas, such as the Gulch, Buckskin Gulch, and the Paria-Hackberry area, where grazing also occurs, the concurrent use of an area for both uses does not automatically result in a conflict. In some cases, the presence of livestock may augment a recreation user's experience. Particularly for recreation users knowledgeable about

livestock use in GSENM, there is an understanding that livestock grazing is an aspect of tourism and recreation in GSENM. Increasing education could therefore alleviate future conflicts.

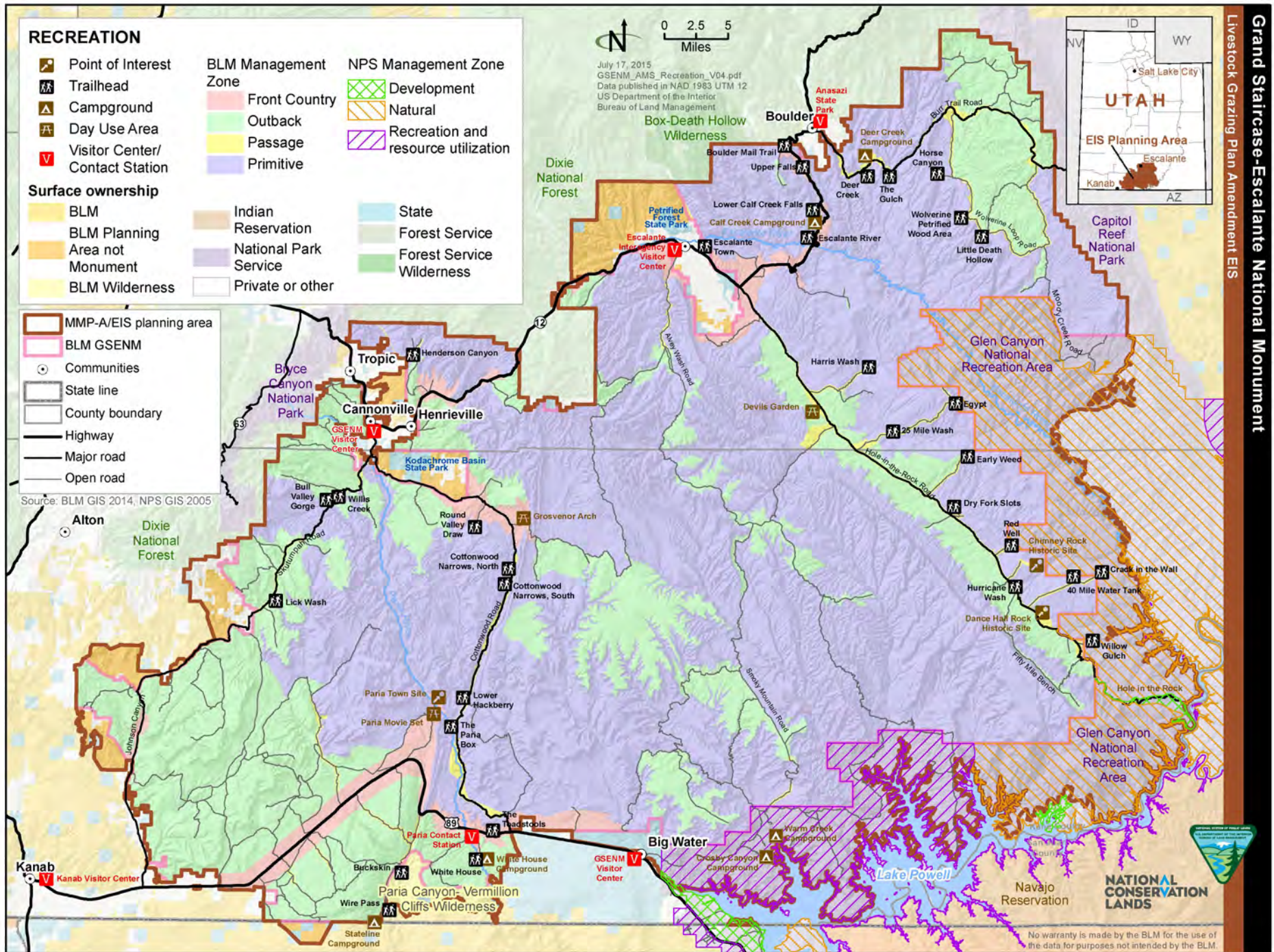
Current Condition

GSENM

There are four management zones within GSENM (see Figure 2-7, Recreation). These zones reflect the location, type of recreational setting, and subsequent opportunities likely to be available to users within GSENM. Each zone's geographic boundary is defined by factors such as the accessibility to and movement within the area via existing roads or trails, sensitive habitats, terrain, and special management area designation boundaries. The four management zones in GSENM consist of the following:

1. The Frontcountry Zone (78,100 acres or 4 percent of GSENM) is intended to be the focal point for visitation by providing day-use opportunities in close proximity to adjacent communities and to Highways 12 and 89, which traverse GSENM. This zone will accommodate the primary interpretation sites, overlooks, trails, and associated facilities necessary to feature GSENM resources. The zone boundaries were developed by locating a corridor along Highways 12 and 89, Johnson Canyon Road, and the portion of Cottonwood Canyon Road leading to Grosvenor Arch. The zone was then expanded or constricted to coincide with the dominant terrain features, which provide identifiable boundaries on the ground. Existing destinations such as Grosvenor Arch, the Pahria townsite, and the Calf Creek Recreation Area were included in order to provide for necessary improvements and to accommodate expected visitation. Lands close to the Town of Escalante were also included due to extensive visitor use. In delineating this zone, wilderness study areas, threatened and endangered species habitat, relict plant areas, riparian areas, and other sensitive resources were avoided wherever possible. Highway 89, from the western boundary to The Cockscomb, lacks dominant terrain to delineate this zone. For this reason, a 1-mile buffer along each side of the highway was used.
2. The Passage Zone (39,000 acres, or 2 percent of GSENM) includes secondary travel routes that receive use as throughways and recreation destinations. While rudimentary facilities necessary for safety, visitor interpretation, and for the protection of resources will be allowed in this zone, the BLM will generally avoid directing or encouraging further increases in visitation due to the condition of routes and distance from communities. The primary criterion for developing the zone boundaries was again dominant terrain. The boundary does not constrict closer than 100 feet to designated routes, and encompasses most obvious imprints of human activities such as trailheads, transmission rights-of-way, and potential resource interpretation sites within 0.5 mile of the subject route. In many cases, dominant terrain was not available along route segments. In these cases, a 660-foot buffer was used. Again, wilderness study areas, threatened and endangered species habitat, relict plant areas, riparian areas, and other sensitive resources were avoided wherever possible.

Figure 2-7

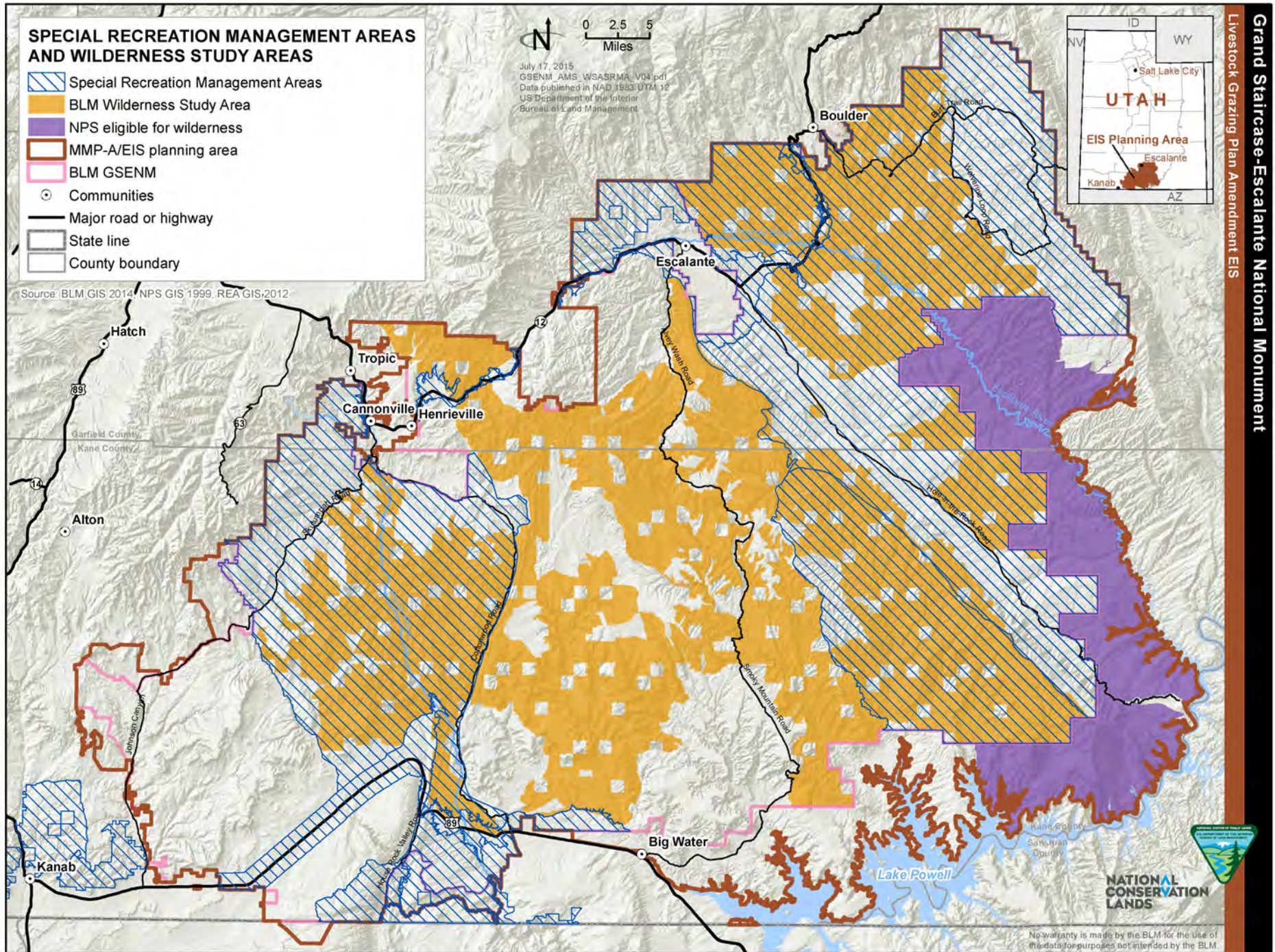


3. The Outback Zone (537,700 acres or 29 percent of GSENM) is intended to provide an undeveloped, primitive and self-directed visitor experience while accommodating motorized and mechanized access on designated routes. Facilities will be rare and provided only when essential for resource protection. The remaining public routes not in the Frontcountry or Passage Zones are included in the Outback Zone. Dominant terrain was again a primary criterion for the zone boundary. The boundary does not constrict closer than 100 feet to the routes. Wilderness study areas were avoided wherever possible.
4. The Primitive Zone (1,210,600 acres or 65 percent of GSENM) is intended to provide an undeveloped, primitive and self-directed visitor experience without motorized or mechanized access. Some administrative routes are included in this zone, which could allow very limited motorized access. Facilities will be nonexistent, except for limited signs for resource protection or public safety. The zone is intended to facilitate landscape-scale research and therefore connects each of the three major landscapes (Escalante Canyons, Kaiparowits Plateau, and Grand Staircase), as well as linking low elevation areas to higher elevations. This zone is also intended to connect primitive and undeveloped areas on surrounding lands managed by other federal agencies (BLM 2000).

The BLM manages six special recreation management areas (SRMAs) in GSENM (Figure 2-8, Special Recreation Management Areas and Wilderness Study Areas). Compared to areas outside SRMAs, BLM management within SRMAs emphasizes the maintenance and enhancement of recreation users' experiences through the preservation of a unique setting and provision of recreational facilities and other features to promote that experience. Within SRMAs, management actions may be necessary to reduce user conflicts and maintain users' safety, while maintaining the quality of the areas' natural resources. Management prescriptions for the six SRMAs in GSENM are as follows (BLM 2000):

1. *SRMA-2 Escalante Canyons SRMA*—The boundary of this SRMA will follow the geographical topography, including all the tributaries to the main Escalante Canyon. It will include trailheads for all the popular routes into the canyons. Activities in this SRMA include backpacking, canyoneering, nonmotorized boating, and equestrian use. The overall recreation experience will continue to be primitive, uncrowded, and remote. Overall, social encounters will remain low compared to other southwest canyon hiking opportunities. However, a range of social encounters will be available. Potential permit systems could address general public, commercial, and administrative users.
2. *SRMA-3 Paria/Hackberry SRMA*—This area is bordered on the west by Kitchen Canyon Road, on the east by Cottonwood Canyon Road corridor, on the south by the confluence of Hackberry/Cottonwood Creeks and the Paria River, and on the north by Dixie National Forest, excluding the Skutumpah corridor. Activities in this SRMA are backpacking, canyoneering, and equestrian use. The overall recreation experience will continue to be primitive, uncrowded, and remote. Equestrian opportunities will be emphasized in Paria Canyon, while backpacking opportunities

Figure 2-8



will be emphasized in Hackberry Canyon. Potential permit systems could address general public use and commercial users.

3. *SRMA-4 Paria Canyon and Plateaus SRMA*—This area encompasses Buckskin Mountain, West Clark Bench, and Cedar Mountain to connect to the BLM Arizona Strip’s “Canyons and Plateaus of the Paria Resource Conservation Area.” These areas are located south of Highway 89, with the Monument boundary marking the east boundary. Activities in this SRMA include canyoneering, equestrian use, backpacking, hiking, hunting, and scenic touring along the House Rock Valley Road. The overall recreation experience will continue to be primitive, uncrowded, and remote. Overall social encounters will remain low compared to other southwest canyon hiking opportunities. However, a range of social encounters occur. Management of this SRMA will be in coordination with the Kanab and the Arizona Strip Field Offices.
4. *SRMA-5 Fiftymile Mountain SRMA*—This areas [sic] includes the geographical area called Fiftymile Mountain including trail access points. Activities in this SRMA include equestrian use, backpacking, and hunting. The recreation experience will be primitive, uncrowded, and remote. Visitors will not be encouraged to go to this area and commercial outfitting will be extremely limited.
5. *SRMA-6 Highway 12 Corridor SRMA*—This area encompasses the Highway 12 corridor located in the Monument, including the Calf Creek Campground and Interpretive Trail. Activities in this SRMA include scenic driving, day-use hiking, camping, equestrian use, road bicycling, and scenic and interpretive viewing. The recreation experience will focus on learning about geology, history, archaeology, biology, and paleontology, in addition to scenic viewing. Short interpretive trails and scenic overlooks will be developed to encourage visitors to learn more about these Monument resources. Opportunities will accommodate all visitors. Information stations located in Boulder, Escalante, and Cannonville will disseminate educational materials to further information about these resources.
6. *SRMA-7 Highway 89 Corridor SRMA*—This area encompasses the Highway 89 corridor within the Monument, including the Paria Movie Set, the old Pahreah townsite, and the Paria Contact Station. Activities in this SRMA include scenic driving, day-use hiking, camping, road and mountain bicycling, and scenic and interpretive viewing. The recreation experience will focus on learning about geology, history, archaeology, biology, and paleontology, in addition to scenic viewing. Short interpretive trails and scenic overlooks will be developed to encourage visitors to learn more about these Monument resources. Opportunities will accommodate all visitors. This corridor will be coordinated with the Vermilion Cliffs Highway Project.

Within SRMAs, and to a lesser extent outside, BLM management seeks to minimize conflict with other uses and among different types of recreational users. In more remote areas in GSENM, user interactions are fewer as users disperse across the landscape. While interactions in these remote areas are fewer, the intensity of conflict can be higher. For example, if a backpacker seeking solitude encounters an off-highway vehicle user, the intensity of the conflict (i.e., the

disruption of the backpacker's desired setting and recreational experience) is greater than if the encounter occurred at the trailhead. In contrast, the off-highway vehicle user may not perceive any conflict.

Similarly, the potential for conflict with other uses occurs when the recreation user's desired setting and experience is altered by an unwanted activity. Potential conflicts among recreational and non-recreational users become a management concern when the conflict occurs frequently or at a high intensity. Interactions can occur frequently with lower perceptions of conflict on the part of the users if the interaction is expected. The intensity of a perceived conflict is higher where the interaction is not typical for the area and is therefore not expected, or where the interaction is expected, but higher than normal user volumes increase the proximity and frequency of the users' interactions thereby resulting in a conflict.

In 2013, Colorado Mesa University conducted the first phase of a five-year study to establish the recreation experience baseline for GSENM. Based on a focused analysis of the Hole in the Rock Road area, the study found that 22 percent of respondents identified livestock or evidence of them as a quality that diminishes the area's specialness. The largest contributors to diminished specialness, according to the study's respondents, were vandalism, overcrowding, lack of solitude, additional improvements, and damage to soils and vegetation (Colorado Mesa University 2014). The study demonstrates that respondents expect a strong sense of solitude and a desire for a natural landscape.

BLM-managed Land Outside GSENM

BLM-managed lands outside GSENM and Glen Canyon account for less than three percent of the planning area. The Kanab Field Office manages the majority of these areas (54,800 acres).

Of the total portion of the planning area in the Kanab Field Office, 42 percent (22,800 acres) are within the Escalante SRMA and another 11,200 acres (20 percent) are within the Paria Canyon SRMA, which includes the Canyon and Uplands Recreation Management Zones (BLM 2008b).

The Kanab RMP contains specific management objectives for each SRMA. In addition, for each SRMA, the RMP identifies the SRMA's recreation niche, primary recreation activities, and desired experiences.

For the Escalante SRMA, which is located northwest of the town of Escalante, the recreation niche is a town-accessible hiking and equestrian trail network offering views and varied terrain. Recreation objectives are to provide easy access to day-use recreational opportunities such as hiking, photography, equestrian use, OHV touring, rock climbing, and viewing scenery and wildlife. BLM management is intended to provide visitors with easy access to an outdoor setting with a mixture of social opportunities (e.g., at trailheads and at group events) and primitive experiences in the backcountry off trails.

In the Paria SRMA, located in the southwestern portion of the planning area, BLM manages for mostly backcountry wilderness recreational experiences in a combination of upland and unique slot canyon features. The recreation niche for the Canyon Recreation Management Zone consists of world-class wilderness trekking in deep slickrock slot canyons where visitors hike explore, backpack, and camp in or along colorful deep canyons, narrow slots, and cliffs. In the

Uplands Recreation Management Zone portion of the Paria SRMA, the recreation niche is world-class primitive and backcountry adventure recreation on and around the area's unique upland geologic features. BLM management objectives are to preserve the area's wilderness character while offering visitors the opportunity to hike, backpack, horseback ride, rock climb, and camp in the area. Recreation experiences are mostly primitive.

While neither the Kanab RMP Record of Decision nor the Final EIS specifically address the potential for recreation and grazing conflicts, designation and management of SRMAs emphasizes recreation management and is intended to minimize conflict with other uses. Management objectives for the Paria and Escalante SRMAs are to preserve backcountry recreation experiences. The Varney Griffin allotment, which covers much of the Escalante SRMA, is available for grazing but has not active grazing use.

Glen Canyon

Glen Canyon, managed by NPS, encompasses 318,900 acres in the southeastern portion of the planning area. The portion of Glen Canyon in the planning area accounts for one quarter of the 1,246,000 total acres in Glen Canyon. Established in 1972, one purpose of Glen Canyon is to provide for public enjoyment through diverse land- and water-based recreation opportunities; another is to protect scenic, scientific, natural, and cultural resources on Lake Powell, the Colorado River, its tributaries, and surrounding lands. In 2011, Glen Canyon received 2.2 million visitors (NPS 2014).

Glen Canyon is divided into four management zones: Recreation and Resource Utilization; Development; Cultural; and Natural Zones. Nearly all Glen Canyon lands in the planning area are within the Recreation and Resource Utilization and Natural Zones, with a small area along Hole in the Rock Road within the Development Zone.

Lands within the Recreation and Resource Utilization Zone consist of dry land and the lake's shoreline. NPS manages the zone to maintain natural processes and enhance fish and game populations. Consumption of renewable and nonrenewable resources is subject to the protection of park resources and values, including recreation.

The Natural Zone includes Glen Canyon's outstanding scenic resources, relatively undisturbed and remote areas, or areas bordering on places with established land-use practices that complement characteristics of the Natural Zone. NPS manages the Natural Zone to maintain isolated, natural processes. Consumption of renewable resources is subject to the protection of the recreational values of the area. The majority of the Natural Zone is proposed for designation as wilderness. Motorized travel is prohibited in the Natural Zone.

The NPS manages the Development Zone to provide visitor services and maintain facilities. This zone includes the permanent structures and operations necessary to support recreation activities and allows a wide range of recreational use.

The most popular activities in Glen Canyon and the reasons most people visit the area are sightseeing, motorized boating, swimming, and visiting the Glen Canyon visitor center. These recreational activities are most common in the spring and summer (NPS 2014).

Year-round paved or maintained gravel surface access to Glen Canyon from the north is limited to routes that pass through GSENM. Passenger vehicle access to Glen Canyon is available via Hole in the Rock Road, Cottonwood Road, Smoky Mountain Road, and Highway 89. Access to the portion of Glen Canyon in the Escalante Canyons area is available via Burr Trail, Wolverine Loop, and Mood Wash Roads, as well as by using primitive roads and trails that spur from Hole in the Rock Road. Motorized access in the Escalante Canyons area of Glen Canyon is prohibited.

Livestock grazing is an ongoing permitted use within portions of Glen Canyon. However, many of the allotments in Glen Canyon (e.g., Escalante River, Navajo Bench, Harvey's Fear, and portions of Rock Creek-Mudholes, Spencer's Bench, and Big Bown's Bench allotments) are closed.

Trends

GSENM

Recreation is a major use in GSENM, and the number of people taking part in recreational activities within GSENM has increased over the past decade and is expected to continue at a similar rate. In 2013, total visitation was 759,600, an increase of 35 percent since 2000, and the second highest number of yearly visitors since 1997 (BLM 2014d). GSENM receives visitors from across the US and internationally. In 2004, nearly 25 percent of all recorded visitors to the front country were from outside the US, while another 30 percent traveled from areas beyond the western US. Of the nearly 50 percent of visitors from the west, 14 percent were from Utah and another 13 percent from California. Demographically, visitors are a majority male (approximately 65 percent), older (average age of 50), first time visitors (60 percent), and visiting with just one other person (56 percent). Most visitors to the front country (87 percent) stay more than one day and stay 3.6 days on average (Utah State University 2004). While these numbers provide an indication of visitor use and activity trends, the BLM is neither able to record all visits to GSENM, nor identify the activities in which each visitor engages. As a result, it is challenging for the BLM to project how different demographic groups will engage with certain recreation activities in the future.

The BLM expects the most popular recreation activities in GSENM to continue to be pedestrian-based activities such as hiking, walking, backpacking, and photography. In 2013, the most popular trailhead for hiking and backpacking with nearly 25,000 visits was Lower Calf Creek Falls. The Calf Creek Recreation Area trailhead is easily accessed from Highway 12, near the Calf Creek Campground, and within a picturesque canyon feeding into the Escalante River; the nearby Upper Calf Creek trailhead received nearly 20,000 visits in 2013. Dry Fork Slots trailhead, located along Hole in the Rock Road, received approximately 20,000 users, Wire Pass trailhead near the Stateline Campground at the southern edge of GSENM received 15,000 visits, and the Toadstools trailhead located along Highway 89 near the White House Campground received approximately 8,000 users in 2013 (BLM 2013).

