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Environmental Assessment

Hell Canyon Range 2010 Project

Hell Canyon Ranger District, Black Hills National Forest
Custer County, South Dakota

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SUMMARY

The Black Hills National Forest proposes to reauthorize domestic livestock grazing on six allotments on the Hell Canyon Ranger District in Custer County, SD. The allotments include Bull Flats, French Creek, Lithograph, Lower Beaver, Tepee, and Water Draw. The Hell Canyon Range 2010 Project area is approximately 106,850 acres in size; 105,900 acres are National Forest System (NFS) land and 950 acres are interspersed private land. The project area is located near Custer, SD, and Newcastle, WY; the main east-west access through the project area is US Highway 16 (figure 1).

Livestock grazing is an authorized use of NFS lands on the Black Hills National Forest. The purpose of the project is to authorize livestock grazing on these six allotments and to ensure grazing is conducted in an environmentally acceptable manner. The Forest Service rangeland allotment management process calls for periodic reviews of allotment conditions and management practices. All of these allotments are due for environmental review, and if necessary, current rangeland management practices would be revised. The underlying needs for this proposal include:

- Improve livestock management so that it is consistent with the Forest Plan.
- Improve bank stability and increase riparian vegetation diversity and abundance in specific areas so spring and stream health, wildlife habitat, and riparian ecosystem conditions are moving toward desired conditions.
- Improve administration of the French Creek Allotment and minimize conflicts with private landowners, where feasible and practical.

In addition to the proposed action, the Forest Service also evaluated the consequences of removing all livestock (Alternative 1 – No Action) and continuing with current management (Alternative 2 – Current Management).

This environmental assessment presents results of an analysis of direct, indirect, and cumulative environmental consequences of all alternatives. Based upon the effects of the alternatives, the responsible official will decide whether or not to continue to authorize livestock grazing on none, all, or portions of the six allotments; and if so, what adaptive management actions and monitoring would be included to help meet or move toward meeting Forest Plan objectives.

CHAPTER 1 – PURPOSE AND NEED

Document Structure

The Forest Service has prepared this environmental assessment (EA) in compliance with the National Environmental Policy Act (NEPA) and other relevant Federal and State laws and regulations. This EA discloses the direct, indirect, and cumulative environmental impacts that would result from the proposed action and alternatives. The document is organized into five parts:

- *Chapter 1 – Purpose and Need:* The section includes information on the history of the project proposal, the purpose of and need for the project, and the Agency's proposal for achieving that purpose and need. This section also details how the Forest Service informed the public of the proposal and how the public responded.
- *Chapter 2 – Alternatives:* This section provides a more detailed description of the Agency's proposed action as well as alternative methods for achieving the stated purpose. These alternatives were developed based on significant issues raised by the public and other agencies. This discussion also includes possible mitigation measures. Finally, this section provides a summary table of the environmental consequences associated with each alternative.
- *Chapter 3 – Environmental Consequences:* This section describes the environmental effects of implementing the proposed action and other alternatives. This analysis is organized by resources with potential to be affected by proposed actions. Within each section the affected environment is described first, followed by the effects of the no-action alternative that provides a baseline for evaluation and comparison of the other alternatives that follow.
- *Chapter 4 – Agencies and Persons Consulted:* This section provides a list of preparers and agencies consulted during the development of the EA.
- *Appendices:* The appendices provide more detailed information to support the analyses presented in the EA.

Background

The Hell Canyon Range 2010 Project (*project* or *Range 2010 Project*) falls under the authority and guidelines of the 1996 schedule the Forest Service provided the United States Congress in response to the 1995 Rescission Act. The 1995 Rescission Act directed the Forest Service to complete environmental analysis on grazing allotments on NFS lands. This project is for the last 6 allotments (out of the 46 allotments on the Hell Canyon Ranger District) that need environmental analysis completed under the Rescission Act.

All proposed actions within the Range 2010 Project apply to NF lands only.

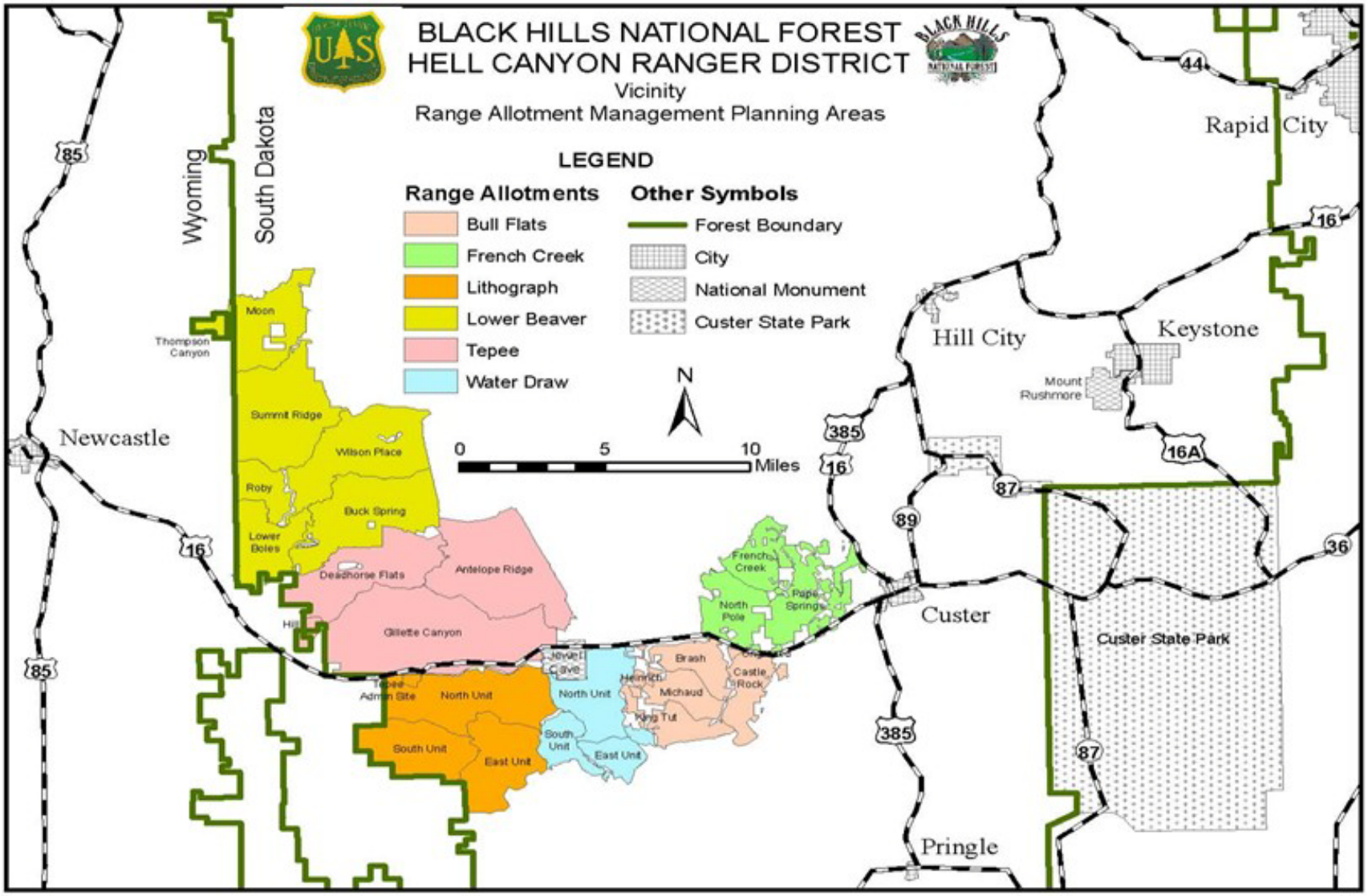

Figure 1. Range 2010 Project vicinity

Project Area Description

Precipitation across the project area ranges from 15 to 22 inches per year, most of which occurs during May and June. Due largely to the limestone geology of the area, most streams are intermittent or ephemeral. There are some perennial stream segments, however, primarily on the French Creek Allotment. Elevations range from 4,400 feet to 6,200 feet. Topography is similar among the allotments characterized by rolling hills, forested canyon slopes, grassy drainage bottoms, and some natural meadows. Wildfires during 2000–2002 burned portions of the Lithograph, Lower Beaver, Tepee, and Water Draw Allotments; the Tepee Allotment was most affected with over 70 percent burned.