In a study conducted for the popular Hole in the Rock Road area, researchers asked survey participants to select the three recreational activities out of a list of 20 that they engage in most often while in the area. The researchers concluded that more than 70 percent of respondents engaged in hiking, walking, or running, 45 percent backpacked, and over 30 percent engaged in

photography. Another 24 percent engaged in scenic driving and 11 percent in OHV riding. Other recreation activities noted in the study include hunting, horseback riding, and picnicking. Approximately 10 percent of recreation users engage in each of these activities (Colorado Mesa University 2014). The BLM expects similar use in the future.

In the southwestern and northeastern portions of GSENM, as well as along the two major thoroughfares, Highways 12 and 89, motorized and mechanized recreation activities are and will likely continue to be popular. These areas provide opportunities for scenic driving and cycling.

The number of special recreation permits the BLM issues in GSENM fluctuates annually; however, the BLM anticipates a gradual increase over time. The BLM issued 90 special recreation permits for organized recreation activities in 2014, an increase of 15 percent since 2012, and the most since 2009 (BLM 2014d). The BLM issues special recreation permits for hiking tours, horseback and trail rides, outfitting and/or guiding for hunting, photography, vehicle tours, backpacking and camping, fishing, ATV tours, and outdoor education. Of the 78 special recreation permits issued in 2013, 24 were for hiking/backpacking, 15 for hunting, 14 for education/therapy, 11 for horseback riding, and 6 for vehicle tours (BLM 2014d).

While permitted uses take place year-round, most occur during the months other than winter. The Escalante Canyons SRMA in the northeastern portion of GSENM has the largest number of permit holders. These permit holders consist of local, regional, and national operators and guides. In 2011, half of the operators and guides were regional (i.e., those who travel two to eight hours to operate in GSENM). Another 38 percent were local (i.e., in the immediate area), while the remaining percentage traveled more than eight hours to operate in GSENM. Regional and national operators were from as far away as Minnesota, Michigan, and Alberta, Canada (BLM 2012). Between 2009 and 2013, total revenue from special recreation permits was \$735,800 (BLM 2014d). Total revenue from special recreation permits is expected to remain steady or increase slightly.

Visitors who are involved with livestock grazing in GSENM identify recreational opportunities associated with livestock grazing. For example, visitors to GSENM are able to observe the cowboy and ranching lifestyle historic to the area. There are also limited opportunities for visitors to participate in cattle drives with operators in order to have a first-hand experience.

BLM-managed Land Outside GSENM

BLM-managed areas outside GSENM will continue to provide important recreational opportunities for the region's local population and visitors. Within the Paria and Escalante SRMAs, the BLM will continue to manage for unique scenic backcountry recreation experiences.

Glen Canyon

Visitation to Glen Canyon as a whole has steadily declined since a peak of 3.5 million visitors in 1992-1993. Total visitation fell below 2 million visitors from 2004 to 2009, but it has rebounded recently with approximately 2.2 million visitors in 2011 (NPS 2014). Despite an overall decline in visitor use to Glen Canyon, visitation in the planning area has increased over time as more visitors discover this area, particularly since the designation of GSENM. Escalante Canyons, the Colorado River, above and below Lake Powell, the Escalante River, and other tributaries attract visitors to areas in the Glen Canyon portion of the planning area.

Forecast

The BLM, in accordance with the FLPMA, the Presidential Proclamation 6920, and the MMP, manages GSENM for of the following purposes:

1. Protect GSENM objects (e.g., archaeological, historic, paleontological, geologic, and biological)
2. Establish a research and adaptive management program
3. Provide for visitor use in a manner consistent with the protection of GSENM objects

The MMP identifies livestock grazing and the accommodation of recreation by providing minor recreation facilities for visitors as primary management emphasis areas for the BLM.

The number of visitors entering the planning area to engage in recreation activities is expected to increase over time. The most notable increases are expected in popular recreation areas, such as Buckskin Gulch, Deer Creek area, Calf Creek area, and the Paria-Hackberry area in GSENM. As permit systems or facility sizes limit increased visitation in campgrounds and other popular areas, recreation users will venture elsewhere in the planning area.

With a continued rise in the number of recreational users within GSENM and Glen Canyon, the potential for conflict with ongoing grazing practices will likely increase. The potential for conflicts are greatest near water sources and in allotments that are also popular recreation areas. Recreation-grazing conflict areas include the Upper Hackberry allotment, near House Rock Valley Road and Paria Canyon, in areas surrounding the Deer Creek recreation site, The Gulch, Buckskin Gulch, and Horse Canyon. Perceived conflicts will occur throughout the planning area where recreation use and grazing coexist.

Additionally, because the unique waterways in the planning area contribute to the area's popularity as a recreation destination, degradation of these waterways resulting from grazing will continue to be viewed negatively by recreation users and will be a focal point of conflict. In the late summer and fall, when water is scarcer, recreation and grazing uses will concentrate on smaller areas of water. Any degradation of these seasonally limited water sources, either by grazing or recreation uses, will intensify the conflict.

Key Features

Recreation is a major and growing use in the planning area; accordingly, key features are areas where grazing and recreation uses are currently in conflict, and areas where there is the potential for increased conflict between grazing and recreation uses.

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CHAPTER 3

CURRENT MANAGEMENT DIRECTION

This chapter describes the current management direction provided by the existing management plans and amendments. This current management will be the basis for the No Action Alternative in the EIS. Management decisions in this chapter are those land use plan-level decisions relevant to livestock grazing. Not every land use plan-level decision related to the topics below has been included, and this chapter is not inclusive of all guidance contained in the referenced plans. The BLM evaluated decisions for water, soils, and recreation and determined that additional management direction might be needed for these resources but that no changes to current management were needed. Therefore, current management for these resources is not included.

Select current management from the Glen Canyon GzMP and the Interagency Agreement between the BLM and NPS for Grazing Management on Glen Canyon National Recreation Area is provided for context.

3.1 RELEVANT PLANS AND AMENDMENTS

Management direction for livestock grazing comes primarily from the four MFPs, the Escalante MFP Amendment, and the Glen Canyon GzMP. The record of decision for this EIS will replace the four MFPs and the Escalante MFP Amendment and will amend the MMP and the Glen Canyon GzMP. Table 3-1, Relevant Plans and Amendments, shows those documents that are applicable to resources and resource uses discussed in this AMS.

Table 3-1
Relevant Plans and Amendments

Document Title	Abbreviation
Escalante Management Framework Plan (BLM 1981a)	Escalante MFP
Paria Management Framework Plan (BLM 1981b)	Paria MFP
Vermilion Management Framework Plan (BLM 1981c)	Vermilion MFP
Zion Management Framework Plan (BLM 1981d)	Zion MFP
Escalante Management Framework Plan Approved Amendment and Record of Decision (BLM 1999)	Escalante MFP Amendment
Glen Canyon General Management Plan (NPS 1979)	GMP

**Table 3-1
Relevant Plans and Amendments**

Document Title	Abbreviation
Glen Canyon National Recreation Area Grazing Management Plan and Environmental Assessment (NPS 1999)	GzMP
Grand Staircase-Escalante National Monument Management Plan (BLM 2000)	MMP
Interagency Agreement between BLM and NPS for Grazing Management on Glen Canyon National Recreation Area (1993)	Interagency Agreement

The 1999 MMP deferred decisions related to livestock grazing because “Monument designation does not affect existing permits or leases for, or levels of, livestock grazing” (BLM 2000, p.4). The MMP (p.4) continues that “grazing will ultimately be addressed after the completion of assessments for each grazing allotment and the preparation of new allotment management plans.”

The MMP included one specific grazing decision (GRAZ-1) that described a process for grazing management and included a schedule for completing the three-step process GSENM-wide, as follows:

1. An assessment
2. A determination of rangeland health and evaluation of existing grazing management
3. Development of allotment management plans

The BLM completed Steps 1 and 2 in 2006 when the BLM issued rangeland health determinations. Step 3 of the process indicated that the allotment management plans would designate lands available for livestock grazing; the MMP did not identify lands available for livestock grazing use. Step 3 has not been completed, and the BLM continues to follow the livestock grazing decisions made in the 1981 MFPs as amended.

3.2 LIVESTOCK GRAZING

Decisions in Table 3-2 are applicable to administration of livestock grazing in Glen Canyon to the extent that they conform to the Glen Canyon enabling legislation, the Organic Act, the Glen Canyon GMP, and other NPS regulations and policies. Implementation actions are subject to review by the Glen Canyon Superintendent to determine effects on the values and purposes.

**Table 3-2
Current Management for Livestock Grazing in GSENM**

Decision	Planning Decision Number	Source
<p>Grazing Management Process The following process will be followed so that grazing management conforms with the grazing regulations and Utah’s Standards and Guidelines. In this process, each grazing allotment will be assessed, and new allotment management plans will be developed, consistent with the BLM-wide grazing permit renewal process.</p> <p>Step 1: Assessment All allotments will be assessed in accordance with the guidelines and guidance issued by the BLM. All available data will be used to make an overall assessment of rangeland health, including ecological processes, watershed functioning condition, water quality conditions, special status species, and wildlife habitat conditions for each allotment, as described in the Utah Standards for Rangeland Health, in light of the Fundamentals of Rangeland Health at 43 CFR § 4180.1.</p> <p>Priorities for completing the assessments and implementing needed changes will be set using the following criteria:</p> <ul style="list-style-type: none"> • presence of values that are regulated by operation of law such as water quality, threatened and endangered or sensitive plant and animal species • areas at high risk of becoming degraded, or high public interest areas • permit renewal schedule <p>Step 2: Determination of Rangeland Health and Evaluation of Existing Grazing Management The GSENM Manager shall determine rangeland health for each allotment according to the Utah Standards and Guidelines for Grazing Administration, in light of the Fundamentals of Rangeland Health. The GSENM Manager determines whether or not assessment results show that each allotment is achieving or making significant progress toward the Utah Standards.</p>	GRAZ-I	MMP

**Table 3-2
Current Management for Livestock Grazing in GSENM**

Decision	Planning Decision Number	Source
<p>To the extent any assessment result is found to be inconsistent with the Standards, the GSENM Manager shall determine whether or not existing livestock grazing practices or levels of use are significant factors in such inconsistency. The GSENM Manager shall take appropriate action under 43 CFR Subparts 4120, 4130, and 4160 as soon as practicable, but not later than the start of the next grazing year, upon determining that existing grazing management practices or levels of grazing on public lands need to be modified to conform with Utah Standards and Guidelines.</p> <p>Step 3: Develop Allotment Management Plans The compatibility of grazing with other land uses will be evaluated in allotment management plans (AMP), and the results of the evaluation will be consistent with all applicable legal authorities, including the FLPMA, the Taylor Grazing Act, the Public Rangelands Improvement Act, 43 CFR Part 4180, Utah Standards and Guidelines, and National Wildlife Federation v. BLM, 140 Interior Board of Land Appeals 85 (1997). AMPs may be developed on an individual basis, or may be developed for a group of allotments where similar ecosystems or land uses exist. These AMPs may include integrated activity planning, addressing a range of non-grazing issues within the plan area.</p> <p>Schedule The 3-step Grazing Management Process described above, and all associated National Environmental Policy Act (NEPA) documents, shall be completed within the 3 years commencing on the first July 1 following the approval of the Monument Management Plan.</p>		
<p>During the interim period until intensive livestock management is achieved, maintain existing production of desirable livestock forage consistent with meeting plant and soil requirements. This includes regulating livestock numbers, season of use, and allowing AUMs for grazing on allotments to the extent of the existing carrying capacity of suitable range.</p>	RM-I	Escalante MFP <i>This is from the Escalante MFP but is also a summary of the objectives from the other MFPs.</i>
<p>As allotments are evaluated through monitoring studies, the season of use can be adjusted to fit current conditions and operator needs consistent with other resource objectives (Escalante MFP RM-I.I Analysis).</p>	RM-I.I	Escalante MFP

Table 3-2
Current Management for Livestock Grazing in GSENM

Decision	Planning Decision Number	Source										
As management is modified, the forage allocations will be adjusted accordingly. These adjustments will come through coordinated efforts with ranchers and other interested parties (Escalante MFP RM-1.2).	RM-1.2	Escalante MFP										
Mitigate recreation interactions by fencing recreation sites when developed, and restricting water hauling in Fiftymile Mountain and Paria Canyon recreation lands to existing roads and trails.	RM- 1.1 or RM-1.2	Paria MFP										
Critical riparian areas that are accessible to livestock will be fenced to keep cattle out (WL-3.1 [of the Zion MFP]).	RM-1.2	Zion MFP										
Improve the condition on suitable and potentially suitable Federal range that is now in poor condition and achieve an upward trend on range that is in a static or downward trend. Increase the production through intensive grazing management and land treatment projects.	RM-2	Escalante MFP <i>(similar actions are included as RM-2 in the other three MFPs)</i>										
Adjust each grazing allotment in the planning unit to the carrying capacity of the range and adjust the grazing period on the allotments proposed for winter grazing until after seed ripe time for key species as called for in RM-1.1 and RM-1.2 [of the Vermilion MFP].	RM-2.2	Vermilion MFP										
Provide for intensive livestock management by construction of developments and facilities.	RM-2.4	Escalante MFP <i>(similar in 2.5 in Vermilion and Zion)</i>										
Complete land treatments.	RM-2.5	Escalante MFP <i>(similar in 2.6 from Vermilion and Zion)</i>										
Continue the unallotted status on Antone Flat, Flag Point, and Varney Griffin by not allocating livestock forage on this area. Protect the relict characteristics of No Man's Mesa.	RM-2.8 RM-3	Escalante MFP Vermilion MFP										
Close the following allotments to grazing and allocate the AUMs to uses other than livestock grazing: <table border="1" data-bbox="178 1136 535 1308"> <thead> <tr> <th>Allotment</th> <th>AUMs</th> </tr> </thead> <tbody> <tr> <td>Escalante River</td> <td>2,422</td> </tr> <tr> <td>McGath Point</td> <td>60</td> </tr> <tr> <td>Saltwater Creek</td> <td>120</td> </tr> <tr> <td>Steep Creek</td> <td>316</td> </tr> </tbody> </table>	Allotment	AUMs	Escalante River	2,422	McGath Point	60	Saltwater Creek	120	Steep Creek	316		Escalante MFP Amendment
Allotment	AUMs											
Escalante River	2,422											
McGath Point	60											
Saltwater Creek	120											
Steep Creek	316											

**Table 3-2
Current Management for Livestock Grazing in GSENM**

Decision	Planning Decision Number	Source
Close to grazing the portion of the Big Bowns Bench (598 AUMs), Deer Creek (83 AUMs), and Phipps (140 AUMs) allotments that are located in the Escalante River. Close the Cottonwood pasture (112 AUMs) of the Deer Creek allotment. The available forage in these areas would be allocated to uses other than livestock grazing.		Escalante MFP Amendment
Create a grass bank or forage reserve with the remaining AUMs on Phipps allotment (140 AUMs) and all available forage on Little Bowns Bench allotment (130 AUMs) and the Wolverine pasture (148 AUMs) of the Deer Creek allotment. This grass bank would only be used during emergencies or for research purposes. Emergencies would include, but would not be limited to drought, insect outbreaks, fire or floods. Any emergency use would not exceed current authorized use and could occur from October 1 to March 31.		Escalante MFP Amendment
Use in Horse Canyon would be restricted to that part of the trail going onto Big Bowns Bench to the trail leaving Horse Canyon going onto King Bench. This area would only be used as a holding pasture to gather livestock at the end of the grazing season.		Escalante MFP Amendment
Livestock grazing allotments will be evaluated, and grazing as it relates to all endangered species will be addressed during this process. Evaluations will incorporate the latest research and information in the protection of species. Section 7 consultation will be conducted for all allotments that may affect listed species during the individual allotment evaluations. This process will provide protection for listed and sensitive species as the evaluation will be site specific for each of the allotments.	SSA-8	MMP
Actions will be taken to improve identified habitat [for Kanab Ambersnail <i>Oxyloma hadeni kanabensis</i>] as consistent with the recovery plan objectives. Actions may include assuring flows in appropriate streams and seeps by removing non-native plants affecting the water table and reducing impacts from visitors and/or livestock. Surveys will also identify current habitat and habitat that is potential if modifications are made.	SSA-24	MMP
Grazing permits are also in this category [Existing Rights or Interests for Other Land Use Authorizations]. Grazing permits or leases convey no right, title, or interest in the land or resources used. Although the Proclamation specifically mentions livestock grazing, it does not establish it as a "right" or convey it any new status. The proclamation states that "grazing shall continue to be governed by applicable laws and regulations other than this proclamation," and says that the Proclamation is not to affect existing permits for, or levels of, livestock grazing with the Monument. Other applicable laws and regulations govern changes to existing grazing permits and levels of livestock grazing in the Monument, just as in other BLM livestock grazing administration programs.	VER-8	MMP

**Table 3-2
Current Management for Livestock Grazing in GSENM**

Decision	Planning Decision Number	Source
Water developments can be used as a management tool throughout the Monument for the following purposes: better distribution of livestock when deemed to have an overall beneficial effect on monument resources, including water sources or riparian areas, or to restore or manage native species or populations. They can be done only when a NEPA analysis determines this tool to be the best means of achieving the above objectives and only when the water development would not dewater streams or springs. Developments will not be permitted to increase overall livestock numbers. Maintenance of existing development can continue, but may require NEPA analysis and must be consistent with objectives of this Plan.	WDEV-1	MMP
Wildlife Services (formerly Animal Damage Control) activities within the Monument will be limited to the taking of individual coyotes within the immediate vicinity after verified livestock kills, where reasonable livestock management measures to prevent predation had been taken and had failed. Reasonable livestock management measures could include preventative measures to control predation, such as managing where calving occurs, in order to develop improved land management practices.	WS-1	MMP
Fences may be used in certain circumstances to protect Monument resources, to manage visitor use, and to manage livestock, consistent with the Proclamation. They will be designed and constructed in accordance with visual resource management objectives and the Monument Facilities Master Plan (see the <i>Visual Resource Management</i> section [in the MMP] for related decisions).	FENCE-1	MMP
In developing allocation plans for areas, efforts will be made to coordinate with other resource planning efforts (e.g., research, grazing allotment management plans), as discussed in the implementation and adaptive management framework in Chapter 3 [of the MMP]. This type of integrated activity planning will lead to more comprehensive planning efforts for specific areas and to better decision making.	ALLO-8	MMP
The BLM will be responsible for administrative routes which will be limited to authorized users. These are existing routes that lead to developments which have an administrative purpose, where the BLM or some permitted user must have access for regular maintenance or operation. These authorized developments include such things as powerlines, cabins, weather stations, communication sites, spring developments, corrals, and water troughs. Routes designated open for certain administrative purposes (approximately 182 miles) are shown on Map 2 [of the MMP]. Access will be strictly limited and will only be granted for legitimate and specific purposes. Maintenance will be the minimum required to keep the routes open for limited use by high clearance vehicles. If the	TRAN-15	MMP

**Table 3-2
Current Management for Livestock Grazing in GSENM**

Decision	Planning Decision Number	Source
administrative purpose of the route ceases, the route will be evaluated for closure following public notification and opportunity to comment. Authorized users could include grazing permittees, researchers, State or Federal Agencies, Native American Indians accessing recognized traditional cultural properties, and others carrying out authorized activities under a permit or other authorization.		
Beyond the routes shown on Map 2 [of the MMP], the BLM will work with any individual operating within the Monument under existing permits or authorizations to document where access must continue in order to allow operation of a current permit or authorization. Routes that go only to BLM range monitoring and study areas will not be maintained, but periodic vehicular access to these sites will be granted for required range monitoring uses.	TRAN-16	MMP

**Table 3-3
Current Management for Livestock Grazing in Glen Canyon**

Decision	Planning Decision Number	Source
<p>Special Status Species</p> <p>To protect healthy populations of special status species, including federally listed threatened and endangered species, federal candidate C1 and former C2 species, and state heritage ranked rare and sensitive species (NPS/USFWS).</p> <p>Appendix D [of the GzMP] lists 18 special status species that occur within Glen Canyon. Of the three federally protected species, one (<i>Pediocactus bradyi</i>) occurs in an area not currently grazed, but the second (<i>Cycladenia jonesii</i>) occurs in an active allotment. However, this latter species prefers habitats that are largely inaccessible to livestock, and the species appears to currently sustain little or no impact through grazing activities. A biological assessment of the potential impacts of grazing on <i>C. jonesii</i> has not been completed.</p> <p>Of the former federal C2 candidates (now NPS sensitive), four occur in or near hanging gardens (<i>Erigeron kachinensis</i>, <i>E. zothecinus</i>, <i>Habenaria zothecina</i>, and <i>Perityle specuicola</i>), two are found on or near the Tropic Shale in the Warm Creek area (<i>Camissonia atwoodii</i> and <i>Cymopterus higginsii</i>), and two occur in sandy and</p>	Objective 2	GzMP

**Table 3-3
Current Management for Livestock Grazing in Glen Canyon**

Decision	Planning Decision Number	Source
<p>rocky desert shrublands in the middle part of the recreation area. (<i>Dalea flavescens</i> var. <i>epica</i> and <i>Psoralea thompsonae</i> var. <i>whitingii</i>).</p> <p>Finally, seven proposed Utah state sensitive species are included. All but one of these species occurs in riparian zones and hanging gardens (<i>Viguiera soliceps</i> occurs on Tropic Shale badlands). Two species (<i>Imperata brevifolia</i> and <i>Aralia racemosa</i>) are known from only one locality each within Glen Canyon.</p> <p><i>Desirable conditions.</i> Special status species will not be subject to grazing if studies show that impacts occur.</p> <ol style="list-style-type: none"> Determine population biology and ecology of species to assess if grazing causes significant impacts to populations. Consult with US Fish and Wildlife Service through Section 7 compliance procedures. If impacts are discovered and the species or populations require protection, determine the best method, including but not limited to fencing, changes in grazing seasons or pasture rotations, or removal of grazing. 		
Recreation/Livestock Conflicts		
Protect recreation resources and the visitor experience (enjoyment and use) by reducing or mitigating recreation/livestock conflicts.	Goal	GzMP
Prevent or reduce livestock/ recreation conflicts so that recreational use and enjoyment of the recreation area is not impaired. (NPS/BLM)	Objective I	GzMP
Range Improvements and Management		
All livestock use facilities (constructed after May 10, 1993) will be authorized only with a BLM cooperative agreement, as provided for under 43 CFR Part 4100.	N/A	Interagency Agreement
Nonstructural range improvements, land treatments, and new line shacks are not appropriate in Glen Canyon.	N/A	Interagency Agreement
When grazing permits are canceled or modified for other than public purposes, existing range improvements will be evaluated for abandonment or removal. Removal may be completed by the benefitting party, owner, or agency.	N/A	Interagency Agreement
The use of supplemental feed, including salt, may be authorized for improved livestock and rangeland management. Maintenance feeding of harvested feed (hay and grain not in block form or otherwise regulated by salt) are not appropriate in Glen Canyon, except in emergencies with NPS concurrence.	N/A	Interagency Agreement

3.3 VEGETATION

Management decisions in Table 3-4 are applicable only to BLM-managed lands in GSENM.