Range capability is a tool used at the allotment level to identify where forage is available and how management can affect use of that forage. Capable acres for each of the six allotments were reviewed using the latest GIS data available. Factors such as tree canopy cover, vegetative type and production, slope, and aspect are used, in combination with actual use adjustments through the history of the allotments, in determining carrying capacity. Each allotment contains some areas that are not capable for grazing; the acres listed below for each allotment indicate the size of the allotment only and not necessarily the total area grazed. Rangeland capability and suitability are discussed in detail in chapter 3.

The Bull Flats Allotment is located approximately 6 miles southwest of Custer, SD, and includes a total of 9,464 acres, of which 9,242 acres are NFS land and 222 acres are private land. Approximately 23 percent of the allotment is not available for grazing (e.g., inaccessible or unused due to steep and rocky terrain).

The French Creek Allotment is located approximately 1 mile west of Custer, SD, and includes a total of 10,128 acres, all of which is NFS land. While not part of the allotment, there are many private land parcels interspersed throughout the area. Approximately 28 percent of the allotment is not available for grazing (e.g., steep and rocky terrain or inaccessible).

The Lithograph Allotment is located approximately 18 miles east of Newcastle, WY, near the southwest corner of Jewel Cave National Monument, SD. It encompasses approximately 16,676 acres, of which 16,668 are NFS land and 8 acres are private land. Approximately 25 percent of the allotment is not available for grazing (e.g., inaccessible and/or unused due to steep and rocky terrain).

The Lower Beaver Allotment is located approximately 9 miles east of Newcastle, WY, in Custer and Pennington Counties, SD. It encompasses approximately 33,037acres, of which 32,554 acres are NFS land and 483 acres are private land. Approximately 32 percent of the allotment is not available for grazing (e.g. inaccessible and/or unused due to steep and rocky terrain).

The Tepee Allotment is located approximately 13 miles east of Newcastle, WY, and primarily north of US Highway 16 in South Dakota. It encompasses approximately 29,386 acres, of which 29,148 acres are NFS land and 238 acres are private land.

Approximately 24 percent of the allotment is not available for grazing (e.g., inaccessible and/or unused due to steep and rocky terrain).

The Water Draw Allotment is located approximately 8 miles west of Custer, SD, and includes a total of 8,157 acres, of which all are NFS land. Approximately 16 percent of the allotment is not available for grazing (e.g., inaccessible and/or unused due to steep and rocky terrain). Livestock are currently not being grazed on the Water Draw Allotment and there is no current permit.

Purpose and Need for Action

The Black Hills National Forest Land and Resource Management Plan, as amended (hereinafter referred to as Forest Plan and cited as "USDA Forest Service 2007") provides direction for the management of the Forest. The Forest Plan contains management goals and objectives, management area direction, and desired conditions for the Forest (appendix D). Resource specialists reviewed the current condition of the project area and compared these conditions with the desired conditions identified in the Forest Plan, as well as other applicable goals and objectives. Opportunities for improvement were identified.

Livestock grazing is an authorized use of NFS lands. Goal 3 of the Forest Plan states that sustained commodity uses should be provided in an environmentally acceptable manner and that rangelands should be maintained in satisfactory range condition. Commodities, including livestock, contribute to the economies of local and regional communities. Because sustained commodity production depends on sustainable ecosystems, the Forest Plan further directs that livestock grazing would occur without impairing the health of ecosystems and in a manner compatible with other Forest uses.

Therefore, the purpose of the project is to authorize livestock grazing on the Bull Flats, French Creek, Lithograph, Lower Beaver, Tepee, and Water Draw Allotments and to ensure grazing is conducted in an environmentally acceptable manner. In order to determine site-specific need for action in the project area, existing and desired conditions have been described and compared, as summarized below.

Management History

Prior to the 1960s, livestock grazing in the Black Hills was season-long and free-ranging; cattle were typically turned out in the spring and gathered in the fall with little management. This resulted in high utilization in many areas. Since then, more intensive management has occurred and all allotments are showing stable or improving trends, although high utilization is still evident in some riparian areas, as discussed in more detail in the existing condition section later in this chapter.

Bull Flats Allotment. On the Bull Flats Allotment, a three-pasture rest-rotation system was started in 1964 and the latest allotment management plan (AMP) was prepared in 1989. Since 2001, the allotment has been managed as a four-pasture deferred-rotation system with a use period of June 1–October 31. The last AMP was approved in 1989.

French Creek Allotment. A rest rotation system started on the French Creek Allotment in 1960 and continued through 2007. In 2007, it was changed to a deferred rotation grazing system with a use period of June 1–September 30. The amount and distribution of private land parcels throughout the French Creek Allotment makes management difficult in this area. The last AMP was approved in 1991.

Lithograph Allotment. A management plan in 1970 for the Lithograph Allotment changed season-long management to a deferred rotation system. In 1982, the allotment was divided into two separate allotments, Lithograph and Water Draw. Adjustments were made in 2002 due to wildfires (shortened season and reduced numbers) and in 2003 a 3 pasture deferred rotation system was implemented. The last AMP was approved in 1992.

Lower Beaver Allotment. The Lower Beaver Allotment changed from season-long to a two-pasture deferred-rotation system in 1973. Numbers and season of use were altered in 2000–2002 due to wildfires. An AMP was prepared in 1991 with a deferred rotation system and a use period of June 11–September 30. Numbers were reduced during 2002–2006 due to wildfires. The last AMP was approved in 1991.

Hell Canyon and Water Draw Allotments. The Water Draw Allotment has had a distribution problem historically. It became its own allotment (separated from the Lithograph Allotment) in 1982. Livestock were shifted to the Hell Canyon Allotment in 2000–2001. The allotment was unstocked in 2002–2003, but was again used in 2004 and 2005; it has not been used since 2005. The last AMP was approved in 1970.

Existing conditions on all allotments is a reflection of past and current land management. Vegetation data collected through "similarity indices" are indicative of stable rangeland that has suffered past heavy grazing in concentrated areas. Past heavy grazing in concentrated areas (due to poor distribution and season-long grazing prior to the 1960s), created the plant species composition and abundance seen today. The return of certain grass species and other native vegetation indicates improving range conditions over the last 40 years. Soil stability and ecological processes are functioning properly on all six allotments.

Desired Conditions

Desired conditions for grazing management are established in the Forest Plan and include providing commodities in an environmentally acceptable manner and maintaining rangelands in satisfactory condition. Additional Forest-wide grazing-related desired conditions include improving range condition over time, with specific improvements in the condition of riparian areas; protecting sensitive species habitat; protecting and improving the basic resources of vegetation, soil and water; protecting and improving water quality; providing healthy watershed and riparian resources that function properly; and providing stream bank stability, water quality, soil protection and desired plant communities in riparian areas. Proper allowable use guidelines and residual levels (remaining height of key plant species) for wetlands and riparian areas are also established in the Forest Plan and guide the development of site-specific desired condition descriptions for individual pastures on individual allotments (appendix D).

Management area (MA)-specific desired conditions are provided in the Forest Plan and are summarized in table 1. The majority of the Bull Flats, Lithograph, Tepee, and Water Draw Allotments are within MA 5.4. The French Creek and Lower Beaver Allotments are primarily within MA 5.1. The Fanny Boles Research Natural Area (RNA, MA 2.2) occurs in a small portion of the Lower Boles Pasture of the Lower Beaver Allotment. This area is steep and rugged and receives only incidental use by livestock.

Desired plant community selection is crucial to effective rangeland planning and was used for this project to determine site-specific desired conditions for vegetation types in the project area (table 2). This technique is supported by Region 2 of the Forest Service (R2 Rangeland Analysis and Management Training Guide [USDA Forest Service 1996c]). Species included in desired condition descriptions currently exist in the general area in similar environmental settings and are capable of occupying the site within a reasonable time period through management changes. Not all of these species are native; a description of existing native and non-native species is included in the next section under "Existing Conditions."