**Table 3-4
Current Management for Vegetation in GSENM**

Decision	Planning Decision Number	Source
General		
<p>The Monument will be managed to achieve a natural range of native plant associations. Management activities will not be allowed to significantly shift the makeup of those associations, disrupt their normal population dynamics, or disrupt the normal progression of those associations.</p> <p>Additionally, the BLM will work to:</p> <ul style="list-style-type: none"> • increase public education and appreciation of vegetation through interpretation, • facilitate appropriate research to improve understanding and management of vegetation, and • protect unique vegetation associations such as hanging gardens and relict plant associations 	Goal	MMP
Vegetation Restoration Methods		
<p>A variety of vegetation restoration methods may be used to restore and promote a natural range of native plant associations in the Monument. Methods and project which do not achieve this objective or which irreversibly impact Monument resources will not be permitted. Vegetation restoration methods fall into four broad categories: mechanical, chemical, biological, and management ignited fires. Each of these methods will be used in accordance with the overall vegetation objectives discussed above, and progress towards these objectives will monitored as part of the adaptive management framework described in Chapter 3 [of the MMP].</p>	Objective	MMP
<p>Mechanical methods, including manual pulling and the use of hand tools (e.g., chainsaws, machetes, pruners) may be allowed throughout the Monument.</p>	RM-1	MMP
<p>The use of machinery (e.g., roller chopping, chaining, plowing, discing) may be allowed in all zones except the Primitive Zone. Chaining has been used in the past to remove pinyon and juniper prior to reseeding with perennial grasses. Due to the potential for irreversible impacts to other Monument resources, such as archaeological sites and artifacts, and paleontological resources, this treatment method will not be used to remove pinyon and juniper. It may be allowed to cover rehabilitation seed mixes with soil after wildfires only where:</p> <ul style="list-style-type: none"> • noxious weeds and invasive non-native species are presenting a significant threat to Monument resources or watershed damage could occur if the burned area is not reseeded, • it can be demonstrated that Monument resources will not be detrimentally affected (i.e., completion of full 	RM-2	MMP

**Table 3-4
Current Management for Vegetation in GSENM**

Decision	Planning Decision Number	Source
<p>archaeological, paleontological, threatened and endangered species and other resource clearance and consultation),</p> <ul style="list-style-type: none"> • it is determined that seed cover is necessary for the growth of the native species proposed for seeding, and • other less surface disturbing measures of covering seed are not available or cannot be applied in a timely manner. <p>Visual impacts of chaining will also be minimized near routes and other points of concern by covering the native seed mix with harrows or light chains. The GSENM Advisory Committee will be consulted before the use of machinery for treatments is permitted.</p>		
<p>Livestock grazing after native seedings are established will be modified to ensure the survival of the native plants. The livestock exclusion period required to allow full establishment of seeded native species and recovery of surviving native plants after a wildfire may be more than two years. Site evaluation will be required to determine when the native seedings should be grazed again and the effectiveness of the current or new grazing system on the persistence of native plants.</p>	RM-3	MMP
<p>Chemical methods will generally be restricted to the control of noxious weed species, and are discussed in that section. The use of chemicals may also be allowed in conjunction with research projects and must lead to the achievement of the overall vegetation objectives. These activities will be approved as determined appropriate through consultation with the GSENM Advisory Committee.</p>	RM-4	MMP
<p>With all of the methods described above, vegetation monitoring plots will be established to determine the effectiveness of the treatments in achieving management objectives and to provide baseline data of overall change. This monitoring will include species frequency, density, and distribution data, and will be part of the overall adaptive management framework described in Chapter 3 [of the MMP].</p>	RM-7	MMP
Noxious Weed Control		
<p>In addition to strategies for control of established noxious weeds, it is also imperative to reduce the introduction of noxious weed species as stated in Presidential Executive Order (EO 11312) on invasive species. Cooperative programs established for control of these species will also help identify potential new invasions before area-wide establishment has occurred. There are two policies which will help to reduce potential noxious weed introduction.</p> <ul style="list-style-type: none"> • First, the BLM requires that all hay used on BLM lands be certified weed free. This is a statewide policy which applies to the Monument, as well as all other BLM lands in the State of Utah. 	NW-7	MMP

**Table 3-4
Current Management for Vegetation in GSENM**

Decision	Planning Decision Number	Source
<ul style="list-style-type: none"> • Second is the requirement that all machinery that has been used outside the Monument be cleaned prior to use in the Monument. This provision generally applies to contract equipment used for projects such as construction of facilities and firefighting equipment. Both of these provisions will help reduce the introduction and spread of noxious weed species in the Monument. 		
Native vs. Nonnative Plants		
In keeping with the overall vegetation objectives and Presidential EO 11312, native plants will be used as a priority for all projects in the Monument.	NAT-1	MMP
Non-native plants may be used in limited, emergency situations where they may be necessary in order to protect Monument resources by stabilizing soils and displacing noxious weeds. This use will be allowed to the extent that it complies with the vegetation objectives, Presidential EO 11312, and the <i>Standards for Rangeland Health and Guidelines for Grazing Management for BLM Lands in Utah (1997)</i> . In these situations, short-lived species (i.e., nurse crop species) will be used and will be combined with native species to facilitate the ultimate establishment of native species.	NAT-2	MMP
All projects proposed in the Monument will contain a restoration or revegetation component and will budget for the cost of seeding with native species. All planning for projects, in all except limited, emergency situations, will use native species, and the use of non-native species will not be analyzed as an alternative.	NAT-3	MMP
Non-native plants may be used for restoration related research if the use is consistent with and furthers the overall vegetation management objectives, including NAT-2 above, and after consultation with the GSENM Advisory Committee.	NAT-4	MMP
Non-native plants will not be used to increase forage for livestock and wildlife.	NAT-5	MMP
Monitoring plots will be established in any areas where non-native plants are used in order to document changes in vegetation structure and composition and will be an integral part of the adaptive management framework described in Chapter 3 [of the MMP].	NAT-6	MMP
Restoration and Revegetation		
<p>Many factors will be considered when deciding to implement a revegetation or restoration strategy. Each project and area to be treated will be evaluated to determine the appropriate strategy. The following general guidelines can be applied to determine which strategy is the most appropriate and how it will be implemented in order to be consistent with the overall vegetation management objectives.</p> <ol style="list-style-type: none"> 1. Restoration will be the goal whenever possible (i.e., an attempt will be made to return disturbed areas to conditions which promote a natural array of native plant and animal associations). 2. Species used in both restoration and revegetation projects will comply with the non-native plant policy 	REV-1	MMP

**Table 3-4
Current Management for Vegetation in GSENM**

Decision	Planning Decision Number	Source
<p>described above (i.e., native plants will be used as a priority).</p> <p>3. Revegetation strategies will be used in areas of heavy visitation, where site stabilization is desired.</p> <p>4. Restoration provisions will be included in all surface disturbing projects including provisions for post restoration monitoring of the area. Costs for these activities will be included in the overall cost of the project and will come out of the entire project budget.</p> <p>5. Priority for restoration or revegetation will be given to projects where Monument resources are being damaged. These sites will likely be in areas near development and/or heavy visitor use. Although these areas are more likely to be candidates for revegetation projects, careful evaluation of disturbed sites needs to be conducted to include desired future condition of an area. Restoration or revegetation of areas receiving heavy use may include limits on visitor use in order to promote recovery.</p>		

**Table 3-5
Current Management for Vegetation in Glen Canyon**

Decision	Planning Decision Number	Source
General		
<p>Maintain naturally diverse plant communities and species populations similar to Potential Natural Community composition (see Appendix C [of the Glen Canyon GzMP]). These include a full complement of native species, plant vigor and health, natural structure for wildlife habitat, dynamic changes, reproductive success, and populational genetic and evolutionary responses.</p> <p>The objectives and various actions to be taken to meet the objectives are listed below. The particular action taken will depend on the characteristics of the vegetation and location. Generally, if an allotment is in Maintenance condition, then the proposed actions for each objective may not be needed. However, if the allotment is not in the Maintenance category, one or more of the following objectives and actions may be necessary.</p>	Goal	GzMP
<p>Maintain in upland (dry site) plant communities, as natural a community as possible, including the full range of native species, a viable seedbank, and minimal presence of increasing undesirable species (BLM/NPS).</p>	Objective I	GzMP

**Table 3-5
Current Management for Vegetation in Glen Canyon**

Decision	Planning Decision Number	Source
<p><i>Desirable Conditions.</i> Potential natural community composition for major plant communities is based on standard descriptions in the Natural Resource Conservation Service (NRCS) O-35 Green River resource area and field work done in Glen Canyon (see Appendix C [of the Glen Canyon GzMP]). These composition values provide the target requirements in most cases for vegetation condition within Glen Canyon. Unless otherwise stated, the potential natural community is the desired plant community. In certain situations, such as in the case of maintaining a special status species, or where fire plays a role, desirable vegetation status may depart from the potential natural community or late seral requirements. Biomass and cover values for key species and life form groups in these tables should be considered approximate and somewhat idealized. It is unlikely that vegetation exactly corresponding to the values in these tables exists. Furthermore, many land site descriptions are based on examples elsewhere in the NRCS Green River Resource Area, and are not specifically based on sites in Glen Canyon. The reported values should be used in conjunction with information on site conditions (landforms, elevation, slope, fire history, other disturbances) that can cause variation in the abundances of many species. Undesirable species that occur in Glen Canyon are also listed in Appendix C [of the Glen Canyon GzMP].</p> <p>It is recognized that there are alternative theories to the traditional potential natural community concept. In particular, recent work has validated the “state and transition” approach which suggests that traditional techniques of vegetation manipulation through stocking rates may be inadequate in many plant communities. Some vegetation has been altered to such an extent by past disturbances (e.g., fire, grazing, construction, establishment of exotics) that simply adjusting stocking rates or even removal of livestock will not cause a shift in community composition towards the potential natural community stage. Currently the NPS is conducting field studies in Glen Canyon on the utility of these newer approaches to grazing management. Until this work is finished, the potential natural community condition will be retained as a useful goal, recognizing that in some cases reduction in stocking rates or removal of livestock may not lead to the desired future condition.</p> <p>The following items 1 through 8 are actions that may be taken to attain the desirable targets and accomplish Objective 1.</p> <ol style="list-style-type: none"> 1. Establish maximum utilization levels of 45% for Indian ricegrass in all key areas in allotments within Glen Canyon, and also for other key species as necessary, until vegetation meets desirable community composition (potential natural community). 2. In allotments or pastures that are grazed in spring, utilization of Indian ricegrass and other key species will 		

**Table 3-5
Current Management for Vegetation in Glen Canyon**

Decision	Planning Decision Number	Source
<p>not exceed 25%.</p> <p>3. In non-nonmaintenance or other high-priority allotments, utilization of Indian ricegrass and other key species will not exceed 25% in spring.</p> <p>The established utilization level is based on key areas, selected in consultation with the BLM. Key areas are those that, 1) are representative of the area's vegetation, 2) support sufficient amounts of the key species, and 3) are utilized but are not areas of congregation (e.g., such as happens around watering sources). Generally, key areas are situated at least from 1/2 to 1 mile from areas of heavy use (such as around stock ponds). The principal key species utilized in Glen Canyon is Indian ricegrass (<i>Stipa hymenoides</i>) but at higher elevations needle-and-thread (<i>Stipa comata</i>) and sand dropseed (<i>Sporobolus cryptandrus</i>) are also important. Other species that can be used as indicators include Galleta grass (<i>Hilaria jamesii</i>), mormon teas (<i>Ephedra cutleri</i> and <i>E. viridis</i>), winterfat (<i>Eurotia lanata</i>), and four-wing saltbush (<i>Atriplex confertifolia</i>; see Appendix C [of the Glen Canyon GzMP]). In addition to these key areas for forage utilization, others may be chosen, in consultation with the BLM, near areas with recreational activities or in areas where important resources (natural or cultural) occur that are of importance to Glen Canyon.</p> <p>Utilization levels are based on standards used by the BLM. Utilization in spring and fall should not exceed 50%, and 60% in the winter. C. Wayne Cook (National Wildlife Federation vs. BLM 1993) suggests that yearly utilization at 60% in winter on the Colorado Plateau is probably too high. He also pointed out that in pastures grazed every year spring utilization of 50% was too high, and that in order to allow for reproduction 25% was the maximum allowable utilization. Levels have been set at 45% in key areas in this plan for all grazing periods, except under conditions (see above) where spring utilization should not exceed 25%. Once 45% utilization of Indian Ricegrass, and if deemed necessary other key species has been reached, livestock will be moved from the area.</p> <p>4. Adjust grazing seasons for Glen Canyon allotments until vegetation meets desirable community composition (potential natural community). [Note: Refer to GzMP for details.] Grazing seasons are defined in the table above for low (below 5,000 feet) and high (above 5,000 feet) elevations. In general, pastures or allotments with both elevational zones will be managed for the more sensitive communities, usually those below 5000'. Seasons of use may deviate from the table if utilization is below 45%, a grazing system is in place, and ecological trend is stable or improving. The spring grazing season has been somewhat shortened in order to allow for adequate reproduction by Indian ricegrass. Key species are listed by resource area and allotment in Appendix C.</p>		

**Table 3-5
Current Management for Vegetation in Glen Canyon**

Decision	Planning Decision Number	Source
<p>5. Maintain or increase amounts of desirable plant species and keep low or reduce numbers of undesirable increasing species (potential natural community; see Appendix C [of the Glen Canyon GzMP]).</p> <p>Butler et. al. (1994) note that snakeweed (<i>Gutierrezia</i> species) is a good indicator of range in poor condition in the recreation area. Since snakeweed can be an increaser (or sometimes an invader) on Glen Canyon range that has been overgrazed, it can serve as an indicator of range in poor condition. However, snakeweed also has a strong cyclic nature dependent on climate, and increases in abundance on a site may reflect factors other than grazing. Any use of the species as an indicator must take this into account. Natural levels of snakeweed can be found in the potential natural community composition tables for the communities in Glen Canyon. Other groups of species that appear to be related to overgrazing are the locoweeds (selected <i>Astragalus</i> species), principally <i>A. lentiginosus</i> and <i>A. praelongus</i>, and the larkspurs (Delphinium). These species may be poisonous to livestock, as many contain toxic levels of chemicals like selenium, nitrotoxins, locoine, and delphinine. These three groups can be used as indicators of change in areas where they occur. Increases in populations of these taxa in selected key areas, in combination with decreases in desirable or key species, will be used to indicate that changes in grazing activity may be needed. In some cases, particular climate events can trigger heavy growth and flowering in many locoweeds, so presence and abundance must be used with care in evaluating range conditions.</p> <p>6. Establish trend plots in key areas to determine successional trend and ecological status.</p> <p>7. Establish grazing exclosures in key areas through consultation with the BLM to determine long term effects and recovery from livestock grazing, as well as how climate affects species growth and abundance.</p> <p>Exclosures of sufficient size (a minimum of 30 m X 30 m) provide valuable baseline data on how climate and other factors affect vegetation independently of livestock grazing. Such baseline data can be used to determine if declines in selected species (e.g., key species) result from climate change (drought), grazing, or a combination of these as well as other factors. The number of exclosures or transects depends on the level of precision needed to detect change in monitored species. Brady et. al. (1995) provide a useful summary of sample sizes for the point count transect method, which is similar to some BLM monitoring techniques.</p> <p>8. Adjust stocking rates or change grazing prescription until key areas meet late seral or potential natural community composition criteria (see Appendix C [of the Glen Canyon GzMP]). For specially designated areas (Research and Protected Natural Areas; see objective 3), conditions must meet potential natural community composition criteria, as set forth above.</p>		

**Table 3-5
Current Management for Vegetation in Glen Canyon**

Decision	Planning Decision Number	Source
<p>Determine the current status and trend of the grazed rangelands in Glen Canyon (NPS/BLM).</p> <p>Baseline data are not available for all grazed portions of Glen Canyon. This objective is designed to provide data essential for proper management of grazing activities and proper use of annual forage production. The results of this work may indicate changes are necessary in potential natural community composition.</p> <p>Complete classification and inventory of the ecological status and successional trend of the upland vegetation in Glen Canyon, using the methods and steps outlined below.</p> <ol style="list-style-type: none"> 1. Compile and analyze existing data. 2. Inventory the current status of the upland arid and semi-arid vegetation, including species richness, diversity, structure, and successional status. 3. Establish permanent monitoring transects to determine future trends. 4. Establish permanent photographic points in association with permanent transects. 5. Revise the current vegetation classification for the recreation area, incorporating new data. <p>Establish baseline community classification criteria to direct management of grazing.</p>	Objective 5	GzMP
Riparian		
<p>Protect wetlands, riparian zones, and spring and seep vegetation (NPS/BLM).</p> <p>These communities support much of the biodiversity in Glen Canyon (Spence 1995). They also provide critical habitat for the majority of the wildlife species in the recreation area (cf. Johnson 1989). Many riparian communities in Glen Canyon are of major scientific importance (Spence 1995). Baseline data on riparian vegetation is lacking from much of Glen Canyon. Desirable conditions can be developed from data supplied by Spence (1995), who surveyed and classified permanent riparian zones in side canyons of Lake Powell (see Appendix C [of the Glen Canyon GzMP]). Inventory techniques and terminology are derived from Platts et. al. (1987; also see Myers 1989, pp. 16-23). Key riparian species are listed in Appendix C [of the Glen Canyon GzMP]. Riparian reaches (zones or sections of stream) to monitor will be selected in consultation with the BLM. Principal monitoring techniques include Proper Functioning Condition assessment (BLM 1993) and Greenline Riparian and Wetland monitoring (Cagney 1993). Other techniques and approaches will be developed in consultation with the BLM and where possible with BLM inventory and monitoring protocols (Myers 1989).</p>	Objective 4	GzMP

**Table 3-5
Current Management for Vegetation in Glen Canyon**

Decision	Planning Decision Number	Source
<p>For key riparian reaches in high priority or non-M allotments, maintain populations of all native species and specific conditions detailed below.</p> <ol style="list-style-type: none"> 1. Streambank alteration (e.g., bank collapse, loss of vegetation) shall not exceed 25% for streambanks in key areas (see Platts et al. 1987, pp. 75-83; Myers 1989, pp. 16-23 for definitions and methods). 2. Browse (of previous years growth) and forage utilization (of current years growth) shall not exceed 30% in key areas. 3. Reduce abundance of undesirable species to low levels (<5%) in areas where present (show declines through monitoring), and prevent establishment of undesirable species in areas where they are currently not present (see Table 9; Appendix C [of the Glen Canyon GzMP]). 4. Establish monitoring transects for vegetation status and trend determination in areas currently not meeting desirable conditions. <p>Adjust stocking rates, rest periods, reduce length of season, change season of use, or remove livestock until desirable conditions are met.</p>		
Scientifically Important Areas		
<p>Manage and protect scientifically important areas and hanging gardens to prevent grazing induced changes (NPS).</p> <p>Appendix E lists known scientifically important areas within Glen Canyon other than hanging gardens. Studies by the NPS and The Nature Conservancy have documented that these areas support important plant communities, including ungrazed relicts, and often include sensitive plant species. At present, none are established Research Natural Areas. No grazing will be allowed in the identified relict areas (approximately 12,000 acres) because of their importance to Glen Canyon resource values, management, or scientific research. No range developments will be authorized in scientifically important areas. The NPS will seek Research Natural Area designation for all eligible relict and near relict (relict areas that have been grazed but not severely altered) areas. Two additional categories, Protected Natural Area and Experimental Research Area, may be used as they provide additional important management options for areas that do not meet Research Natural Area criteria. Protected Natural Areas are based on important natural features that are generally smaller in size than areas with a Research Natural Area designation, or they are to protect single important resources (such as a specific patch of vegetation). Experimental Research Areas are already disturbed but are useful for comparisons and for research on the impacts of various kinds of disturbances,</p>	Objective 3	GzMP

**Table 3-5
Current Management for Vegetation in Glen Canyon**

Decision	Planning Decision Number	Source
<p>including grazing.</p> <p><i>Desirable Conditions.</i> Sensitive plant communities of importance for scientific research will not be subject to livestock grazing impacts.</p> <ol style="list-style-type: none"> 1. Prioritize areas according to immediacy of threats, and importance of resource to Glen Canyon. 2. Determine if Research Natural Area, Protected Natural Area or Experimental Research Area designation, and/or fencing is most appropriate to protect the site. 3. Prepare Experimental Research Area, Protected Natural Area or Research Natural Area justification report. 4. Consult with BLM on ways to exclude livestock from Protected Natural Areas or Research Natural Areas. 		
Predator, Plant, and Pest Control		
<p>Predator, pest, and noxious weed control activities will be authorized and carried out by NPS. Control efforts will be approved by NPS in coordination with the US Department of Agriculture Animal Plant Health Inspection Service (APHIS). NPS will coordinate directly with APHIS if any predator or pest control work is necessary in Glen Canyon and will complete all necessary NEPA documentation.</p>	N/A	Interagency Agreement

Sources:

- BLM. 1993. Process for assessing proper functioning condition. Bureau of Land Management Technical Reference 1737-9.
- Brady, W. W., J. E. Mitchell, C. D. Bonham, and J. W. Cook. 1995. "Assessing the power of the point-line transect to monitor changes in plant basal cover." *Journal of Range Management* 48:187-190.
- Butler, J. L., and K. J. Painter. 1994. Rangeland Recovery Potential: Soil Seed Content and Seed Viability. Draft Final Report to the National Park Service. University of South Dakota, Vermillion.
- Cagney, J. 1993. Greenline riparian-wetland monitoring. Bureau of Land Management Technical Reference 1737-8.
- Johnson, A. S. 1989. The thin green line: riparian corridors and endangered species in Arizona and New Mexico. pp. 35-46 In *Preserving Communities and Corridors*. Defenders of Wildlife, Washington, DC.
- Myers, L. H. 1989. Inventory and monitoring of riparian areas. Bureau of Land Management, Riparian Area Management TR-1737-3.
- Platts, W. S., C. Armour, G. D. Booth, M. Bryant, J. L. Bufford, P. Cuplin, S. Jensen, et al. 1987. Methods for evaluating riparian habitats with applications to management. Forest Service General Technical Report INT-221.
- Spence, J. R. 1995. A survey and classification of the riparian vegetation in side canyons around Lake Powell, Glen Canyon National Recreation Area. Draft Final Report, National Park Service, Glen Canyon National Recreation Area, Page, Arizona.

3.4 WATER

Management decisions in Table 3-6 are applicable only to BLM-managed lands in GSENM.