Table 1. National Forest management area acreage/percent within the Range 2010 Project area

MA	Emphasis	Acres	% (NFS lands only)	Livestock Grazing Allowed?	Primary Allotments	Desired Conditions
5.1	Resource Production	32,150	30	Yes	§French Creek §Lower Beaver	Trees managed to produce forest products while providing forage production
5.4	Big Game Winter Range	71,000	67	Yes	§Bull Flats §Lithograph §Tepee §Water Draw	Provide big game winter range while maintaining healthy plant communities; grazing is managed to be compatible with big game objectives
3.7	Late Suc-cessional Forest Landscape	2,235	2	Yes	§Lithograph	Provide large and old trees with varying stand sizes and densities, with few signs of development
2.2	Research Natural Areas	315	< 1	Yes, as needed to conserve biological characteristics, with least impact on desired characteristics	315 acres or 1% of Lower Beaver	Conserve ecological processes; develop RNA management plan to determine grazing suitability and desired vegetation conditions
	Total (NFS Lands)	105,700	100			

Table 2. Desired conditions for vegetative communities within the project area

Community Type	Desired Conditions
Upland Grasslands	Mixed native grass and forb communities provide a diverse mosaic of plant species, a variety of vegetative structures, and effective ground cover (not more than 5–10% bare ground depending on soil type) to maintain soil stability and provide wildlife habitat. Maintain quality of desired plant communities by managing for perennial, native species; non-native cheatgrass would be limited where possible. Primary native graminoid species may include: *Hesperostipa comata* (needleandthread), *Nassella viridula* (green needlegrass), *Pascopyrum smithii* (western wheatgrass), *Schizachyrium scoparium* (little bluestem), *Carex filifolia* (threadleaf sedge), and *Koeleria macrantha* (prairie junegrass). Acceptable non-native species may include *Poa pratensis* (Kentucky bluegrass), *Bromus inermis* (smooth brome), and *Phleum pratense* (timothy). Forb species may include *Vicia americana* (American vetch), *Achillea millefolium* (common yarrow) and *Trifolium* spp. (clovers).
Riparian Communities (Including Seeps & Springs, Aspen, and White Spruce Alluvial Communities)	Maintain riparian plant communities that provide overhanging vegetation and effective ground cover (not more than 5% bare ground within the riparian area) to help trap sediment and dissipate energy during peak flows, protect soils from erosion processes, maintain stream bank stability, and provide wildlife habitat. Plant species include *Carex* spp. (sedges), *Juncus* spp. and *Scirpus* spp. (rushes), and desirable riparian grass species [ex: *Glyceria* spp. (mannagrass), and *Calamagrostis canadensis* (bluejoint reedgrass)]. Some riparian communities may include *Salix* spp. (willows), in particular *Salix bebbiana* (Bebb's willow), and *Cornus sericea* (redosier dogwood). Tree species may include *Betula papyrifera* (paper birch), *Betula occidentalis* (water birch), *Populus tremuloides* (quaking aspen), *Acer negundo* (boxelder) and *Picea glauca* (white spruce). Age class structure in willow communities should have the number of young/mature plants greater than the number of decadent/dead plants. New shrubs are establishing and are increasing in size and cover. Stream banks should be mostly stable consistent with the potential of the site.
Upland Forested Communities (Including Ponderosa pine and Rocky Mountain juniper)	Maintain diverse understory of native grasses including *Nassella viridula* (green needlegrass), *Hesperostipa spartea* (porcupinegrass), *Piptatherum micranthum* (littleseed ricegrass), *Elymus trachycaulus* (slender wheatgrass), *Carex inops* ssp. *heliophila* (sun sedge), little bluestem and prairie junegrass. Maintain effective ground cover (not more than 10% bare ground) to maintain soil stability and provide wildlife habitat. Acceptable non-native species may include Kentucky bluegrass, smooth brome, and timothy. Forb species may include American vetch, common yarrow, and *Dalea* spp. (purple and/or white prairie clovers). Shrub species may include *Juniperus communis* (common juniper), *Symphoricarpos* spp. (snowberry), *Ribes* spp. (currant and gooseberries), and *Rhus trilobata* (skunkbush sumac).
Mountain Mahogany	*Cercocarpus montanus* (mountain mahogany) is strongly dominant, with a relatively sparse herbaceous stratum. Maintain a minimum of 10 percent of the site in cover (mature and over mature shrubs) with an understory of native grasses, forbs and short shrubs. Grasses include *Bouteloua curtipendula* (sideoats grama), *Aristida purpurea* (perennial threeawn), and *Oryzopsis hymenoides* (Indian ricegrass). Forbs and short shrubs include *Hedeoma drummondii* (Drummond's false pennyroyal), *Chrysopsis villosa* (hairy goldaster), skunkbush sumac and *Gutierrezia sarothrae* (broom snakeweed).