**Table 3-6
Current Management for Water in GSENM**

Decision	Planning Decision Number	Source
<p>The BLM’s objective with respect to water resources will be to:</p> <ul style="list-style-type: none"> • ensure that appropriate quality and quantity of water resources are available for the proper care and management of the objects of the Monument, • increase public education and appreciation of water resources through interpretation, and • facilitate appropriate research to improve management of water resources. 	Objective	MMP
<p><i>Ensure that land management policies protect water resources.</i></p> <p>Since much of the water important to the Monument falls as precipitation within the Monument, its continued availability can be ensured by appropriate land management policies within the Monument. The BLM will exercise its existing land management authorities to protect and maintain all available water and natural flows in the Monument. Several decisions described in other sections of this Plan are designed to meet this objective. These include the following:</p> <ul style="list-style-type: none"> • The need for water for visitor facilities within the Monument will be minimal because the only facilities provided will be a relatively small number of modest pullouts, toilets, parking areas, trailheads, and picnic sites. Most of these sites do not require water, including most toilet facilities which could use other technologies. In the limited cases where water is needed for a visitor facility, the acquisition of State appropriate water rights (discussed above) should be possible. • New water developments for other uses could be permitted for the following purposes: better distribution of livestock when deemed to have an overall beneficial effect on Monument resources, or to restore or manage native species or populations. These developments could only be done when a NEPA analysis determines this tool to be the best means of achieving the above objectives and only when the water development will not dewater springs or streams. • In general, diversions of water out of the Monument will not be permitted. 	WAT-1	MMP
<p><i>Pursue other options for assuring water availability, if needed.</i></p> <p>At any point that the above data collection [described in WAT-2 of the MMP] and assessment effort suggests that adequate water to protect Monument resources is not entering the Monument, or that water is otherwise being depleted to the detriment of the Monument, other measures for assuring water availability will be taken. These measures could include:</p> <ul style="list-style-type: none"> • Cooperation with other Federal agencies that may already have Federal reserved water rights. Glen 	WAT-3	MMP

**Table 3-6
Current Management for Water in GSENM**

Decision	Planning Decision Number	Source
<p>Canyon is a Federal reservation and has a Federal reserved water right (as yet unquantified) which could indirectly provide adequate protection to the Monument resources. If the United States successfully establishes a Federal reserved water right for [Glen Canyon], that water right would have a priority date of about 1965. The Monument will benefit from this water right, because some of the water necessary to satisfy the [Glen Canyon]’s water needs will pass through the Monument. The BLM will begin discussions with [Glen Canyon] to quantify this water right.</p> <ul style="list-style-type: none"> • Initiate discussions with the Utah State Engineer (Utah Division of Water Rights), Utah Division of Water Resources, and State and local water users to identify how nearby communities could secure water supplies for expected future growth without interfering with the water flows needed for Monument resources. These discussions will include negotiations toward an agreement between the State and local water users similar to the agreement recently reached for Zion National Park. The Zion agreement (reached between the Department of the Interior, the State of Utah, and local water users) allows additional future non-Federal development of water that could affect the Park, but caps it, and protects the continuation of “spike” or flood events in the Park environment. The BLM will explore options with the State of Utah and local communities, perhaps based on the Zion National Park model, for securing local water needs without jeopardizing the water needs of the Monument. If such an agreement is reached, or if any other agreement is reached with the State under the options below, segments of rivers determined to be suitable for Wild and Scenic River designation in this Plan would be managed in accordance with that agreement. • Other options are available to the BLM for assuring water availability. These are summarized below. <ul style="list-style-type: none"> <u>Appropriative Water Rights Under State Law</u> – options in this category include: Pursuing a cooperative agreement between the BLM and one of the State agencies authorized to acquire and hold an instream flow right (where the State agency has a similar interest in protecting a particular resource); approaching the Utah State Engineer with a request to use his authority to protect natural flows in the Monument by denying water rights applications where the water would serve a more beneficial purpose by remaining in the channel; and, converting BLM held water rights that may no longer be needed for grazing to wildlife rights after an appropriate proceeding to change the water right in the Office of the State Engineer. <u>Federal Reserved Water Rights</u> - The GSENM Proclamation does not reserve water as a matter of Federal law. It does not, however, abolish or defeat the BLM’s claims to Federal law-based water rights under other reservations or proclamations. Options in this category include: Public water reserves; Wild and Scenic Rivers (upon designation by Congress, or the Secretary of the Interior upon application of the Utah Governor); Congressional reservation of unappropriated water; and, by Presidential Proclamation. 		

**Table 3-6
Current Management for Water in GSENM**

Decision	Planning Decision Number	Source
Water quality monitoring will be implemented when ground disturbance or other factors could adversely affect water quality. Mitigation will be required if adverse effects are detected.	WAT-6	MMP

**Table 3-7
Current Management for Water in Glen Canyon**

Decision	Planning Decision Number	Source
Maintain water quality in all natural bodies of water and sources of water (does not include stock ponds or reservoirs) and maintain natural flows to preserve water dependent resources. At a minimum, water quality standards will meet the Utah State water requirements of 303(d) and 317 (e) as defined in the Standards and Guidelines (Appendix B [of the GzMP]).	Goal	GzMP
In all natural surface waters accessible for public use, water quantity and quality including physical/chemical parameters of flow, temperature, conductivity, pH, turbidity, salinity, dissolved oxygen, suspended and dissolved solids, and nutrients will not be degraded (NPS).	Objective 1	GzMP
Bacteriological levels for fecal coliform in natural surface waters will not exceed standards for recreational use (NPS).	Objective 2	GzMP
Preserve naturally occurring aquatic species diversity, composition and abundance (NPS).	Objective 3	GzMP
Maintain integrity of stream morphology, instream flows, riparian zone, and springs' natural emergence (NPS/BLM).	Objective 4	GzMP
Preserve the aesthetic value of natural water. Instream flows will be maintained in natural, unaltered condition (NPS).	Objective 5	GzMP
Ensure access to water sources for wildlife and recreational uses (NPS).	Objective 6	GzMP
All water developments must consider the needs of wildlife and recreation and will not be constructed, maintained, or utilized in such a way as to preclude the access to that source by wildlife or recreation users. Water rights, not presently allocated, will be obtained by NPS.	N/A	Interagency Agreement

3.5 SOIL

Management decisions in Table 3-8 are applicable only to BLM-managed lands in GSENM.

**Table 3-8
Current Management for Soil in GSENM**

Decision	Planning Decision Number	Source
<p>The overall objective with respect to soil resources within the Monument is to:</p> <ul style="list-style-type: none"> • manage uses to prevent damage to soil resources and to ensure that the health and distribution of fragile biological soil crusts is maintained or improved, • increase public education and appreciation of soils and biological soil crusts through interpretation, and • facilitate appropriate research to improve understanding and management of soil resources and biological soil crusts. 	Objective	MMP
<p>The BLM will apply procedures to protect soils from accelerated or unnatural erosion in any ground-disturbing activity, including route maintenance and restoration. The effects of activities such as grazing developments, mineral exploration or development, or water developments will be analyzed through the preparation of project specific NEPA documents. This process will include inventories for affected resources and the identification of mitigation measures.</p>	SOIL-1	MMP
<p>Prior to any ground disturbing activity, the potential effects on biological soil crusts will be considered and steps will be taken to avoid impacts on their function, health, and distribution. Long-term research toward preservation and restoration of soils will be part of the adaptive management framework described in Chapter 3 [of the MMP]. Further research will be conducted on these crusts, and the results interpreted for management and education purposes.</p>	SOIL-2	MMP

**Table 3-9
Current Management for Soil in Glen Canyon**

Decision	Planning Decision Number	Source
Maintain the evolutionary and ecological processes of the soil ecosystem.	Goal	GzMP
<p>Collect data on rates of soil erosion on various grazed and ungrazed plots, targeting areas showing excessive erosion, such as rills, soil pedestals, or actively eroding gullies (NPS).</p> <p>Use a combination of rangeland monitoring and sedimentation studies to quantify annual losses or gains from selected, established trend and riparian plots. Determine values from plots and compare to expected erosion rates developed by the Natural Resources Conservation Service (NRCS) in all sample areas, through the year 2005.</p>	Objective 1	GzMP
Enhance soil productivity and surface cover by promoting deposition of sufficient cover and litter to protect the soil from excessive water and wind erosion, and to promote infiltration (NPS).	Objective 2	GzMP

CHAPTER 4

MANAGEMENT OPPORTUNITIES

This chapter analyzes the ability of current management direction to achieve desired conditions and address resource demands. This chapter serves as a starting point for alternative formulation by providing a list of possible management opportunities for later sorting and refining into alternatives. Identifying management opportunities is a process of considering changes in management (opportunities to manage and administer the land and people differently) to respond to any problems with existing management practices, information gathered in the area profile, and issues and concerns raised through internal and external scoping.

In assessing current management for water, soil, and recreation, the BLM determined that no changes to current management were needed. However, new management actions to address specific concerns related to livestock grazing may be warranted. For example, there are opportunities to establish thresholds for biological soil crust presence to maintain ecological functions. These sections are not included below.

Current vegetation management is generally adequate as it relates to livestock grazing except that nonstructural range improvements (e.g., seedings) are not addressed. New objectives and actions to address such range improvements are needed. Existing objectives and actions may also be modified to include nonstructural range improvements.

Only management directions from BLM documents are included in the following tables. These decisions apply only to BLM-managed land in GSENM. Livestock grazing in Glen Canyon is guided by the Glen Canyon GzMP and GMP.

4.1 LIVESTOCK GRAZING

Table 4-1
Adequacy of Current Management Direction for Livestock Grazing and Options for Change

Decision	Planning Decision Number (Source)	Responsive to Current Issues (Y/N)	Remarks (Rationale) and Options for Change
<p>Grazing Management Process The following process will be followed so that grazing management conforms with the grazing regulations and Utah's Standards and Guidelines. In this process, each grazing allotment will be assessed, and new allotment management plans will be developed, consistent with the BLM-wide grazing permit renewal process.</p> <p>Step 1: Assessment All allotments will be assessed in accordance with the guidelines and guidance issued by the BLM. All available data will be used to make an overall assessment of rangeland health, including ecological processes, watershed functioning condition, water quality conditions, special status species, and wildlife habitat conditions for each allotment, as described in the Utah Standards for Rangeland Health, in light of the Fundamentals of Rangeland Health at 43 CFR § 4180.1.</p> <p>Priorities for completing the assessments and implementing needed changes will be set using the following criteria:</p> <ul style="list-style-type: none"> • presence of values that are regulated by operation of law such as water quality, threatened and endangered or sensitive plant and animal species 	GRAZ-1 (MMP)	Partially	<p>Steps 1 and 2 were completed in 2006 when the BLM issued rangeland health determinations.</p> <p>The permit renewal process commonly used by the BLM since about 1999 yields a document that is the functional equivalent to an allotment management plan. This may be a more efficient process for many of GSENM's allotments. The allotment management plan process, as outlined, also substitutes the allotment management plan process into the land use plan by relying on it to determine overall allocations in GSENM as well as the areas available and unavailable for livestock grazing. This is not consistent with BLM guidance for designating lands as available for livestock grazing use. The grazing regulations (43 CFR, Part 4130.2[a]) indicate that grazing permits and leases shall be issued to authorize use on the public lands that are designated as available for livestock grazing through land use plans. These regulations (43 CFR, Part 4100.0-8) also indicate that livestock grazing activities and management actions shall be conformance with the land use plan. The BLM Land Use Planning Handbook (H-1601-1) indicates that</p>

**Table 4-1
Adequacy of Current Management Direction for Livestock Grazing and Options for Change**

Decision	Planning Decision Number (Source)	Responsive to Current Issues (Y/N)	Remarks (Rationale) and Options for Change
<ul style="list-style-type: none"> • areas at high risk of becoming degraded, or high public interest areas permit renewal schedule <p>Step 2: Determination of Rangeland Health and Evaluation of Existing Grazing Management The GSENM Manager shall determine rangeland health for each allotment according to the Utah Standards and Guidelines for Grazing Administration, in light of the Fundamentals of Rangeland Health. The GSENM Manager determines whether or not assessment results show that each allotment is achieving or making significant progress toward the Utah Standards.</p> <p>To the extent any assessment result is found to be inconsistent with the Standards, the GSENM Manager shall determine whether or not existing livestock grazing practices or levels of use are significant factors in such inconsistency. The GSENM Manager shall take appropriate action under 43 CFR Subparts 4120, 4130, and 4160 as soon as practicable, but not later than the start of the next grazing year, upon determining that existing grazing management practices or levels of grazing on public lands need to be modified to conform with Utah Standards and Guidelines.</p> <p>Step 3: Develop Allotment Management Plans The compatibility of grazing with other land uses will be evaluated in allotment management plans (AMP),</p>			<p>land use plan decisions should identify lands available or not available for livestock grazing. Further, the handbook also indicates that for lands available for livestock grazing, identify on an area-wide basis both the amount of existing forage available for livestock and the future anticipated amount of forage available for livestock with full implementation of the land use plan.</p> <p>The schedule for completing the grazing administration process needs to be updated. So far, none of the grazing permits in the decision area have been fully processed.</p>

**Table 4-1
Adequacy of Current Management Direction for Livestock Grazing and Options for Change**

Decision	Planning Decision Number (Source)	Responsive to Current Issues (Y/N)	Remarks (Rationale) and Options for Change
<p>and the results of the evaluation will be consistent with all applicable legal authorities, including the FLPMA, the Taylor Grazing Act, the Public Rangelands Improvement Act, 43 CFR Part 4180, Utah Standards and Guidelines, and National Wildlife Federation v. BLM, 140 Interior Board of Land Appeals 85 (1997). AMPs may be developed on an individual basis, or may be developed for a group of allotments where similar ecosystems or land uses exist. These AMPs may include integrated activity planning, addressing a range of non-grazing issues within the plan area.</p> <p>Schedule The 3-step Grazing Management Process described above, and all associated National Environmental Policy Act (NEPA) documents, shall be completed within the 3 years commencing on the first July 1 following the approval of the Monument Management Plan.</p>			
<p>During the interim period until intensive livestock management is achieved, maintain existing production of desirable livestock forage consistent with meeting plant and soil requirements. This includes regulating livestock numbers, season of use, and allowing AUMs for grazing on allotments to the extent of the existing carrying capacity of suitable range.</p>	<p align="center">RM-1 <i>(This is from the Escalante MFP but is also a summary of the objectives from the other MFPs.)</i></p>	<p align="center">No</p>	<p>Because no goals or objectives are currently identified, land use plan decisions need to be made to add goals, objectives, allowable uses, and management actions specific to livestock grazing. In addition, land use plan decisions for other resources such as vegetation may need to be modified in order to integrate livestock grazing with management of other GSENM Resources.</p>

**Table 4-1
Adequacy of Current Management Direction for Livestock Grazing and Options for Change**

Decision	Planning Decision Number (Source)	Responsive to Current Issues (Y/N)	Remarks (Rationale) and Options for Change
As allotments are evaluated through monitoring studies, the season of use can be adjusted to fit current conditions and operator needs consistent with other resource objectives (Escalante MFP RM-1.1 Analysis).	RM-1.1 (Escalante MFP)	Yes	Current process is similar to this direction. Potential for adding other information to inform decisions to adjust allocations. The level and frequency of monitoring by allotment varies across the planning area. Allotments are categorized into I (Improvement), M (Maintenance), and C (Custodial). Generally, Category I allotments are monitored more frequently than allotments in the other categories. Since 2000 monitoring or assessments have occurred at more than 500 upland sites, on approximately 360 miles of streams (i.e., lotic reaches), and at more than 100 seeps/springs (i.e., lentic sites).
As management is modified, the forage allocations will be adjusted accordingly. These adjustments will come through coordinated efforts with ranchers and other interested parties (Escalante MFP RM-1.2).	RM-1.2 (Escalante MFP)	No	This decision needs to be replaced. Allotment evaluations will need to follow the Utah Standards for Rangeland Health and Guidelines for Livestock Grazing management. Land use plan decisions are needed to identify possible grazing management practices that will ensure grazing is compatible with management of GSENM objects and Glen Canyon values and purposes.
Mitigate recreation interactions by fencing recreation sites when developed, and restricting water hauling in Fiftymile Mountain and Paria Canyon recreation lands to existing roads and trails.	RM- 1.1 or RM- 1.2 (Paria MFP)	No	Land use plan decisions are needed to set guidelines and criteria for future allotment-specific adjustments in the amount of forage available for livestock, season of use, or other grazing management practices such as structural and nonstructural range improvements.

**Table 4-1
Adequacy of Current Management Direction for Livestock Grazing and Options for Change**

Decision	Planning Decision Number (Source)	Responsive to Current Issues (Y/N)	Remarks (Rationale) and Options for Change
Critical riparian areas that are accessible to livestock will be fenced to keep cattle out (WL-3.1 [of the Zion MFP]).	RM-1.2 (Zion MFP)	Yes	Fencing is one option for protecting riparian areas but there may be other options available that should be explored in the alternatives (e.g., eliminate grazing from those areas or changing season of use).
Improve the condition on suitable and potentially suitable Federal range that is now in poor condition and achieve an upward trend on range that is in a static or downward trend. Increase the production through intensive grazing management and land treatment projects.	RM-2 (Escalante MFP; similar actions are included as RM-2 in the other three MFPs)	No	The classifications (poor, fair, good) for suitable and unsuitable have been replaced by State and Transition models. While the nomenclature is different, the ideas are similar. Update to current standards and practices (i.e., land health standards). This decision may also not be compatible with other decisions in the MMP.
Adjust each grazing allotment in the planning unit to the carrying capacity of the range and adjust the grazing period on the allotments proposed for winter grazing until after seed ripe time for key species as called for in RM-1.1 and RM-1.2 [of the Vermilion MFP].	RM-2.2 (Vermilion MFP)	No	Land use plan level decisions are needed that consider new information such as adoption of the Utah Standards for Rangeland Health and Guidelines for Grazing Management and establishment of GSENM.
Provide for intensive livestock management by construction of developments and facilities.	RM-2.4 (Escalante MFP; similar to RM-2.5 in Vermilion and Zion MFPs)	N/A	Planning-level decisions are needed to identify allowable practices that guide development and maintenance of range improvements to manage livestock uses.
Complete land treatments.	RM-2.5 (Escalante MFP; similar to RM-2.6 in Vermilion and Zion MFPs)	No	There are opportunities to consider additional management direction for nonstructural range improvements (e.g., seedings and chainings). The MMP guides vegetation management but does not include nonstructural range improvements. See Table 4-2, Adequacy of

**Table 4-1
Adequacy of Current Management Direction for Livestock Grazing and Options for Change**

Decision	Planning Decision Number (Source)	Responsive to Current Issues (Y/N)	Remarks (Rationale) and Options for Change
			Current Management and Direction for Vegetation and Options for Change, for nonstructural range improvements.
Continue the unallotted status on Antone Flat, Flag Point, and Varney Griffin by not allocating livestock forage on this area. Protect the relict characteristics of No Man's Mesa.	RM-2.8 (Escalante MFP); RM-3 (Vermilion MFP)	Possibly	These decisions need to be reviewed to determine whether these areas would be available for livestock grazing.
Close the following allotments to grazing and allocate the AUMs to uses other than livestock grazing: <u>Allotment</u> <u>AUMs</u> Escalante River 2,422 McGath Point 60 Saltwater Creek 120 Steep Creek 316	Escalante MFP Amendment	Possibly	This action has been completed. Reconsider these allotments as available or unavailable for livestock grazing.
Close to grazing the portion of the Big Bowns Bench (598 AUMs), Deer Creek (83 AUMs), and Phipps (140 AUMs) allotments that are located in the Escalante River. Close the Cottonwood pasture (112 AUMs) of the Deer Creek allotment. The available forage in these areas would be allocated to uses other than livestock grazing.	Escalante MFP Amendment	Possibly	This action has been completed. Reconsider these allotments as available or unavailable for livestock grazing.
Create a grass bank or forage reserve with the remaining AUMs on Phipps allotment (140 AUMs) and all available forage on Little Bowns Bench allotment (130 AUMs) and the Wolverine pasture (148 AUMs) of the Deer Creek allotment This grass bank would only be used during emergencies or for research purposes. Emergencies would include, but would not be limited to drought, insect outbreaks, fire or floods.	Escalante MFP Amendment	Possibly	This action has been completed. Reconsider these allotments as available for livestock grazing, not as forage reserves.

**Table 4-1
Adequacy of Current Management Direction for Livestock Grazing and Options for Change**

Decision	Planning Decision Number (Source)	Responsive to Current Issues (Y/N)	Remarks (Rationale) and Options for Change
Any emergency use would not exceed current authorized use and could occur from October 1 to March 31.			
Use in Horse Canyon would be restricted to that part of the trail going onto Big Bowns Bench to the trail leaving Horse Canyon going onto King Bench. This area would only be used as a holding pasture to gather livestock at the end of the grazing season.	Escalante MFP Amendment	N/A	This action has been completed. Reconsider these allotments as available for livestock grazing, not as forage reserves.
Livestock grazing allotments will be evaluated, and grazing as it relates to all endangered species will be addressed during this process. Evaluations will incorporate the latest research and information in the protection of species. Section 7 consultation will be conducted for all allotments that may affect listed species during the individual allotments evaluations. This process will provide protection for listed and sensitive species as the evaluation will be site specific for each of the allotments	SSA-8 (MMP)	Yes	Ongoing. No change to current management needed.
Actions will be taken to improve identified habitat (Kanab Ambersnail <i>Oxyloma hadeni kanabensis</i>) as consistent with the recovery plan objectives. Actions may include assuring flows in appropriate streams and seeps by removing non-native plants affecting the water table and reducing impacts from visitors and/or livestock. Surveys will also identify current habitat and habitat that is potential if modifications are made.	SSA-24 (MMP)	No	The species in GSENM is a nonlisted relative of the noted species. No change to management due to livestock grazing, although the action is no longer relevant.
Grazing permits are also in this category [Valid Existing Rights and Other Land Use Authorizations]. Grazing permits or leases convey no right, title, or	VER-8 (MMP)	Yes	No change.

**Table 4-1
Adequacy of Current Management Direction for Livestock Grazing and Options for Change**

Decision	Planning Decision Number (Source)	Responsive to Current Issues (Y/N)	Remarks (Rationale) and Options for Change
<p>interest in the land or resources used. Although the Proclamation specifically mentions livestock grazing, it does not establish it as a “right” or convey it any new status. The proclamation states that “grazing shall continue to be governed by applicable laws and regulations other than this proclamation,” and says that the Proclamation is not to affect existing permits for, or levels of, livestock grazing in the Monument, just as in other BLM livestock grazing administration programs.</p>			
<p>Water developments can be used as a management tool throughout the Monument for the following purposes: better distribution of livestock when deemed to have an overall beneficial effect on monument resources, including water sources or riparian areas, or to restore or manage native species or populations. They can be done only when a NEPA analysis determines this tool to be the best means of achieving the above objectives and only when the water development would not dewater streams or springs. Developments will not be permitted to increase overall livestock numbers. Maintenance of existing development can continue, but may require NEPA analysis and must be consistent with objectives of this Plan.</p>	WDEV-1 (MMP)	Yes	<p>May need to clarify, through education, how decisions to allow new structures would be made according to the existing management direction. Explore opportunity to update this decision to integrate livestock grazing.</p>
<p>Wildlife Services (formerly Animal Damage Control) activities within the Monument will be limited to the taking of individual coyotes within the immediate vicinity after verified livestock kills, where reasonable</p>	WS-1 (MMP)	Yes	<p>No change to current management. Other predators are handled by Utah Division of Wildlife Resources, and coyotes are handled through Animal and Plant Health Inspection</p>

**Table 4-1
Adequacy of Current Management Direction for Livestock Grazing and Options for Change**

Decision	Planning Decision Number (Source)	Responsive to Current Issues (Y/N)	Remarks (Rationale) and Options for Change
livestock management measures to prevent predation had been taken and had failed. Reasonable livestock management measures could include preventative measures to control predation, such as managing where calving occurs, in order to develop improved land management practices.			Services.
Fences may be used in certain circumstances to protect Monument resources, to manage visitor use, and to manage livestock, consistent with the Proclamation. They will be designed and constructed in accordance with visual resource management objectives and the Monument Facilities Master Plan (see the <i>Visual Resource Management</i> section [in the MMP] for related decisions).	FENCE-1 (MMP)	Yes	No change to current management.
In developing allocation plans for areas, efforts will be made to coordinate with other resource planning efforts (e.g., research, grazing allotment management plans), as discussed in the implementation and adaptive management framework in Chapter 3 [of the MMP]. This type of integrated activity planning will lead to more comprehensive planning efforts for specific areas and to better decision making.	ALLO-8 (MMP)	Yes	No change to current management.
The BLM will be responsible for administrative routes which will be limited to authorized users. These are existing routes that lead to developments which have an administrative purpose, where the BLM or some permitted user must have access for regular maintenance or operation. These authorized developments include such things as powerlines,	TRAN-15 (MMP)	Yes	No change to current management.

**Table 4-1
Adequacy of Current Management Direction for Livestock Grazing and Options for Change**

Decision	Planning Decision Number (Source)	Responsive to Current Issues (Y/N)	Remarks (Rationale) and Options for Change
cabins, weather stations, communication sites, spring developments, corrals, and water troughs. Routes designated open for certain administrative purposes (approximately 182 miles) are shown on Map 2 [of the MMP]. Access will be strictly limited and will only be granted for legitimate and specific purposes. Maintenance will be the minimum required to keep the routes open for limited use by high clearance vehicles. If the administrative purpose of the route ceases, the route will be evaluated for closure following public notification and opportunity to comment. Authorized users could include grazing permittees, researchers, State or Federal Agencies, Native American Indians accessing recognized traditional cultural properties, and others carrying out authorized activities under a permit or other authorization.			
Beyond the routes shown on Map 2 [of the MMP], the BLM will work with any individual operating within the Monument under existing permits or authorizations to document where access must continue in order to allow operation of a current permit or authorization. Routes that go only to BLM range monitoring and study areas will not be maintained, but periodic vehicular access to these sites will be granted for required range monitoring uses.	TRAN-16 (MMP)	Yes	No change to current management.

4.2 VEGETATION

**Table 4-2
Adequacy of Current Management Direction for Vegetation and Options for Change**

Decision	Planning Decision Number (Source)	Responsive to Current Issues (Y/N)	Remarks (Rationale) and Options for Change
General			
<p>The Monument will be managed to achieve a natural range of native plant associations. Management activities will not be allowed to significantly shift the makeup of those associations, disrupt their normal population dynamics, or disrupt the normal progression of those associations.</p> <p>Additionally, the BLM will work to:</p> <ul style="list-style-type: none"> • increase public education and appreciation of vegetation through interpretation, • facilitate appropriate research to improve understanding and management of vegetation, and • protect unique vegetation associations such as hanging gardens and relict plant associations 	Goal (MMP)	No	The objective does not cover existing seedings, which are not native plant associations. New objectives and actions specific to management of existing seedings are needed. The BLM may also consider new nonstructural range improvements to increase forage using nonnative species.
Vegetation Restoration Methods			
<p>A variety of vegetation restoration methods may be used to restore and promote a natural range of native plant associations in the Monument. Methods and project which do not achieve this objective or which irreversibly impact Monument resources will not be permitted. Vegetation restoration methods fall into four broad categories: mechanical, chemical, biological, and management ignited fires. Each of these methods will be used in accordance with the overall vegetation objectives discussed above, and progress towards these objectives will be monitored as part of the adaptive management</p>	Objective (MMP)	Yes	This objective will not change but additional objectives and actions may be added to address existing seedings.

**Table 4-2
Adequacy of Current Management Direction for Vegetation and Options for Change**

Decision	Planning Decision Number (Source)	Responsive to Current Issues (Y/N)	Remarks (Rationale) and Options for Change
framework described in Chapter 3 [of the MMP].			
Mechanical methods, including manual pulling and the use of hand tools (e.g., chainsaws, machetes, pruners) may be allowed throughout the Monument.	RM-1 (MMP)	Yes	This action will not change but additional objectives and actions may be added to address existing seedings.
<p>The use of machinery (e.g., roller chopping, chaining, plowing, discing) may be allowed in all zones except the Primitive Zone. Chaining has been used in the past to remove pinyon and juniper prior to reseeding with perennial grasses. Due to the potential for irreversible impacts to other Monument resources, such as archaeological sites and artifacts, and paleontological resources, this treatment method will not be used to remove pinyon and juniper. It may be allowed to cover rehabilitation seed mixes with soil after wildfires only where:</p> <ul style="list-style-type: none"> • noxious weeds and invasive non-native species are presenting a significant threat to Monument resources or watershed damage could occur if the burned area is not reseeded, • it can be demonstrated that Monument resources will not be detrimentally affected (i.e., completion of full archaeological, paleontological, threatened and endangered species and other resource clearance and consultation), • it is determined that seed cover is necessary for the growth of the native species proposed for seeding, and • other less surface disturbing measures of covering seed are not available or cannot be applied in a timely manner. 	RM-2 (MMP)	No	Opportunities to allow mechanical treatments in all zones should be explored. Treatments appropriate to site types should also be considered.

**Table 4-2
Adequacy of Current Management Direction for Vegetation and Options for Change**

Decision	Planning Decision Number (Source)	Responsive to Current Issues (Y/N)	Remarks (Rationale) and Options for Change
Visual impacts of chaining will also be minimized near routes and other points of concern by covering the native seed mix with harrows or light chains. The GSENM Advisory Committee will be consulted before the use of machinery for treatments is permitted.			
Livestock grazing after native seedlings are established will be modified to ensure the survival of the native plants. The livestock exclusion period required to allow full establishment of seeded native species and recovery of surviving native plants after a wildfire may be more than two years. Site evaluation will be required to determine when the native seedlings should be grazed again and the effectiveness of the current or new grazing system on the persistence of native plants.	RM-3 (MMP)	No	Clarifications to this action may be needed to allow flexibility.
Chemical methods will generally be restricted to the control of noxious weed species, and are discussed in that section. The use of chemicals may also be allowed in conjunction with research projects and must lead to the achievement of the overall vegetation objectives. These activities will be approved as determined appropriate through consultation with the GSENM Advisory Committee.	RM-4 (MMP)	No	Consider modifying this action to allow for sagebrush control.
With all of the methods described above, vegetation monitoring plots will be established to determine the effectiveness of the treatments in achieving management objectives and to provide baseline data of overall change. This monitoring will include species frequency, density, and distribution data, and will be part of the overall	RM-7 (MMP)	Yes	Monitor vegetation using the AIM core indicators and standard methods, and to set up monitoring in a statistically sound manner to determine if treatment objectives are being met at multiple scales (e.g., local, GSENM-wide, and regional).

**Table 4-2
Adequacy of Current Management Direction for Vegetation and Options for Change**

Decision	Planning Decision Number (Source)	Responsive to Current Issues (Y/N)	Remarks (Rationale) and Options for Change
adaptive management framework described in Chapter 3 [of the MMP].			
Noxious Weed Control			
<p>In addition to strategies for control of established noxious weeds, it is also imperative to reduce the introduction of noxious weed species as stated in Presidential Executive Order (EO 11312) on invasive species. Cooperative programs established for control of these species will also help identify potential new invasions before area-wide establishment has occurred. There are two policies which will help to reduce potential noxious weed introduction.</p> <ul style="list-style-type: none"> • First, the BLM requires that all hay used on BLM lands be certified weed free. This is a statewide policy which applies to the Monument, as well as all other BLM lands in the State of Utah. • Second is the requirement that all machinery that has been used outside the Monument be cleaned prior to use in the Monument. This provision generally applies to contract equipment used for projects such as construction of facilities and firefighting equipment. Both of these provisions will help reduce the introduction and spread of noxious weed species in the Monument. 	NW-7 (MMP)	Yes	Standard operating procedures; no change needed. May need to add actions for undesirable species if it ties back to livestock grazing.
Native vs. Nonnative Plants			
In keeping with the overall vegetation objectives and Presidential EO 11312, native plants will be used as a priority for all projects in the Monument.	NAT-1 (MMP)	Possibly	Include separate action for existing seedings that might include restoring with nonnative species.
Non-native plants may be used in limited, emergency situations where they may be necessary in order to	NAT-2 (MMP)	Possibly	Add language to include existing seedings.

**Table 4-2
Adequacy of Current Management Direction for Vegetation and Options for Change**

Decision	Planning Decision Number (Source)	Responsive to Current Issues (Y/N)	Remarks (Rationale) and Options for Change
protect Monument resources by stabilizing soils and displacing noxious weeds. This use will be allowed to the extent that it complies with the vegetation objectives, Presidential EO 11312, and the <i>Standards for Rangeland Health and Guidelines for Grazing Management for BLM Lands in Utah</i> (1997). In these situations, short-lived species (i.e., nurse crop species) will be used and will be combined with native species to facilitate the ultimate establishment of native species.			
All projects proposed in the Monument will contain a restoration or revegetation component and will budget for the cost of seeding with native species. All planning for projects, in all except limited, emergency situations, will use native species, and the use of non-native species will not be analyzed as an alternative.	NAT-3 (MMP)	Possibly	Consider options for managing existing seedings.
Non-native plants may be used for restoration related research if the use is consistent with and furthers the overall vegetation management objectives, including NAT-2 above, and after consultation with the GSENM Advisory Committee.	NAT-4 (MMP)	Possibly	Consider options for managing existing seedings.
Non-native plants will not be used to increase forage for livestock and wildlife.	NAT-5 (MMP)	Possibly	Consider adding exceptions or alternative management methods for existing seedings.
Monitoring plots will be established in any areas where non-native plants are used in order to document changes in vegetation structure and composition and will be an integral part of the adaptive management framework described in Chapter 3 [of the MMP].	NAT-6 (MMP)	Possibly	Update to address existing seedings.

**Table 4-2
Adequacy of Current Management Direction for Vegetation and Options for Change**

Decision	Planning Decision Number (Source)	Responsive to Current Issues (Y/N)	Remarks (Rationale) and Options for Change
Restoration and Revegetation			
<p>Many factors will be considered when deciding to implement a revegetation or restoration strategy. Each project and area to be treated will be evaluated to determine the appropriate strategy. The following general guidelines can be applied to determine which strategy is the most appropriate and how it will be implemented in order to be consistent with the overall vegetation management objectives.</p> <ol style="list-style-type: none"> 1. Restoration will be the goal whenever possible (i.e., an attempt will be made to return disturbed areas to conditions which promote a natural array of native plant and animal associations). 2. Species used in both restoration and revegetation projects will comply with the non-native plant policy described above (i.e., native plants will be used as a priority). 3. Revegetation strategies will be used in areas of heavy visitation, where site stabilization is desired. 4. Restoration provisions will be included in all surface disturbing projects including provisions for post restoration monitoring of the area. Costs for these activities will be included in the overall cost of the project and will come out of the entire project budget. 5. Priority for restoration or revegetation will be given to projects where Monument resources are being damaged. These sites will likely be in areas near development and/or heavy visitor use. Although these areas are more likely to be candidates for revegetation 	REV-1 (MMP)	Yes	No change to this action is needed. However, a separate set of similar guidance may be needed for existing seedings.

**Table 4-2
Adequacy of Current Management Direction for Vegetation and Options for Change**

Decision	Planning Decision Number (Source)	Responsive to Current Issues (Y/N)	Remarks (Rationale) and Options for Change
projects, careful evaluation of disturbed sites needs to be conducted to include desired future condition of an area. Restoration or revegetation of areas receiving heavy use may include limits on visitor use in order to promote recovery.			

CHAPTER 5

CONSISTENCY/COORDINATION WITH OTHER PLANS

Section 202 of the FLPMA requires the BLM to coordinate land use planning activities with other federal agencies, and state, local, and tribal governments (FLPMA Section 202[c][9]). The FLPMA states,

[T]he Secretary shall, to the extent he finds practical, keep apprised of State, local, and tribal land use plans; assure that consideration is given to those State, local, and tribal land use plans that are germane in the development of land use plans for public lands; assist in resolving, to the extent practical, inconsistencies between Federal and non-Federal Government plans, and shall provide for meaningful public involvement of State and local government officials... (FLPMA Section 202[c][9]).

The FLPMA also states, “Land use plans of the Secretary under this section [202] shall be consistent with State and local plans to the maximum extent he finds consistent with Federal law and the purposes of this Act (FLPMA Section 202[c][9]).” The BLM planning regulations further clarify that

Guidance and resource management plans and amendments to management framework plans shall be consistent with officially approved or adopted resource related plans, and the policies and programs contained therein, of other Federal agencies, State and local governments and Indian tribes, so long as the guidance and resource management plans are also consistent with the purposes, policies and programs of Federal laws and regulations applicable to public lands, including Federal and State pollution control laws as implemented by applicable Federal and State air, water, noise, and other pollution standards or implementation plans (43 CFR, Part 1610.3-2[a]).

The planning regulations also indicate that where state and local government policies, plans, and programs differ, those of the higher authority will normally be followed (43 CFR, Part 1610.3-2[d]). The multiple use definition in FLPMA (Section 103) means “the management of the public lands and their various resource values so that they are utilized in the combination that will best meet the present and future needs of the American people; making the most judicious use of

the land for some or all of these resources or related services over areas large enough to provide sufficient latitude for periodic adjustments in use to conform to changing needs and conditions; the use of some land for less than all of the resources; a combination of balanced and diverse resource uses that takes into account the long-term needs of future generations for renewable and non-renewable resources, including, but not limited to, recreation, range, timber, minerals, watershed, wildlife and fish, and natural scenic, scientific and historical values; and harmonious and coordinated management of the various resources without permanent impairment of the productivity of the land and the quality of the environment with consideration being given to the relative values of the resources and not necessarily to the combination of uses that will give the greatest economic return or the greatest unit output.”

Prior to the approval of the proposed MMP-A decisions, the Utah State Director will submit to the Governors of Utah and Arizona the proposed MMP-A and will identify any known inconsistencies with the state or local plans, policies, or programs. The Governors have 60 days in which to identify inconsistencies and provide recommendations in writing to the Utah State Director.

If the Governors do not respond within the 60-day period, the MMP-A is presumed to be consistent. If the Governors recommend changes in the proposed MMP-A that were not raised during the public participation process, the Utah State Director will provide the public with an opportunity to comment on the recommendation(s).

If the Utah State Director does not accept the recommendation(s) of the Governors, the Utah State Director will notify the Governors, and the Governors will have 30 days in which to submit a written appeal to the Director of the BLM.

The BLM Director will accept the recommendation(s) of the Governors if the Director determines that they provide for a reasonable balance between the national interest and the states’ interest. The BLM Director will communicate to the Governors in writing and publish in the Federal Register the reasons for the decision to accept or reject such Governor’s recommendation(s) (43 CFR, Part 1610.3-2[e]).

Plans formulated by federal, state, local, and tribal governments that relate to management of lands and resources have been reviewed for the AMS and will be considered as the MMP-A/EIS is developed. The plans identified include, but are not limited to, those below.

5.1 FEDERAL AGENCY PLANS

Glen Canyon General Management Plan (NPS 1979). This plan specifically identified the following values and purposes for the park unit: vegetation, soils, wildlife, water quality, cultural resources (historic and prehistoric), scenic resources, recreation, and paleontology.

Glen Canyon Grazing Management Plan (NPS 1999). To give further clarity to the Glen Canyon values and purposes with respect to grazing practices across the recreation area, NPS developed a grazing component of the GzMP; it was signed in 1999. This plan’s intent was to be a foundational document to give management direction for the future of grazing practices across the recreation area. The GzMP was made to be flexible, allowing new data and methods to be

incorporated into the determinations of park values and resource conditions and the management of livestock practices.

Kanab Field Office Resource Management Plan (BLM 2008b). This RMP provides management direction for the Kanab Field Office. GSENM retains livestock grazing administration responsibility for certain allotments that are in both the Kanab Field Office and GSENM. The Kanab Field Office is responsible for all other aspects of land management as directed by the Kanab RMP.

Arizona Strip Field Office Record of Decision and Resource Management Plan (BLM 2008c). This RMP provides management direction for the Arizona Strip Field Office. GSENM retains livestock grazing administration responsibility for certain allotments that are in both the Arizona Strip Field Office and GSENM. The Arizona Strip Field Office is responsible for all other aspects of land management as directed by the Arizona Strip RMP.

Dixie National Forest Land and Resource Management Plan (Forest Service 1986), as amended. Certain allotments in the decision area extend onto the Dixie National Forest. While the Forest Service is responsible for all management decisions pertaining to the portion of the allotments on the National Forest, the BLM is responsible for permit administration. The BLM coordinates with the Dixie National Forest to maintain a cohesive grazing system on the common allotments.

5.2 STATE STATUTES AND PLANS

Utah Code, Title 63J Chapter 4, Part 4, Planning. This part describes the duties of the planning coordinator and office.

Utah Code, Title 63J, Chapter 8, State of Utah Resource Management Plan for Federal Lands— Within this chapter, Section 105.8 established the Utah Grazing Agricultural Commodity Zones. The Escalante Region Grazing Zone is one of many grazing zones across Utah. The purpose of these grazing zones are as follows:

1. Preserving and protecting the agricultural livestock industry from ongoing threats
2. Preserving and protecting the history, culture, customs, and economic value of the agricultural livestock industry from ongoing threats
3. Maximizing efficient and responsible restoration, reclamation, preservation, enhancement, and development of forage and watering resources for grazing and wildlife practices and affected natural, historical, and cultural activities

5.3 COUNTY STATUTES AND PLANS

Coconino County Comprehensive Plan (adopted 2003). This plan adopted in 2003, is currently being revised. The plan addresses growth, conservation, and development; and includes a section on preserving ranches and ranchlands in the county.

Garfield County General Management Plan (adopted November 8, 2007). This plan establishes criteria, policies, and requirements to be met in the federal land use planning process. It documents baseline conditions for analysis and states where quantified data is not available,

professional judgment must defer to policies and objectives outlined in the Garfield County Resource Management Plan. A 2013 amendment (Resolution 2013-2) addresses the cultural and historic value of grazing and places the Escalante Historic/Cultural Grazing Region on the County Register of Cultural and Historic Resources.

Kane County General Plan (adopted 1998, amended 2014). This plan addresses growth and development and partnerships with federal agencies in Kane County. It was amended in August 2014 to adopt the Escalante Region Multiple Use/Multiple Functions Grazing Zone in response to public concerns on grazing of public lands versus private lands and agricultural pursuits. The Grazing Zone emphasizes the social, economic, historic, and cultural importance of grazing to Kane County and its residents.

Kane County Resource Management Plan (adopted 1998, amended March 2015). This document lays out a series of resource development goals, objectives, and policies that guide the efforts of the Resource Development Committee in coordination with the County Land Use Authority. Both advise the County Commission regarding planning and development issues in a coordinated fashion pertaining to Kane County resource management and this Plan. This plan was also amended with adoption of the Escalante Region Multiple Use/Multiple Functions Grazing Zone.

Kane County Land Use Ordinance, Chapter 27, Escalante Region Multiple Use/Multiple Functions Grazing Zone (last amended September 22, 2014). Chapter 27 of the Kane County Land Use Ordinance establishes the Escalante Region Multiple Use/Multiple Functions Grazing Zone, which overlaps GSENM. The ordinance states that the purpose of providing a multiple use/multiple functions zone are to establish areas that are open and generally undeveloped lands where human habitation would be limited. The zone is designed to enhance and protect land and associated open space resources. It is established to encourage the use of land, where appropriate, for livestock grazing, wildlife habitat, and recreation, among other uses. This zone is established to protect all valid private property rights and the continued use and full access to these rights. This zone is intended to promote the health, safety, convenience, order, prosperity, and general welfare and economy of the inhabitants of Kane County, tourists, and future generations.

5.4 GSENM PROCLAMATION AND OBJECTS

Land use planning decisions for National Landscape Conservation System units, such as GSENM, must be consistent with the purposes of the designating proclamation or Act of Congress (BLM Manual 6100, p. 1-6). In addition, land use plans must clearly identify GSENM objects as described in the designating proclamation (BLM Manual 6220, p. 1-12). When the MMP was written, the BLM did not have the specific land use planning guidance for National Landscape Conservation System units that is now provided in BLM Manuals 6100 and 6220. The MMP does not specifically identify GSENM objects.

BLM Manual 6220 Section 1.6.C.2 directs that through the NEPA process, the BLM will analyze whether the impacts of the proposed use in GSENM is consistent with the protection of the area's objects. Section 1.6.G.4 of Manual 6220 states that land use plans must analyze and consider measures to ensure that objects are conserved, protected, and restored. As part the

MMP-A/EIS process, the BLM must identify, assess, and disclose effects on GSENM objects and resources.

GSENM performed an initial assessment as to whether livestock grazing could potentially impact GSENM objects. The results of the preliminary assessment are in Table 5-1, Preliminary Determination of Livestock Grazing Effects on GSENM Objects. This table is a preliminary determination of the effects of livestock grazing on GSENM objects. The BLM evaluated each object and made a determination of “not impacted” or “potentially impacted.” A determination of “not impacted” means that the interdisciplinary team has sufficient information to state that there are not impacts on the object from livestock grazing. A determination of “potentially impacted” means that there are opportunity for livestock grazing to impact the object, whether GSENM-wide or in certain locations, or that sufficient data is not available to make a determination. GSENM will use this initial assessment to begin evaluating the impacts of livestock grazing use on objects. GSENM plans to carry out the evaluation of impacts on GSENM objects as an integral part of the overall NEPA process.

**Table 5-1
Preliminary Determinations of Livestock Grazing Effects on Monument Objects**

Object or Value	Monument Proclamation Language	Determination	Rationale
General/Social			
Vast and austere landscape	The Grand Staircase-Escalante National Monument's <u>vast and austere landscape</u> embraces a spectacular array of scientific and historic resources. This high, rugged, and remote region, where bold plateaus and multi-hued cliffs run for distances that defy human perspective, was the last place in the continental United States to be mapped. Even today, this unspoiled natural area remains a frontier, a quality that greatly enhances the monument's value for scientific study. The monument has a long and dignified human history: it is a place where one can see how nature shapes human endeavors in the American West, where distance and aridity have been pitted against our dreams and courage. Remoteness, limited travel corridors and low visitation have all helped to preserve intact the monument's important ecological values. The blending of warm and cold desert floras, along with the high number of endemic species, place this area in the heart of perhaps the richest floristic region in the Intermountain West. It contains an abundance of unique, isolated communities such as hanging gardens, tinajas, and rock crevice, canyon bottom, and dunal pocket communities, which have provided refugia for many ancient plant species for millennia. Geologic uplift with minimal deformation and subsequent downcutting by streams have exposed large expanses of a variety of geologic strata, each with unique physical and chemical characteristics. These strata are the parent material for a spectacular array of unusual and diverse soils that support many different vegetative communities and numerous types	Not Impacted	Livestock grazing would not alter the vast and austere nature of the landscape of GSENM, such as large natural cliffs and open space value of the geologic formations. The immense scale and the high degree of visual variety in form, line, color, and texture of this landscape allows the typical, modestly scaled, and randomly dispersed developments associated with livestock grazing (e.g., fencing and water developments) to be visually absorbed.

**Table 5-1
Preliminary Determinations of Livestock Grazing Effects on Monument Objects**

Object or Value	Monument Proclamation Language	Determination	Rationale
	of endemic plants and their pollinators. This presents an extraordinary opportunity to study plant speciation and community dynamics independent of climatic variables. The monument contains an extraordinary number of areas of relict vegetation, many of which have existed since the Pleistocene, where natural processes continue unaltered by man.		
Rugged and remote	This high, <u>rugged, and remote</u> region, where bold plateaus and multi-hued cliffs run for distances that defy human perspective, was the last place in the continental United States to be mapped. <u>Remoteness</u> , limited travel corridors and low visitation have all helped to preserve intact the monument's important ecological values.	Not Impacted	Rugged and remote refers to the geographic location of GSENM. Livestock grazing cannot change the location of GSENM or move it toward travel corridors that make it more accessible.
Unspoiled natural area	Even today, this <u>unspoiled natural area</u> remains a frontier, a quality that greatly enhances the monument's value for scientific study.	Potentially Impacted	While the “unspoiled” nature is recognized, it is also well known that the area is not completely “unspoiled.” Livestock grazing has been ongoing for more than 100 years and likely has altered, and likely has the potential to continue to alter, the unspoiled natural area.
Natural processes unaltered by man	The monument contains an extraordinary number of areas of relict vegetation, many of which have existed since the Pleistocene, where <u>natural processes</u> continue <u>unaltered by man</u> .	Not Impacted	These areas remain unaltered by humans because they are not accessible and have not been grazed. See <i>Relict Plant Communities</i> .
Frontier	Even today, this unspoiled natural area remains a <u>frontier</u> , a quality that greatly enhances the monument's value for scientific study.	Not Impacted	One definition of “frontier” is “a region that forms the margin of settled or developed territory.” The remote and undeveloped character of GSENM is responsible for the existence and quality of most of the scientific and historic

**Table 5-1
Preliminary Determinations of Livestock Grazing Effects on Monument Objects**

Object or Value	Monument Proclamation Language	Determination	Rationale
			resources described in the Proclamation. Livestock grazing would not alter the frontier location of GSENM.
Scientific study	<p>Even today, this unspoiled natural area remains a frontier, a quality that greatly enhances the monument's value for <u>scientific study</u>.</p> <p>Remoteness, limited travel corridors and low visitation have all helped to preserve intact the monument's important ecological values. The blending of warm and cold desert floras, along with the high number of endemic species, place this area in the heart of perhaps the richest floristic region in the Intermountain West. It contains an abundance of unique, isolated communities such as hanging gardens, tinajas, and rock crevice, canyon bottom, and dunal pocket communities, which have provided refugia for many ancient plant species for millennia. Geologic uplift with minimal deformation and subsequent downcutting by streams have exposed large expanses of a variety of geologic strata, each with unique physical and chemical characteristics. These strata are the parent material for a spectacular array of unusual and diverse soils that support many different vegetative communities and numerous types of endemic plants and their pollinators. This presents an extraordinary opportunity to <u>study plant speciation and community dynamics independent of climatic variables</u>.</p> <p>Such diverse objects make the monument outstanding for purposes of <u>geologic study</u>. (See <i>Geology</i> section below.)</p>	Potentially Impacted	<p>While the “unspoiled” nature is recognized as enhancing the scientific study value, it is also well known that the area is not completely “unspoiled.” Livestock grazing likely has altered, and likely has the potential to continue to alter, the opportunities for scientific study, reducing some and enhancing others (e.g., our ability to study truly “unspoiled” ecosystems is limited, but our ability to study ecosystems responding to human uses and management is enhanced).</p> <p>There would not be an impact on opportunities to study GSENM’s geology (see <i>Geology</i> section below).</p> <p>There would not be an impact on opportunities to study GSENM’s paleontology (see <i>Paleontology</i> section below).</p> <p>Livestock grazing could potentially impact archaeological sites (see <i>Archaeological</i> section below).</p>

**Table 5-1
Preliminary Determinations of Livestock Grazing Effects on Monument Objects**

Object or Value	Monument Proclamation Language	Determination	Rationale
	<p>The thickness, continuity and broad temporal distribution of the Kaiparowits Plateau's stratigraphy provide significant opportunities to <u>study the paleontology of the late Cretaceous Era</u>. (See <i>Paleontology</i> section below.)</p> <p>The area was a contact point for the Anasazi and Fremont cultures, and the evidence of this mingling provides a <u>significant opportunity for archeological study</u>. ... Many more undocumented sites that exist within the monument are of significant scientific and historic value worthy of <u>preservation for future study</u>. (See <i>Archaeological</i> section below.)</p>		
Long and dignified human history	<p>The monument has a <u>long and dignified human history</u>: it is a place where one can see how nature shapes human endeavors in the American West, where distance and aridity have been pitted against our dreams and courage.</p> <p>The monument is rich in <u>human history</u>. (See <i>Historic</i> section below.)</p>	Not Impacted	Grazing does not affect the history of GSENM but may affect archaeological and historic sites (see <i>Archaeology</i> and <i>Historic</i> sections below).
Geology			
Grand Staircase Upper Paria Canyon System White Cliffs Vermilion Cliffs Kaiparowits Plateau Burning Hills coal	The monument is a geologic treasure of clearly exposed stratigraphy and structures. The sedimentary rock layers are relatively undeformed and unobscured by vegetation, offering a clear view to understanding the processes of the earth's formation. A wide variety of formations, some in brilliant colors, have been exposed by millennia of erosion. The monument contains significant portions of a vast geologic stairway, named the <u>Grand Staircase</u> by pioneering geologist Clarence Dutton, which rises 5,500 feet to	Not Impacted	The geologic features are not affected by grazing, which largely occurs in vegetated areas or bottoms filled with alluvium.

**Table 5-1
Preliminary Determinations of Livestock Grazing Effects on Monument Objects**

Object or Value	Monument Proclamation Language	Determination	Rationale
seams East Kaibab Monocline (the Cockscomb) Circle Cliffs Waterpocket Fold (portion of it) Arches and natural bridges Escalante Natural Bridge Grosvenor Arch Upper Escalante Canyons	<p>the rim of Bryce Canyon in an unbroken sequence of great cliffs and plateaus. The monument includes the rugged canyon country of the <u>upper Paria Canyon system</u>, major components of the <u>White and Vermilion Cliffs</u> and associated benches, and the <u>Kaiparowits Plateau</u>. That Plateau encompasses about 1,600 square miles of sedimentary rock and consists of successive south-to-north ascending plateaus or benches, deeply cut by steep-walled canyons. Naturally burning coal seams have scorched the tops of the <u>Burning Hills</u> brickred. Another prominent geological feature of the plateau is the <u>East Kaibab Monocline</u>, known as the <u>Cockscomb</u>. The monument also includes the spectacular <u>Circle Cliffs</u> and part of the <u>Waterpocket Fold</u>, the inclusion of which completes the protection of this geologic feature begun with the establishment of Capitol Reef National Monument in 1938 (Proclamation No. 2246, 50 Stat. 1856). The monument holds many <u>arches and natural bridges</u>, including the 130-foot-high <u>Escalante Natural Bridge</u>, with a 100 foot span, and <u>Grosvenor Arch</u>, a rare “double arch.” The <u>upper Escalante Canyons</u>, in the northeastern reaches of the monument, are distinctive: in addition to several major arches and natural bridges, vivid geological features are laid bare in narrow, serpentine canyons, where erosion has exposed sandstone and shale deposits in shades of red, maroon, chocolate, tan, gray, and white. Such diverse objects make the monument outstanding for purposes of geologic study.</p>		

**Table 5-1
Preliminary Determinations of Livestock Grazing Effects on Monument Objects**

Object or Value	Monument Proclamation Language	Determination	Rationale
Paleontology			
Late Cretaceous fossils	The thickness, continuity and broad temporal distribution of the Kaiparowits Plateau's stratigraphy provide significant opportunities to study the paleontology of the late Cretaceous Era. Extremely significant fossils, including marine and brackish water mollusks, turtles, crocodylians, lizards, dinosaurs, fishes, and mammals, have been recovered from the Dakota, Tropic Shale and Wahweap Formations, and the Tibbet Canyon, Smoky Hollow and John Henry members of the Straight Cliffs Formation. Within the monument, these formations have produced the only evidence in our hemisphere of terrestrial vertebrate fauna, including mammals, of the Cenomanian-Santonian ages. This sequence of rocks, including the overlying Wahweap and Kaiparowits formations, contains one of the best and most continuous <u>records of Late Cretaceous terrestrial life</u> in the world.	Not Impacted	Fourteen years of inventory and observation have shown that fossiliferous outcrops and cattle/ranching activity rarely overlap because of the lack of vegetation.
Petrified wood – Circle Cliffs	The <u>Circle Cliffs</u> reveal remarkable specimens of <u>petrified wood</u> , such as large unbroken logs exceeding 30 feet in length.	Not Impacted	Fourteen years of inventory and observation have shown that fossiliferous outcrops and cattle/ranching activity rarely overlap because of the lack of vegetation.
Archeological			
Archaeological sites Anasazi cultural sites Fremont cultural sites Rock art panels Occupation sites	<u>Archeological inventories</u> carried out to date <u>show extensive use</u> of places within the monument by ancient Native American cultures. The area was a contact point for the <u>Anasazi and Fremont cultures</u> , and the evidence of this mingling provides a significant opportunity for archeological study. The cultural resources discovered so far in the monument are outstanding in their variety of cultural affiliation, type and distribution. <u>Hundreds of recorded sites</u> include	Potentially Impacted	Many types of archaeological and historic sites can be adversely impacted by direct grazing activities (e.g., trampling, toppling walls, or rubbing), by grazing-exacerbated erosion, and by range-related improvements such as fence lines, corrals, water improvements, and pipelines. This category includes prehistoric and historic sites.

**Table 5-1
Preliminary Determinations of Livestock Grazing Effects on Monument Objects**

Object or Value	Monument Proclamation Language	Determination	Rationale
Campsites Granaries	<u>rock art panels, occupation sites, campsites, and granaries.</u> Many more undocumented sites that exist within the monument are of significant scientific and historic value worthy of preservation for future study.		
Historic			
Powell Expedition Routes / Sites	John Wesley Powell's expedition did initial mapping and scientific field work in the area in 1872.	Potentially Impacted	No Powell-related sites prone to grazing-related adverse effects are known, but it is possible that such sites might exist. Rock cairns could be affected if livestock topple them. Campsites could also be affected. Observation points would not be affected by livestock grazing.
Mormon Pioneer Trails Inscriptions Ghost towns Old Paria townsite Rock houses Cowboy line camps	Early <u>Mormon pioneers</u> left many historic objects, including <u>trails, inscriptions, ghost towns</u> such as the <u>Old Paria townsite, rock houses, and cowboy line camps,</u> and built and traversed the renowned Hole-in-the-Rock Trail as part of their epic colonization efforts.	Potentially Impacted	Some pioneer-era sites can be adversely impacted by direct grazing activities (e.g., trampling, toppling walls, or rubbing), by grazing-exacerbated erosion, and by range-related improvements such as fence lines, corrals, water improvements, and pipelines. Many of these trails and cowboy line camps are still used and maintained by the permittees for livestock access.
Hole in the Rock Trail	Early Mormon pioneers left many historic objects, including trails, inscriptions, ghost towns such as the Old Paria townsite, rock houses, and cowboy line camps, and built and traversed the renowned <u>Hole-in-the-Rock Trail</u> as part of their epic colonization efforts.	Potentially Impacted	Although the trail itself is probably not subject to adverse grazing-related effects, associated sites, such as campsites and historic inscriptions, could be adversely affected.
Dance Hall Rock National Historic Site	Sixty miles of the [Hole-in-the-Rock] Trail lie within the monument, as does <u>Dance Hall Rock,</u> used by intrepid Mormon pioneers and now a National Historic Site.	Potentially Impacted	The site can be impacted by direct grazing activities, such as rubbing on inscriptions and increased trailing around features.

**Table 5-1
Preliminary Determinations of Livestock Grazing Effects on Monument Objects**

Object or Value	Monument Proclamation Language	Determination	Rationale
Biological/ Ecological			
Intact ecological values in five lifezones (low-lying desert to coniferous forest)	Spanning <u>five life zones</u> from low-lying desert to coniferous forest, with scarce and scattered water sources, the monument is an outstanding biological resource. Remoteness, limited travel corridors and low visitation have all helped to preserve <u>intact</u> the monument's important ecological values. The blending of warm and cold desert floras, along with the high number of endemic species, place this area in the heart of perhaps the richest floristic region in the Intermountain West.	Potentially Impacted	Grazing has the potential to impact vegetation and water sources throughout the five life zones (see specific vegetation communities and water resources below).
Hanging Gardens Floristic Communities	It contains an abundance of unique, isolated communities such as <u>hanging gardens</u> , tinajas, and rock crevice, canyon bottom, and dunal pocket communities, which have provided refugia for many ancient plant species for millennia.	Potentially Impacted	Hanging gardens are typically in remote areas and are made up of ferns and mosses, which have little nutritional value for cattle. They have water, which may attract cattle. Where hanging gardens are accessible, there is the possibility of impact from physical contact.
Tinajas Floristic Communities	It contains an abundance of unique, isolated communities such as hanging gardens, <u>tinajas</u> , and rock crevice, canyon bottom, and dunal pocket communities, which have provided refugia for many ancient plant species for millennia.	Potentially Impacted	Most of these communities are inaccessible by livestock. Those that are accessible are often used by livestock as a water source. These areas also provide habitat for micro flora and fauna, especially where sediment forms, which can be impacted by cattle.
Rock Crevice Floristic Communities	It contains an abundance of unique, isolated communities such as hanging gardens, tinajas, and <u>rock crevice</u> , canyon bottom, and dunal pocket communities, which have provided refugia for many ancient plant species for millennia.	Potentially Impacted	Where livestock can access these areas, they may eat vegetation growing in rock crevices.

**Table 5-1
Preliminary Determinations of Livestock Grazing Effects on Monument Objects**

Object or Value	Monument Proclamation Language	Determination	Rationale
Canyon Bottom Floristic Communities	It contains an abundance of unique, isolated communities such as hanging gardens, tinajas, and rock crevice, <u>canyon bottom</u> , and dunal pocket communities, which have provided refugia for many ancient plant species for millennia.	Potentially Impacted	These are not a desirable plant community but may be used by livestock.
Dunal Pocket Floristic Communities	It contains an abundance of unique, isolated communities such as hanging gardens, tinajas, and rock crevice, canyon bottom, and <u>dunal pocket</u> communities, which have provided refugia for many ancient plant species for millennia.	Not Impacted	These communities form on large dunes that cattle do not access.
Endemic plants and their pollinators	Geologic uplift with minimal deformation and subsequent downcutting by streams have exposed large expanses of a variety of geologic strata, each with unique physical and chemical characteristics. These strata are the parent material for a spectacular array of unusual and diverse soils that support many different vegetative communities and numerous types of <u>endemic plants and their pollinators</u> .	Potentially Impacted	These plant communities are small and they are not a desirable forage species for livestock. However, cattle could graze on these species intermittently.
Relict Plant Communities No Man's Mesa	The monument contains an extraordinary number of areas of <u>relict vegetation</u> , many of which have existed since the Pleistocene, where natural processes continue unaltered by man. These include relict grasslands, of which <u>No Mans Mesa</u> is an outstanding example, and pinyon-juniper communities containing trees up to 1,400 years old. As witnesses to the past, these relict areas establish a baseline against which to measure changes in community dynamics and biogeochemical cycles in areas impacted by human activity. Most of the ecological communities contained in the monument have low resistance to, and slow recovery from, disturbance.	Not Impacted	Relict plant communities are inaccessible to cattle.

**Table 5-1
Preliminary Determinations of Livestock Grazing Effects on Monument Objects**

Object or Value	Monument Proclamation Language	Determination	Rationale
Pinyon-Juniper Communities with up to 1,400 year old trees	The monument contains an extraordinary number of areas of relict vegetation, many of which have existed since the Pleistocene, where natural processes continue unaltered by man. These include relict grasslands, of which No Mans Mesa is an outstanding example, and <u>pinyon-juniper communities containing trees up to 1,400 years old</u> . As witnesses to the past, these relict areas establish a baseline against which to measure changes in community dynamics and biogeochemical cycles in areas impacted by human activity. Most of the ecological communities contained in the monument have low resistance to, and slow recovery from, disturbance.	Not Impacted	In GSENM, cattle primarily use pinyon-juniper stands for shade and not forage. These areas lack vegetation in the understory such as grasses, forbs, and shrubs that are palatable to cattle. In a study of a historically ungrazed area in GSENM (No Man's Mesa) and an area grazed since the mid-1800s (Deer Springs Point), Barger et al. (2009) found that pinyon-juniper recruitment and growth is more closely correlated with climate patterns than with livestock grazing.
Diversity of wildlife species	The <u>wildlife</u> of the monument is characterized by a <u>diversity of species</u> . The monument varies greatly in elevation and topography and is in a climatic zone where northern and southern habitat species intermingle.	Potentially Impacted	Cattle operations can be beneficial or detrimental to wildlife depending upon how they are managed. Proper grazing and associated infrastructure (e.g., water sources) generally enhance wildlife diversity. This is due to the addition of new watering sources and the creation of some disturbance, which may benefit some species. Seedings and other treatments that alter vegetation and create mosaics generally allow for a greater diversity of wildlife species as more habitats of differing characteristics become available. Where resources are limited, livestock and wildlife may compete for the same resources and limit use by wildlife.
Mountain lion	<u>Mountain lion</u> , bear, and desert bighorn sheep roam the monument.	Potentially Impacted	Mountain lion inhabit remote areas and prey on big game species such as deer and elk. Grazing operations tend to benefit big game species by

**Table 5-1
Preliminary Determinations of Livestock Grazing Effects on Monument Objects**

Object or Value	Monument Proclamation Language	Determination	Rationale
			providing watering sources. Benefits to big game are also enjoyed by mountain lions that prey on those species. If mountain lions prey on cattle, they can be removed.
Bear	Mountain lion, <u>bear</u> , and desert bighorn sheep roam the monument.	Potentially Impacted	There are very few black bears inhabiting GSENM. Where they exist they are in remote areas and reclusive. Their diet overlaps slightly with cattle due to their omnivorous nature so there may be some competition for forage. Watering sites provided by cattle operations can be beneficial to bears.
Desert bighorn sheep habitat	Mountain lion, bear, and <u>desert bighorn sheep</u> roam the monument.	Potentially Impacted	Bighorn sheep occupy steep, rocky terrain, unreachable by cattle. Their habitat does not overlap with most cattle operations. Watering sites provided by cattle operations can be beneficial to bighorn sheep. If domestic sheep or goats are permitted, there could be an impact on wild sheep depending upon the proximity of domestic and wild sheep. None of the allotments are currently permitted for sheep or goats.
200 bird species	Over <u>200 species of birds</u> , including bald eagles and peregrine falcons, are found within the area. Wildlife, including neotropical birds, concentrate around the Paria and Escalante Rivers and other riparian corridors within the monument.	Potentially Impacted	Cattle operations can be beneficial or detrimental to birds depending upon how they are managed. Proper grazing and associated infrastructure can enhance bird diversity. This is due to the addition of new watering sources. Seedings (nonstructural range improvements) alter vegetation, which also alters wildlife habitats. Seedings may improve habitat for some avian species while causing a decline in habitat quality for other species.

**Table 5-1
Preliminary Determinations of Livestock Grazing Effects on Monument Objects**

Object or Value	Monument Proclamation Language	Determination	Rationale
Bald eagles	Over 200 species of birds, including <u>bald eagles</u> and peregrine falcons, are found within the area. Wildlife, including neotropical birds, concentrate around the Paria and Escalante Rivers and other riparian corridors within the monument.	Not Impacted	Bald eagles are seasonal inhabitants of GSENM. They prey mostly on carrion during the winter and are found mostly along roadsides. Cattle operations would have no impact on bald eagles.
Peregrine falcons	Over 200 species of birds, including bald eagles and <u>peregrine falcons</u> , are found within the area. Wildlife, including neotropical birds, concentrate around the Paria and Escalante Rivers and other riparian corridors within the monument.	Potentially Impacted	Peregrine falcons inhabit cliff faces, which are inaccessible by cattle. Watering locations provided by cattle operations can enhance habitat for peregrine falcons due to the fact that water attracts species the birds prey upon.
Neo-tropical Birds in riparian corridors (Paria and Escalante Rivers)	Over 200 species of birds, including bald eagles and peregrine falcons, are found within the area. Wildlife, including <u>neotropical birds</u> , concentrate around the <u>Paria and Escalante Rivers</u> and <u>other riparian corridors</u> within the monument.	Potentially Impacted	Due to the scarcity of water and riparian corridors in GSENM, these areas are important to neo-tropical birds. Cattle are also attracted to riparian areas as they provide water and green forage. Grazing can reduce vegetative cover needed to conceal nesting birds and disturb birds to the point they may abandon a nest. For ground-nesting birds, cattle may trample nests. Proper grazing administration would allow birds to complete their lifecycle requirements.
Riparian corridors	Over 200 species of birds, including bald eagles and peregrine falcons, are found within the area. Wildlife, including neotropical birds, concentrate around the Paria and Escalante Rivers and other <u>riparian corridors</u> within the monument.	Potentially Impacted	Riparian corridors serve as both groundwater discharge and recharge areas. They dissipate energy that would otherwise erode stream channels. Livestock grazing has the potential to alter hydrologic processes, thereby affecting the conditions of the riparian area, its associated stream or river, and the broader landscape.
Cryptobiotic crusts (biological soil crusts)	Fragile <u>cryptobiotic crusts</u> , themselves of significant biological interest, play a critical role throughout the monument, stabilizing the highly erodible desert soils and providing nutrients to plants.	Potentially Impacted	Cattle grazing could impact the health of the biological soil crusts. Fragile cryptobiotic crusts are susceptible to trampling by livestock. Most of GSENM is winter grazing, which has been

**Table 5-1
Preliminary Determinations of Livestock Grazing Effects on Monument Objects**

Object or Value	Monument Proclamation Language	Determination	Rationale
			found to have less of an impact on the soil crusts. Science is showing that moist soil crusts are more resistant to disturbance.
Packrat middens	An abundance of <u>packrat middens</u> provides insight into the vegetation and climate of the past 25,000 years and furnishes context for studies of evolution and climate change.	Not Impacted	Packrat middens are generally found in crevices, rock piles, jumbled logs, and other hard to access places.
Water sources (streams, springs, seeps, tinajas, wells)	Spanning five life zones from low-lying desert to coniferous forest, with scarce and scattered <u>water sources</u> , the monument is an outstanding biological resource. ... It contains an abundance of unique, isolated communities such as... <u>hanging gardens, tinajas...</u> [The water sources include] the <u>Paria and Escalante Rivers</u> and other <u>riparian corridors...</u>	Potentially Impacted	Water on GSENM is limited in both distribution and in quantity. Many of GSENM's water sources are used for or by livestock, and such use has the potential to affect water quantity and quality throughout GSENM.
Unusual and diverse soils	Geologic uplift with minimal deformation and subsequent downcutting by streams have exposed large expanses of a variety of geologic strata, each with unique physical and chemical characteristics. These strata are the parent material for a spectacular array of <u>unusual and diverse soils</u> that support many different vegetative communities and numerous types of endemic plants and their pollinators. This presents an extraordinary opportunity to study plant speciation and community dynamics independent of climatic variables.	Potentially Impacted	Livestock grazing can alter many soil properties and soil stability via compression, devegetation, desertification, and changes in chemistry.
Coniferous forest	Spanning five life zones from low-lying desert to <u>coniferous forest...</u>	Potentially Impacted	Livestock grazing would not impact the larger ponderosa pine trees. Grazing could impact ponderosa pine seedling by reducing competition for resources between other types of vegetation and the seedlings.

5.5 GLEN CANYON ENABLING LEGISLATION AND VALUES AND PURPOSES

In 1972, Congress passed the Glen Canyon's enabling legislation (Public Law 92-593). The Glen Canyon enabling legislation created the recreation area as a unit of the National Park System, managed by the NPS in accordance with the 1916 Organic Act.

The purpose of the recreation area, as described in the enabling legislation, is "to provide public outdoor recreation use and enjoyment of Lake Powell and lands adjacent thereto...and to preserve and protect the scenic, scientific, and historic features contributing to public enjoyment of the area."

The values of Glen Canyon are the "scenic, scientific, and historic features" indicated in the recreation area's enabling legislation of 1972. The 1979 GMP specifically identified the following values and purposes: vegetation, soils, wildlife, water quality, cultural resources (historic and prehistoric), scenic resources, recreation, and paleontology. Grazing, although not a purpose of the recreation area, is a use recognized by Congress in Glen Canyon's enabling legislation.

The enabling legislation specifies that the BLM will administer grazing permits. The BLM accomplishes this task through four offices, including GSENM. GSENM administers grazing on a portion of the recreation area. GSENM applies BLM policies for issuing and administering grazing permits such as the 1934 Taylor Grazing Act (43 USC, Section 315 et seq.) and FLPMA (43 USC 1701 et seq.).

In addition, GSENM administration is subject to Glen Canyon's enabling legislation. Public Law 92-593 states, "the Secretary shall administer, protect, and develop the recreation area in accordance with the provisions of the (Organic) Act of August 25, 1916 (16 USC 1a et seq.), as amended and supplemented, and with other statutory authority available to him for conservation and management of natural resources to the extent he finds such authority will further the purpose of this Act." The Redwoods Act of March 27, 1978 states that in areas of the National Park System, "The authorization of activities...shall not be exercised in derogation of the values and purposes for which these various areas have been established."

To foster coordination between the BLM and the NPS, an Umbrella Memorandum of Understanding for grazing administration within units of the NPS where grazing is authorized was signed by the Directors of the BLM and NPS on September 4, 1984. To implement this Memorandum of Understanding, an Interagency Agreement was executed in 1993 between Glen Canyon and both Utah and Arizona BLM state offices. The intent of this agreement is to "conduct a program to coordinate grazing administration activities on [Glen Canyon] which shall be carried out by the respective BLM District Managers of the Arizona Strip, Cedar City, Richfield, and Moab Districts...and in coordination and cooperation with the Superintendent of [Glen Canyon]." This agreement states that the "BLM has expertise in developing, implementing, and analyzing grazing programs" and that "NPS has expertise in determining whether an activity is consistent with the values and purposes of [Glen Canyon]."

The BLM shall not act on any grazing authorizations, range developments, management plans, management agreements, or resource monitoring and evaluation efforts or approve or act on a change in a grazing permit; change in the kind of livestock; change in the season of use; new construction, reconstruction or major maintenance of existing range

developments/improvements; a new or modified allotment management plan; a new grazing system; or new resource monitoring or evaluation efforts (not covered by an agreed upon plan) until the Superintendent of Glen Canyon has completed a determination regarding the potential effects of the proposed action upon the values and purposes of Glen Canyon. This process is called a “Values and Purposes Determination.” The determination requirement is to ensure that grazing activities do not conflict with the protection of resources as called for in the 1916 NPS Organic Act or the Glen Canyon GMP (NPS 1979).

To give further clarity to the Glen Canyon values and purposes with respect to grazing practices across the recreation area, a Grazing Component of the GzMP was developed and signed in 1999 (NPS 1999). This plan’s intent was to be a foundational document to give management direction for the future of grazing practices across the recreation area. It was made to be flexible, allowing new data and methodologies to be incorporated into the determinations of park values and resource conditions and the management of livestock practices.

The 1999 GzMP identifies specific value statements for each fundamental recreation area resource. It includes resource values, goals, and objectives for vegetation, soils, water quality, wildlife, cultural resources, paleontological and quaternary resources, scenic resources, and recreational resources. Resource management goals and 34 resource objectives were also developed with the assistance of local BLM offices that would comply with the intent of the NPS Organic Act and Glen Canyon’s enabling legislation and help achieve each resource value. It is against these 34 objectives that approval of any proposed grazing activity across the recreation area, via a Values and Purposes Determination, is based. See Chapter 3, Current Management Direction, for pertinent management direction from the GzMP.

In addition, NPS management policies provide additional guidance to all NPS units, including Glen Canyon (NPS 2006).

CHAPTER 6

SPECIFIC MANDATES AND AUTHORITY

The foundation of public land management is in the mandates and authorities provided in laws, regulations, and executive orders. The BLM planning process (as described in 43 CFR, Part 1600) is authorized and mandated through two important laws: the FLPMA and the National Environmental Policy Act of 1969. In addition to these laws, several other laws, Instructional Memoranda, manuals, and handbooks give direction and authority to the BLM. The following are some of the documents that direct the management of public lands and resources in the decision area.

6.1 GENERAL

Federal Laws and Regulations

- Antiquities Act of 1906
- NPS Organic Act of 1916 (16 USC 1)
- Migratory Bird Treaty Act of 1929
- National Historic Preservation Act of 1966 (Public Law 89-655; 80 Stat. 915)
- Redwoods National Park Act of 1968, as amended (Public Law 90-545; 16 USC 79a)
- National Environmental Policy Act of 1969, as amended (Public Law 90-190)
- Clean Air Act of 1970 (42 USC 7401 et seq.)
- Endangered Species Act of 1973, as amended (Public Law 93-205; 87 Stat. 884; 16 USC 1531-1543)
- Federal Land Policy and Management Act of 1976 (Public Law 94-579)
- Archeological Resources Protection Act of 1979 (Public Law 96-95; 16 USC 470aa, et seq.)
- Paleontological Resources Protection Act of 2009
- Omnibus Public Land Management Act of 2009
- Glen Canyon enabling legislation (Public Law 92-593) to established Glen Canyon

- Presidential Proclamation 6920 to established GSENM
- CEQ regulations (40 CFR, Parts 1500-1508)
- Resources Management Planning regulations (43 CFR, Part 1610)
- National Park Service Authorities Act (Public Law 94-458: 90 Stat. 1939; 16 USC la, et seq.)

BLM Policy

- Utah BLM Standards for Rangeland Health and Guidelines for Livestock Grazing Management (1997). Utah BLM's Standards for Rangeland Health and Guidelines for Grazing Management were developed in accordance with 43 CFR, Part 4180 to provide for conformance with the Fundamentals of Rangeland Health. Through conformance and attainment of Utah's Standards and Guidelines, the Utah BLM assures that the Fundamentals of Rangeland Health are met. Standards describe the desired condition of the biological and physical components and characteristics of rangelands. Guidelines are the grazing management approaches, methods, and practices that are indented to achieve a Standard.
- Secretarial Order 3308, Management of the National Landscape Conservation System (November 15, 2010). This order furthers the purposes of the Omnibus Public Land Management Act of 2009, which established the National Landscape Conservation System under the jurisdiction of the BLM. The purpose of the National Landscape Conservation System is to conserve, protect, and restore nationally significant landscapes that have outstanding cultural, ecological, and scientific values for the benefit of current and future generations. It directs the BLM to manage components of the National Landscape Conservation System to protect the values for which they were designated, including prohibiting uses that are in conflict with the unit's values. Where consistent with such protection and with applicable laws, multiple uses may be allowed.
- Manual 6100, National Landscape Conservation System Management (2012). The purpose of this manual is to provide general policy to BLM personnel on managing public lands in the National Landscape Conservation System according to the Omnibus Public Land Management Act of 2009.
- Manual 6220, National Monuments, National Conservation Areas, and Similar Designations (2012). This manual provides guidance to BLM personnel on managing public lands that are components of the National Landscape Conservation System and that have been designated by Congress or the President as National Monuments, National Conservation Areas, or similar designations.
- Manual 6330, Management of Wilderness Study Areas (2012). The manual outlines procedures to ensure the Congressional mandate to manage wilderness study areas so as not to impair the suitability of such areas for preservation as wilderness will be met.
- Handbook H-1790-1, National Environmental Policy Act (BLM 2008a). The purpose of the NEPA Handbook is to help BLM comply with the NEPA, the CEQ's NEPA

regulations (40 CFR, Parts 1500–1508) and the Department of the Interior NEPA manual.

- Handbook H-1601-1, Land Use Planning Handbook (BLM 2005). The BLM Land Use Planning Handbook provides supplemental guidance for implementing the BLM land use planning requirements established by Sections 201 and 202 of the FLPMA (42 USC 1711-1712) and the regulations at 43 CFR, Part 1600. It provides guidance for preparing or amending BLM land use plans.
- Manual 4180, Land Health (2009). This manual establishes policy, provides guidelines, and assigns management structure and responsibilities for conducting land health evaluations.
- Handbook H-4180-1, Rangeland Health Standards (2001). This handbook gives specific direction for implementing the policies listed in the BLM Manual 4180. It describes the authorities, objectives, and policies that guide the implementation of the Healthy Rangeland Initiative.
- Handbook H-4400-1, Rangeland Monitoring and Evaluation (1989). This handbook provides guidance related to monitoring and evaluation plans, monitoring schedules, coordination, training, and sampling.
- Healthy Lands Initiative. The Healthy Lands Initiative is a major vegetation resources enhancement initiative to restore and improve the health and productivity of western public lands. The strategy increases the effectiveness and efficiencies of vegetation enhancement treatments by focusing on treatments on a significant percentage of lands rather than at the project level.
- IM 2009-007, Process for Evaluating Status of Land Health and Making Determinations of Causal Factors When Land Health Standards Are Not Achieved. This policy establishes requirements for the work that must be completed before the BLM Authorized Officer signs a determination document that identifies significant causal factors for not achieving land health standards. It provides an updated procedure for evaluating land health, making determinations, and developing appropriate actions that will make significant progress toward achieving land health standards developed in accordance with 43 CFR, Part 4180.2(c).
- Assessment, Inventory, and Monitoring (AIM) Strategy (Toevs et al. 2011, Information Bulletin No. 2012-080). The AIM Strategy establishes a framework for collection of monitoring data that is consistent and compatible across scales, programs, and administrative boundaries. Implementation of the AIM Strategy will provide defensible, quantitative data to inform decisions and allow data to be collected once and used many times for many purposes.

NPS Policy

- NPS Management Policies (2006). The NPS Management Policies is a guide to managing the National Park System. Applicable sections include the following:
 - Section 1.4, Park Management. Discusses the prohibition on impairment

- Section 5.2, Planning (Cultural Resource Management). Discusses requirements for consideration of cultural resources during planning, including consultation requirements
- Section 6.3, Wilderness Resource Management
- Section 8.1.2, Process for Determining Appropriate Uses
- Director's Order 12, Environmental Impact Analysis. This Director's Order and associated handbook contains the basic information needed for meeting the legal requirements of the NEPA. Section 2.7 offers guidance on defining and examining alternatives.
- Director's Order 28, Cultural Resources Management. This Director's Order offers guidance in applying policies to establish, maintain, and refine park cultural resource programs and refers users to the variety of technical manuals, handbooks, and other sources for specific program areas. Chapter 6, Section 5 states that, in accordance with the NEPA, at the earliest possible stage of planning, it must be determined (1) whether and at what level the proposed project area has been surveyed archeologically, (2) whether archeological resources eligible for the National Register have been identified in the area, and (3) whether such resources will be affected by the proposed project.
- Director's Order 41, Wilderness Stewardship. This Director's Order offers guidance for wilderness stewardship in eligible, proposed, recommended, and designated wilderness areas. Section 6 describes wilderness preservation, including scientific values, effects of climate change, and cultural resources, which are also identified in planning issues for this MMP-A/EIS.
- Director's Order 46, Wild and Scenic Rivers. This Director's Order provides policy guidance necessary for accountability, consistency and continuity in the implementation of the Wild and Scenic Rivers Act, which was passed to protect selected rivers from dams, diversions, channelization, and other projects that would result in impacts on various resources (including water quality and wildlife, scenic, or recreational resources). Section 4.1 describes these impacts and resources and states NPS responsibilities in accordance with this act.
- Director's Order 53, Special Park Uses. This Director's Order sets forth the policies and procedures for administering special park uses on NPS-managed lands, which includes grazing. Section 10.5 provides guidance for domestic livestock management in parks that permit livestock use.
- Director's Order 75A: Civic Engagement and Public Involvement. This Director's Order articulates the NPS's commitment to civic engagement and public involvement that reinforces preservation for cultural and natural resources. Among the entities that the NPS considers are recreational user groups. Section VI describes policies and standards that the NPS will uphold to support this Director's Order, which includes public involvement in decision-making.
- Director's Order 79, Integrity of Scientific and Scholarly Activities. This Director's Order establishes scientific and scholarly ethical standards, including a code of

conduct, to ensure scientific integrity of NPS activities. Section IV details the Code of Scientific and Scholarly Conduct, which will be adhered to during alternative development and analysis.

- Director's Order 83, Public Health. The purpose of this Director's Order is to outline what NPS will do to ensure compliance with prescribed public health policies, practices and procedures. Depending on what is considered in the MMP-A/EIS, sections that could be consulted include: Section D, Recreational Waters; Section F, Backcountry Operations; and Section G, Vectorborne and Zoonotic Diseases.

Interagency Agreements

- NPS-BLM Memorandum of Understanding on grazing management (1984). This sets up the working relationship between the BLM and NPS for grazing management within Glen Canyon. Under the memorandum, the BLM is responsible for grazing administration and NPS is responsible for ensuring that proposed grazing activities are consistent with the purposes for which the area was established.
- NPS-BLM Interagency Agreement on grazing management (1993). The NPS must provide the BLM with terms and conditions regarding grazing to ensure compatibility with Glen Canyon's values and purposes.

6.2 LIVESTOCK GRAZING

In addition to the general mandates and authorities described above, the following apply specifically to livestock grazing administration.

Federal Laws and Regulations

- Taylor Grazing Act of 1934 (43 USC, Sections 315, 315a to 315r)
- Public Rangelands Improvement Act of 1978 (43 USC, Section 1901 et seq.)
- 43 CFR, Part 4100, Grazing Administration
- Fundamentals of Rangeland Health and Standards and Guidelines for Grazing Administration (43 CFR, Part 4180).

BLM Policy

- IM 2012-169, Resource Management Plan Alternative Development for Livestock Grazing. Provides guidance for developing livestock grazing alternatives during land use planning.
- Manual 4100, Grazing Administration (2009). This sets forth the objectives, responsibilities, and policies for livestock grazing administration on BLM-managed lands, exclusive of Alaska.
- Handbook H-4120-1, Grazing Management (1987). This describes cooperative management agreements, allotment management plans, range improvements, cooperation with government agencies, and special rules as they pertain to livestock grazing on BLM lands.

NPS Policy

- NPS Management Policies (2006), Section 8.6.8.2, Managing Agricultural Grazing. This describes when the NPS permits grazing within a park and which regulations must apply.

6.3 VEGETATION

In addition to the general mandates and authorities described above, the following apply specifically to vegetation management.

Federal Laws and Regulations

- Federal Noxious Weed Act (7 USC, Section 2801 et seq.)

BLM Policy

- Manual 1737, Riparian – Wetland Management (1992). This establishes the process for assessing PFC.
- IM UT-2005-091, Attachment I, Utah Riparian Management Policy. This states that riparian areas will be maintained in or improved to PFC.
- Handbook H-1740-2, Integrated Vegetation Management H-1740-2 (2008). This guides implementation of vegetation management planning and treatment activities to achieve the objectives set forth in Manual 1740, Renewable Resource Improvements and Treatments (2008). These objectives include adding policy on maintaining and restoring native plant community diversity, resiliency, and productivity.

NPS Policy

- Director's Order 77-1, Wetland Protection. The purpose of this Director's Order is to establish NPS policies, requirements, and standards for implementing Executive Order 11990, Protection of Wetlands. Section 2 describes these policies, requirements, and standards.
- Director's Order 77-7, Integrated Pest Management Manual. This provides descriptions of the biology and management of 21 species or categories of pests.

Miscellaneous

- Executive Order 11990, Protection of Wetlands (May 24, 1977)
- Executive Order No. 13112: Invasive Species, 1999
- DOI Manual 520, Chapter 1, Floodplain Management and Wetlands Protection Procedures (2000). This sets forth the procedures to be followed in implementing Executive Order 11988, Floodplain Management and Executive Order 11990, Protection of Wetlands.

6.4 WATER

In addition to the general mandates and authorities described above, the following apply specifically to water resources management.

Federal Laws and Regulations

- The Federal Water Pollution Control Act, 33 USC, Section 1251 et seq., as amended, commonly referred to as the Clean Water Act, establishes objectives to restore and maintain the chemical, physical, and biological integrity of the nation's water.
- The Safe Drinking Water Act, 42 USC, Section 300 et seq., is the main federal law that ensures the quality of the nation's drinking water.

BLM Policy

- IM UT-2015-019, Utah Senate Bill 274 Regarding Livestock Water Rights. This provides policy and guidance updates precipitated by changes to Utah Code, Section 73-3-31, when Utah Senate Bill 274 was signed into law. This IM sets forth procedures for obtaining BLM water rights for use in its livestock grazing program, for responding to water rights applications filed by grazing permittees, and for deciding whether BLM funds should be expended on construction of livestock water developments.
- Manual 7240, Water Quality Manual (2015). This establishes policies and guidance and assigns responsibilities for the BLM stewardship of water resources, including protecting, restoring, and maintaining the quality of waters on National System of Public Lands.
- Manual 7250, Water Rights Manual (2013). This establishes policy and guidance for the BLM in locating, perfecting, documenting, and protecting BLM-managed water rights, which are considered property rights, necessary to manage and conserve the economic and resource values of the public lands.

NPS Policy

- Director's Order 77-2, Floodplain Management. The purpose of this Director's Order is to establish NPS policies, requirements, and standards for implementing Executive Order 11988, Floodplain Management, which was issued "to avoid to the extent possible the long and short term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct or indirect support of floodplain development wherever there is a practicable alternative." Section 5.0 describes the procedures that NPS must carry out for proposed actions in order to comply with this policy, which includes classification, a statement of findings (involving an investigation of alternative sites), and an approval process.
- Reference Manual 83A1, Drinking Water. NPS Unit Managers will reduce the risk of waterborne diseases and provide safe drinking water to employees, the visiting public, and park partners by assuring that drinking water systems are properly operated, maintained, monitored, and deficiencies promptly corrected.

6.5 SOIL

In addition to the general mandates and authorities described above, the following apply specifically to soil resources management.

Federal Laws and Regulations

- Soil and Water Resources Conservation Act of 1977. This provides for conservation, protection and enhancement of soil, water, and related resources

BLM Policy

- Manual 7100, Soil Resource Management (2008). This defines the policy of the BLM's Soil Resource Management Program.

6.6 RECREATION

In addition to the general mandates and authorities described above, the following apply specifically to recreation management.

Federal Laws and Regulations

- Federal Lands Recreation Enhancement Act (2004). This creates common definitions, policy guidance, and reporting for agencies involved in recreation management.

BLM Policy

- Manual 8320 (Planning for Recreation and Visitor Services) (2011). Provides planning policy for recreation and visitor services on BLM lands.

CHAPTER 7

LIST OF PREPARERS

This AMS was prepared by an interdisciplinary team of staff from the BLM and Environmental Management and Planning Solutions, Inc. (EMPSi). The following people prepared or contributed to the development of the AMS.

Name	Role	Education	Years' Experience
BLM			
Allysia Angus	Landscape Architect/Land Use Planner	MLA, Landscape Architecture and Environmental Planning; BA, Communications	14
Allan Bate	Rangeland Management Specialist	BS, Range Science	27
Matt Betenson	Assistant Monument Manager: Planning and Support Services	Graduate Work, Anthropology and Geographic Information Systems; BS, Anthropology; AA, General Studies	24
Raymond Brinkerhoff	Botanist	BS, Biology/Botany	15
Jason Bybee	Rangeland Management Specialist	BS, Biology	5
Katherine Farrell	Planning and Environmental Coordinator (<i>former</i>)	N/A	26
Cameron McQuivey	Wildlife Biologist	BS, Zoology	21
Richard Madril	Assistant Monument Manager: Resources	AS, Agricultural Economics: Farm and Ranch Business Management; BS, Agricultural Science, Animal Production, Minor Range and Natural Resources	28
Kevin Miller	Soils and Water	Doctorate Work, Coastal Resources Management; MS, Chemistry and Aquatic Ecology; BS, Chemistry	30

Name	Role	Education	Years' Experience
Sean Stewart	Rangeland Management Specialist	BA, Botany, History Minor; Post-Graduate Course work in Range Management	18
EMPSi			
Kate Krebs	Project Manager	BA, Environmental Studies, Spanish, Minor in Political Science	9
Jack Alexander	Livestock Grazing	MS, Range Science; BS, Range Science	25
Peter Gower	Recreation	MS, Land Use Planning; BA, Political Science; BS, Geography, Minor in Environmental Studies	10
Derek Holmgren	Water and Soils	MS, Environmental Science; MPA, Environmental Policy and Natural Resources Management; BS, Environmental Science	15
Meredith Zaccherio	Vegetation	MA, Biology; BS, Biology; BS Environmental Science	10

CHAPTER 8

GLOSSARY

Active use. That portion of the grazing preference that is: 1) available for livestock grazing use under a permit or lease based on livestock carrying capacity and resource conditions in an allotment; and 2) not in suspension (43 CFR, Part 4100.0-5).

Actual use. Where, how many, what kind or class of livestock, and how long livestock graze on an allotment, or on a portion or pasture of an allotment (43 CFR, Part 4100.0-5).

Allotment. An area of land designated and managed for grazing of livestock (43 CFR, Part 4100.0-5).

Allotment management plan. A documented program developed as an activity plan, consistent with the definition at 43 USC 1702(k), that focuses on, and contains the necessary instructions for, the management of livestock grazing on specified public lands to meet resource condition, sustained yield, multiple use, economic and other objectives (43 CFR, Part 4100.0-5).

Animal unit month (AUM). The amount of forage necessary for the sustenance of one cow or its equivalent for a period of one month (43 CFR, Part 4100.0-5).

Available (for livestock grazing). Public lands where a land use plan decision has been made that identified livestock grazing use as an allowable use. In other words, a land use plan decision indicates that areas are open to livestock grazing use.

Benthic. Of, relating to, or occurring at the bottom of a body of water.

Ecological site. 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.

Ecoregion. Areas identified through the analysis of the patterns and the composition of biotic and abiotic phenomena that affect or reflect differences in ecosystem quality and integrity. These phenomena include geology, physiography, vegetation, climate, soils, land use, wildlife, and hydrology. The relative importance of each characteristic varies from one ecological region to another regardless of the hierarchical level.

Fundamentals of rangeland health. Overarching principles of rangeland health, listed at 43 CFR, Part 4180.1, which establish the Department's policy of managing for healthy rangelands (60 Federal Register at 9954). State or regional standards and guidelines must provide for conformance with the Fundamentals of Rangeland Health (43 CFR, Part 4180.2[b]).

Grazing lease. A document that authorizes grazing use of the public lands under Section 15 of the Taylor Grazing Act. A grazing lease specifies grazing preference and the terms and conditions under which lessees make grazing use during the term of the lease (43 CFR, Part 4100.0-5).

Grazing permit. A document that authorizes grazing use of the public lands under Section 3 of the Taylor Grazing Act. A grazing permit specifies grazing preference and the terms and conditions under which permittees make grazing use during the term of the permit (43 CFR, Part 4100.0-5).

Grazing preference. The total number of animal unit months on public lands apportioned and attached to base property owned or controlled by a permittee, lessee, or applicant for a permit or lease. Grazing preference includes active use and use held in suspension. Grazing preference holders have a superior or priority position against others for the purpose of receiving a grazing permit or lease (43 CFR, Part 4100.0-5).

Guideline. A practice, method, or technique determined to be appropriate to ensure that standards can be met or that significant progress can be made toward meeting the standard. Guidelines are tools such as grazing systems, vegetative treatments, or improvement projects that help managers and permittees achieve standards. Guidelines may be adapted or modified when monitoring or other information indicates the guideline is not effective, or a better means of achieving the applicable standard becomes appropriate (BLM Handbook H-4180-1).

Invasive plants. Plants that are not part (if exotic) of or are a minor component (if native) of the original plant community or communities that can become a dominant or co-dominant species on the site if their future establishment and growth is not actively controlled by management interventions, or are classified as exotic or noxious plants under state or federal law. Species that become dominant for only one to several years (e.g., short-term response to drought or wildfire) are not invasive plants (BLM Handbook H-1740-2, Integrated Vegetation Management).

Inventory. Gathering of baseline information (including quantitative data, cultural knowledge, and qualitative observations) about condition of resources. Examples of inventory are ecological site inventory and population counts of threatened or endangered species (BLM Handbook H-4180-1).

Land health. Degree to which the integrity of the soil and the ecological processes of ecosystems are sustained (BLM Handbook H-4180-1).

Land use plan. A resource management plan, developed under the provisions of 43 CFR, Part 1600, or a management framework plan. These plans are developed through public participation in accordance with the provisions of the Federal Land Policy and Management Act of 1976 (43

USC 1701 et seq.) and establish management direction for resource uses of public lands (43 CFR, Part 4100.0-5).

Lentic. Standing water habitat such as lakes, ponds, seeps, bogs, and meadows.

Livestock carrying capacity. The maximum stocking rate possible without damaging vegetation or related resources. The rate may vary from year to year in the same area as a result of fluctuating forage production (43 CFR, Part 4100.0-5).

Lotic. Running water habitat such as rivers, streams, and springs.

Monitoring. The periodic observation and orderly collection of data to evaluate: 1) effects of management actions; and 2) effectiveness of actions in meeting management objectives (43 CFR, Part 4100.0-5).

Nonnative Invasive Species. An alien species whose introduction does or is likely to cause economic or environmental harm or harm to human health (Executive Order 13112).

Noxious weed: A plant species designated by federal or state law as generally possessing one or more of the following characteristics: aggressive and difficult to manage; parasitic; a carrier or host of serious insects or disease; or nonnative, new, or not common to the US (BLM Handbook H-1740-2, Integrated Vegetation Management).

Range improvement. An authorized physical modification or treatment which is designed to improve production of forage; change vegetation composition; control patterns of use; provide water; stabilize soil and water conditions; restore, protect and improve the condition of rangeland ecosystems to benefit livestock, wild horses and burros, and fish and wildlife. The term includes, but is not limited to, structures, treatment projects, and use of mechanical devices or modifications achieved through mechanical means (43 CFR, Part 4100.0-5).

Rangeland health. The degree to which the integrity of the soil and ecological processes of rangeland ecosystems are sustained. Rangeland health exists when ecological processes are functioning properly to maintain the structure, organization, and activity of the system over time (BLM Handbook H-4180-1).

Rangeland health assessment. The degree to which the integrity of the soil and ecological processes of rangeland ecosystems are sustained. Rangeland health exists when ecological processes are functioning properly to maintain the structure, organization and activity of the system over time. A three-step process is used to determine whether rangeland health standards are being met on BLM-managed lands:

- **Assessment.** The estimation or judgment of the status of ecosystem structures, functions, or processes, within a specified geographic area (preferably a watershed or a group of contiguous watersheds) at a specific time. An assessment is conducted by gathering, synthesizing, and interpreting information, from observations or data from inventories and monitoring. An assessment characterizes the status of resource conditions so that the status can be evaluated (see definition of evaluation)

relative to land health standards. An assessment sets the stage for an evaluation. An assessment is not a decision.

- *Evaluation.* An evaluation is conducted to arrive at two outcomes. Firstly, an evaluation conducts an analysis and interpretation of the findings resulting from the assessment, relative to land health standards, to evaluate the degree of achievement of land health standards. Secondly, an evaluation conducts an analysis and interpretation of information—be it observations or data from inventories and monitoring—on the causes for not achieving a land health standard. An evaluation of the causes provides the foundation for a determination (see definition for determination). An evaluation goes further than an assessment because an evaluation takes what the assessment provides—which is the status of resource conditions characterized by the appropriate indicators—and evaluates them according to land health standards. Then, this leads to a prognosis of: land health standard achieved; making significant progress toward achieving a land health standard; or land health standard not achieved. If the land health standard is not achieved, the evaluation of the causes allows a determination to be made. In summary, an evaluation builds on the assessment, and the evaluation sets the stage for a determination.
- *Determination.* Document recording the BLM Authorized Officer’s finding that existing grazing management practices or levels of grazing use on public lands grazing either are or are not significant factors in failing to achieve the standards and conform with the guidelines within a specified geographic area (preferably watershed or a group of contiguous watersheds). (BLM H-4180-1.)

Riparian area: 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, next to, or contiguous with perennially and intermittent flowing rivers and streams, glacial potholes, and the shores of lakes and reservoirs with stable water levels are typical riparian areas (Leonard et al. 1992, p. 7).

Special recreation management area (SRMA). An area of BLM-managed land where the existing or proposed recreation opportunities and recreation setting characteristics are recognized for their unique value, importance, and/or distinctiveness, especially as compared to other areas used for recreation (BLM Manual 8320). SRMAs are designated in land use plans.

Standard. Standards of land health are expressions of levels of physical and biological condition or degree of function required for healthy lands and sustainable uses, and define minimum resource conditions that must be achieved and maintained (BLM Handbook H-4180-1).

Stocking rate. The number of specific kinds and classes of animals grazing or utilizing a unit of land for a specific period of time. It may be expressed as animals per acre, hectare, or section or the reciprocal (area of land per animal). When dual use is practiced (e.g., cattle and sheep), the stocking rate is often expressed as animals per unit of land or the reciprocal (NRCS 2003, p. Glossary-55).

Suspension. The withholding from active use through a decision issued by the authorized officer or by agreement of part or all of the grazing preference specified in a grazing permit or lease (43 CFR, Part 4100.0-5).

Temporary nonuse. That portion of active use that the authorized officer authorizes not to be used, in response to an application made by the permittee or lessee (43 CFR, Part 4100.0-5).

Trend. The direction of change over time, either toward or away from desired management objectives (43 CFR, Part 4100.0-5).

Unalloted. Public lands open to grazing which currently have no livestock grazing authorized.

Unavailable (for livestock grazing). Public lands where a land use plan decision has been made to close lands to livestock grazing use.

Utilization. The portion of forage that has been consumed by livestock, wild horses and burros, wildlife, and insects during a specified period. The term is also used to refer to the pattern of such use (43 CFR, Part 4100.0-5).

Wetland: Those areas inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas (US Army Corps of Engineers 1987, p. 9).

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CHAPTER 9

REFERENCES

- Barger, N. N., H. D. Adams, C. Woodhouse, J. C. Neff, and G. P. Asner. 2009. "Influence of livestock grazing and climate on pinyon pin (*Pinus edulis*) dynamics." *Rangeland Ecology and Management* 62:531-539.
- Belliston, N., R. Whitesides, S. Dewey, J. Merritt, and S. Birmingham. 2009. Noxious Weed Field Guide for Utah. Internet website: http://extension.usu.edu/files/publications/publication/pub_8746541.pdf.
- Belnap, J. 1995. Potential role of cryptobiotic soil crusts in semiarid rangelands. In: Symposium on Ecology, Management, and Restoration of Intermountain Annual Rangelands, US Forest Service, General Technical Report INT-GTR-313. General Technical Report INT-GTR-313. Washington, DC: DOI-U.S. Forest Service. Pp. 179-185.
- _____. 1997. "Ecological resources of the Grand Staircase-Escalante National Monument." *In: Learning from the Land, Grand Staircase-Escalante National Monument Science Symposium Proceedings 1997*. BLM/UT/GI-98/006+1220.
- BLM (US Department of the Interior, Bureau of Land Management). 1980. Kanab/Escalante Grazing Management Draft Environmental Impact Statement.
- _____. 1981a. Escalante Management Framework Plan. BLM, Escalante Resource Area, Cedar City District. April 22, 1981.
- _____. 1981b. Paria Management Framework Plan. BLM, Kanab Resource Area, Cedar City District. April 22, 1981.
- _____. 1981c. Vermilion Management Framework Plan. BLM, Kanab Resource Area, Cedar City District. April 22, 1981.
- _____. 1981d. Zion Management Framework Plan. BLM, Kanab Resource Area, Cedar City District. April 22, 1981.

-
- _____. 1997. Standards for Rangeland Health and Guidelines for Grazing Management for BLM Lands in Utah. BLM, Utah State Office.
- _____. 1999. Escalante Management Framework Plan Approved Amendment and Decision Record. BLM Utah State Office, Salt Lake City. March 15, 1999.
- _____. 2000. Grand Staircase-Escalante National Monument Management Plan and Record of Decision. BLM, Grand Staircase-Escalante National Monument, Cedar City, Utah. February 2000.
- _____. 2001. Handbook H-4180-I, Rangeland Health Standards. BLM, Washington, DC. January 19, 2001.
- _____. 2005. Handbook H-1601-I, Land Use Planning Handbook. BLM, Washington, DC. March 11, 2005.
- _____. 2006. Rangeland Health Determination. BLM, Grand Staircase-Escalante National Monument. Utah.
- _____. 2008a. Handbook H-1790-I: NEPA Handbook. Rel. I-1710, January 30, 2008. BLM, Washington, DC.
- _____. 2008b. Kanab Field Office Record of Decision and Approved Resource Management Plan. BLM, Kanab Field Office, Kanab, Utah. October 2008.
- _____. 2008c. Arizona Strip Field Office Record of Decision and Resource Management Plan. BLM, Arizona Strip Field Office, St. George, Utah. February 2008.
- _____. 2012. Programmatic EA for Issuing Special Recreation Permits within Grand Staircase – Escalante National Monument.
- _____. 2013. Recreation Management Information System Data, Fiscal Year Range October 1, 2011 – September 30, 2012.
- _____. 2014a. BLM Range Administration System.
- _____. 2014b. What are Noxious and Invasive Weeds? Internet website: http://www.blm.gov/wo/st/en/prog/more/weeds/weed_definition.html.
- _____. 2014c. Investing in Range Improvements on Public Lands Fact Sheet. Internet website: http://www.blm.gov/pgdata/etc/medialib/blm/wo/Information_Resources_Management/policy/im_attachments/2008.Par.37258.File.dat/IM2008-170_att2.pdf.
- _____. 2014d. Special Recreation Permit Program Business Plan: Grand Staircase – Escalante National Monument. WBS# LVRD UT 340000.
- Bowker, Matthew A., Jayne Belnap, and Mark E. Miller. 2006. "Spatial modeling of biological soil crusts to support rangeland assessment and monitoring." *Rangeland Ecology & Management* 59(5):519-529.

- Breshears, D. D., N. S. Cobb, P. M. Rich, K. P. Price, C. D. Allen, R. G. Balice, W. H. Romme, J. H. Kastens, M. L. Floyd, J. Belnap, J. J. Anderson, O. B. Myers, and C. W. Meyer. 2005. "Regional vegetation die-off in response to global-change-type drought." *PNAS* 102(42):15144-15148.
- Bryce, S. A., J. R. Strittholt, B. C. Ward, and D. M. Bachelet. 2012. Colorado Plateau Rapid Ecoregional Assessment Report. Prepared for the US Department of the Interior, Bureau of Land Management, Denver, Colorado.
- Busby, F. E., and S. Green. 2006. "Integrating concepts of ecological sites, state and transition models, and indicators of rangeland health into ecosystem management programs." Learning from the Land – Grand Staircase-Escalante National Monument Science Symposium Proceedings.
- Chaudhary, V. B., M. A. Bowker, T. E. O'Dell, J. B. Grace, A. E. Redman, M. C. Rillig, and N. C. Johnson. 2009. "Untangling the biological contributions to soil stability in semiarid shrublands." *Ecological Applications* 19(1):110-122.
- Clements, C. D., D. N. Harmon, J. A. Young, and J. Knight, J. 2012. "Diorhabda carinulata and tamarisk control" (abstract). *Western Society of Weed Science* 64:8.
- Colorado Mesa University. 2014. Grand Staircase-Escalante National Monument Recreational Experience Baseline Study Report: Phase I: Hole in the Rock Road Area.
- Cowardin, L. M., V. Carter, F. C. Golet, and E. T. LaRoe. 1979. Classification of wetlands and deepwater habitats of the United States. US Department of the Interior, Fish and Wildlife Service, Washington, DC. Internet website: <http://www.npwrc.usgs.gov/resource/wetlands/classwet/>.
- Derner, J. D., H. B. Johnson, B. A. Kimball, P. J. Pinter, Jr., H. W. Polley, C. R. Tischler, T. W. Boutton, R. L. Lamorte, G. W. Wall, N. R. Adam, S. W. Leavitt, M. J. Ottman, A. D. Matthias, and T. J. Brooks. 2003. "Above- and below-ground responses of C3-C4 species mixtures to elevated CO₂ and soil water availability." *Global Change Biology* 9:452-460.
- Edvarchuk, K., and C. Ransom. 2012. An Inventory of Noxious and Invasive Plants in Grand Staircase-Escalante National Monument - 2012 Final Report. Prepared for the Bureau of Land Management by Utah State University; Plants, Soils, and Climate; Weed Science Research Project Report No. CR1202A.
- EPA (US Environmental Protection Agency). 2011. Level III Ecoregions of the Continental United States, revised December 2011. National Health and Environmental Effects Research Laboratory, US Environmental Protection Agency. Internet website: http://www.epa.gov/wed/pages/ecoregions/level_iii_iv.htm.
- _____. 2012. Utah 303(d) Listed Waters for Reporting Year 2010. Internet website: http://ofmpub.epa.gov/waters10/attains_impaired_waters.impaired_waters_list?p_state=UT&p_cycle=2010.
- _____. 2013. Primary distinguishing characteristics of Level III ecoregions of the continental United States. September 2013. Internet website: http://www.epa.gov/wed/pages/ecoregions/level_iii_iv.htm.

- Forest Service (US Department of Agriculture, National Forest Service). 1986. Dixie National Forest Land and Resource Management Plan. Dixie National Forest, Cedar City, Utah.
- Forest Service (US Department of Agriculture, National Forest Service) and BLM (US Department of the Interior, Bureau of Land Management). 1996. Interagency Technical Reference 1734-3, Utilization Studies and Residual Measurements. Revised 1997, 1999.
- Freethy, Geoffrey W. 1997. "Hydrogeology and water resources of the Grand Staircase Escalante National Monument." In: Learning from the Land: Grand Staircase-Escalante National Monument Symposium Proceedings (Linda H. Hill and Janine J. Koslak, editors). November 4 and 5, 1997, Southern Utah University. Bureau of Land Management, Utah State Office, Salt Lake City, Utah. Internet website: http://www.blm.gov/pgdata/etc/medialib/blm/ut/grand_staircase-escalante/science___research/1997_symposium.Par.66473.File.dat/poster05.htm.
- Great Basin Institute. 2014. Land health assessment: BLM GSENM: 2014 Final Report. Great Basin Institute, Reno, Nevada.
- Ironside, K. E., and N. E. Cobb. 2006. "Effects of past management treatments on vegetation structure and dynamics in pinyon-juniper woodlands at Grand Staircase-Escalante National Monument." In *Learning from the Land – Grand Staircase-Escalante National Monument Science Symposium Proceedings, 2006*.
- Leonard, S., G. Staidl, J. Fogg, K. Gebhardt, W. Hagenbuck, D. Pritchard. 1992. Procedures for Ecological Site Inventory with Special Reference to Riparian-Wetland Sites. Technical Reference TR-1737-7. Bureau of Land Management. Denver, Colorado.
- Milchunas, Daniel G. 2006. Responses of plant communities to grazing in the southwestern United States. Gen. Tech. Rep. RMRS-GTR-169. Fort Collins, Colorado: US Department of Agriculture, Forest Service, Rocky Mountain Research Station.
- Millennium Science & Engineering, Inc. Undated(a). Escalante River Watershed Water Quality Management Plan. Prepared for Utah Department of Environmental Quality Division of Water Quality.
- _____. Undated(b). Paria River Watershed Water Quality Management Plan. Prepared for Utah Department of Environmental Quality Division of Water Quality.
- Miller, M. E. 2005. The Structure and Functioning of Dryland Ecosystems—Conceptual Models to Inform Long-Term Ecological Monitoring. US Geological Survey. Scientific Investigations Report 2005–5197.
- _____. 2008. "Broad-scale assessment of rangeland health, Grand Staircase-Escalante National Monument, USA." *Rangeland Ecology and Management* 61:249-262.
- Miller, M. E., J. Belnap, R. Reynolds, J. Neff, and M. Reheis. 2006. "Cheatgrass performance in relation to soil characteristics in Colorado Plateau Drylands." *Learning from the Land – Grand Staircase-Escalante National Monument Science Symposium Proceedings, 2006*.

- Munson, S. M., J. Belnap, C. D. Schelz, M. Moran, and T. W. Carolin. 2011. "On the brink of change: Plant responses to climate on the Colorado Plateau." *Ecosphere* 2(6):art68. doi:10.1890/ES11-00059.1.
- National Oceanic and Atmospheric Administration. 2013. Flood Safety Awareness and Preparedness, Flash Flood Potential Rating. Internet website: <http://www.wrh.noaa.gov/slc/wxsafety/flood/floodsafetyawarenesspreparedness.html>.
- NPS (US Department of the Interior, National Park Service). 1979. Glen Canyon National Recreation Area Proposed General Management Plan, Wilderness Recommendation, and Road Study Alternatives Final Environmental Impact Statement.
- _____. 1999. Glen Canyon National Recreation Area Grazing Management Plan and Finding of No Significant Impact. NPS, Glen Canyon National Recreation Area, Page, Arizona. August 1999.
- _____. 2006. Management Policies. US Department of the Interior, National Park Service. ISBN 0-16-076874-8.
- _____. 2014. Glen Canyon National Recreation Area Off-road Vehicle Management Plan/Draft Environmental Impact Statement. January 2014.
- NRCS (Natural Resources Conservation Service). 2003. National Range and Pasture Handbook. Issued September 1997, revised December 2003.
- _____. 2007. Soil Survey of Grand Staircase-Escalante National Monument Area, Parts of Kane and Garfield Counties, Utah. Issued 2007.
- _____. 2010. Soil Survey of Glen Canyon National Recreation Area, Arizona and Utah. Issued 2010.
- _____. 2014. Ecological Site Descriptions. Internet website: <http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/technical/ecoscience/desc/>.
- Pellant, M., P. Shaver, D. A. Pyke, and J. E. Herrick. 2005. Interpreting indicators of rangeland health, version 4. Technical Reference 1734-6. US Department of the Interior, Bureau of Land Management, National Science and Technology Center, Denver, Colorado. BLM/WO/ST-00/001+1734/REV05.
- Robson, S. G., and E. R. Banta. 1995. Ground Water Atlas of the United States, Arizona, Colorado, New Mexico, Utah, HA 730-C. US Geological Survey. Internet website: http://pubs.usgs.gov/ha/ha730/ch_c/C-text8.html.
- Sada, D. W., and K. F. Pohlman. 2002. "Spring inventory and monitoring protocols." Conference proceedings. Spring-fed Wetlands: Important Scientific and Cultural Resources of the Intermountain Region.
- Sheley, R., J. Petroff, and M. Borman. 1999. Introduction to Biology and Management of Noxious Rangeland Weeds. Corvallis, Oregon. Internet website: http://www.blm.gov/wo/st/en/prog/more/weeds/weed_definition.html.

- Stager's Environmental Consulting. 2014. Final Report on Riparian and Proper Functioning Condition and Standards for Rangeland Health Updated Independent Evaluation for Allotment Livestock Management for the Cottonwood, Death Hollow, Lower Cattle, Mollies Nipple, School Section, Soda, and Vermilion Allotments. January 16, 2014.
- Stohlgren, T. J., M. Miller, P. Evangelista, A. Crall, D. Guenther, N. Alley, and M. Kalkhan. 2006. "Landscape-scale assessment of Grand Staircase-Escalante National Monument." Learning from the Land – Grand Staircase-Escalante National Monument Science Symposium Proceedings, 2006.
- Toevs, G. R., J. J. Taylor, C. S. Spurrier, W. C. MacKinnon, and M. R. Bobo. 2011. Bureau of Land Management Assessment, Inventory, and Monitoring Strategy: For integrated renewable resources management. Bureau of Land Management, National Operations Center, Denver, Colorado.
- US Army Corps of Engineers. 1987. Corps of Engineers Wetlands Delineation Manual. Technical Report Y-87-1. Waterways Experiment Station. Vicksburg, Mississippi.
- US Department of the Interior. 2001. Technical Reference 1730-2, Biological Soil Crusts: Ecology and Management. Produced by BLM and US Geological Survey.
- Utah Department of Environmental Quality. 2013. Utah Nonpoint Source Pollution Management Program, Fiscal Year 2012, Annual Report. In cooperation with NPS Task Force. January 2013
- _____. 2014. Water Quality Assessment. Utah Department of Environmental Quality, Division of Water Quality. Internet website: <http://www.waterquality.utah.gov/WQAssess/>.
- US Fish and Wildlife Service. Undated. The Springs and Seeps of Tennessee. Internet website: <http://www.fws.gov/asheville/pdfs/Curricula-TNspringsandseeps.pdf>.
- Utah Division of Water Resources. 2014. Utah's Water Supply. Internet website: http://www.water.utah.gov/brochures/uws_broc.htm.
- Utah State University. 2004. Front Country Visitor Use Study.
- Utah Weed Control Association. 2014. Utah's Noxious Weed List. Internet website: www.utahweed.org/weeds.html.
- Western Regional Climate Center. 2014. Escalante, Utah (422592) Period of Record Monthly Climate Summary. Internet website: <http://www.wrcc.dri.edu/cgi-bin/cliRECTM.pl?ut2592>.
- Wilkowske, Chris D., David V. Allen, and Jeff V. Phillips. 2003. Drought Conditions in Utah During 1999-2002: A Historical Perspective. USGS Fact Sheet 037-03. US Geological Survey. April 2003.
- Woody Invasive Control Committee. 2010. Final Draft. Woody Invasive Control Plan. Appendix A of the Action Plan. Escalante River Watershed Partnership. November 10, 2010.

GIS Reference

- BLM GIS. 2014a. Base GIS data on file with BLM's eGIS Server used to describe the GSENM decision area and planning boundary. BLM, Grand Staircase-Escalante National Monument, Utah. Updated through July 2014.
- _____. 2014b. GIS data created to describe the GSENM MMP-A alternatives. BLM, Grand Staircase-Escalante National Monument, Utah.
- NHD GIS. 2014. GIS data to describe water bodies. National Hydrography Dataset. Internet website: <http://nhd.usgs.gov/>. Accessed on July 11th, 2014.
- NRCS GIS. 2011. Conservation Biology Institute GIS 2011. GIS data of dominant derived soil orders synthesized from NRCS GIS data by the Conservation Biology Institute. Internet website: <http://databasin.org/datasets/02f98e65b51e4cf48e4659a2adec1d9a>. Accessed on July 22, 2014.
- _____. 2014. GIS data for SSURGO soil surveys including rangeland ecological sites. Natural Resource Conservation Service Internet website: <http://soils.usda.gov/survey/> Accessed on July 11th, 2014.
- NVCS GIS. 2014. National Vegetation Classification crosswalk used to reclass SWReGAP data. Internet website: http://www.blm.gov/wo/st/en/info/regulations/Instruction_Memos_and_Bulletins/national_instruction/2013/im_2013-111_the_national.html. Accessed on July 9, 2014.
- SWReGAP GIS. 2004. Southwest Regional Gap Analysis Project (SWReGAP) vegetation classes grouped using the National Vegetation Classification. United States Geological Survey. September 2004.
- REA GIS. 2012. Colorado Plateau Rapid Ecological Assessment. GIS data of biological soil crusts and sensitive soils. Bureau of Land Management. Internet website: http://www.blm.gov/pgdata/etc/medialib/blm/wo/Communications_Directorate/public_affairs/landscape_approach/documents/Par.84901.File.dat/COP_REA_Data_Catalog.pdf. Accessed on July 10, 22, and October 17 2014.
- US EPA GIS. 2013. GIS data used to describe the Level III Ecoregions within the MMP-A Planning area. Environmental Protection Agency, Western Ecology Division. Internet website: http://www.epa.gov/wed/pages/ecoregions/level_iii_iv.htm. Accessed on November 15, 2013.
- _____. 2014. GIS data used to describe the 303d impaired waters. Environmental Protection Agency, Internet website: <https://edg.epa.gov/clipship/>. Accessed on July 14th, 2014.

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