Existing Conditions

Native and Non-Native Species

Native grasses and forbs are a major component of the understory across the project area (USDA Forest Service 2008a, 2009). However, many areas support non-native, introduced perennial grasses [e.g., Kentucky bluegrass (*Poa pratensis*), smooth brome (*Bromus inermis*), and timothy (*Phleum pratense*)]. Much of the primary grazing area in the Black Hills has been converted to non-native species through historic management practices. For example, numerous meadows were planted with timothy and/or smooth brome and managed as hay grounds (Graves 1899; MacIntosh 1928). These species have naturalized and spread to adjacent areas (Larson and Johnson 1999). It is not feasible for these areas to return to a "natural" state without major effort and expense. While not as desirable for wildlife habitat and rangeland health on public lands as native species, non-native grasses do provide some benefits (SAIC 2003). For example, both timothy and Kentucky bluegrass have a palatability rating of "good" for elk, mule deer, and white-tailed deer in Wyoming (Esser 1993). Smooth brome has a resource value rating of "high" for elk and "moderate" for mule deer preference as well as "high" for watershed protection (USDA Forest Service 1996c). These ratings are based on wildlife and livestock forage preferences and may vary by season.

While project objectives do not include managing for increases in these non-native species, reducing them through grazing management is usually not practical and unlikely to succeed. Grazing exclosures in place for over 40 years have nearly identical species composition to grazed areas outside the exclosures (USDA Forest Service 2006). Other options for removal include treatment with herbicide and/or ripping up the ground and reseeding. Herbicide treatment is expensive and could have detrimental effects on native grass species that do exist in these communities. Disturbing the soil has proven to increase noxious weeds, especially in those areas where they may already exist. Reseeding after spraying and ripping is highly recommended; however, this is also expensive and often the available seed comes from other areas and is genetically different. Establishing native species back into an area may take several years and repeated herbicide treatment for weeds.

For these reasons, many non-native species are acceptable and would continue to be a component of both existing and desired conditions in the project area.

Uplands

Recent vegetation monitoring data show that upland rangeland conditions on all allotments are improving and are recovering from past heavy grazing in concentrated areas (due to poor distribution and season-long grazing practices of the distant past). Past effects are primarily seen through species composition and abundance. Some native warm-season grass species expected to be common in many areas are largely absent, having been replaced by a species complex dominated by cool-season grass species. Movement toward more native grass species is evident on all allotments, and rangeland conditions overall are considered satisfactory. Recent soil and watershed monitoring data show that soil stability and ecological processes are functioning properly on all six allotments. Calculated "similarity coefficients" to desired conditions in 2008/2009 ranged

from 65 percent similar to 87 percent similar. Desired species compositions are not necessarily climax conditions. If desired conditions are attained then the site can be re-evaluated and desired conditions adjusted. Desired conditions of vegetation and physical resources on the acres having capability to support livestock grazing are conditions that are at least 65 percent similar to those that could occur naturally within various seral stages of development on a particular site (USDA Forest Service 1996).

Riparian Areas (Land Along Streams, Springs, Meadows, and Wetlands)

Some form of riparian area is present on all allotments. The Bull Flats, Lithograph, Tepee, and Water Draw Allotments contain small, isolated riparian areas primarily associated with springs, or small sections of intermittent or perennial streams. The Lower Beaver Allotment has some perennial water, several intermittent streams and springs with limited riparian areas. The French Creek Allotment contains perennial water and the most riparian habitat of the other allotments, including riparian areas along French Creek, Crow Creek, and Ruby Creek.

Recent riparian monitoring data for the Bull Flats, French Creek, and Water Draw Allotments show that many riparian areas are meeting their desired conditions, although one site along French Creek in the French Creek Allotment is not. Several other riparian areas of French Creek show bank alteration, unstable banks, and less than desired hydric communities, among other concerns. In addition, Lower Beaver, Tepee, and Lithograph Allotments have spring sites and other water sources that show signs of heavy livestock use. On the Water Draw Allotment that currently has no livestock grazing, wildlife use is evident at spring sites and other water sources. Therefore, while movement toward desired riparian conditions is evident in some areas, continued improvements in grazing management are needed to address site-specific riparian-related concerns where desired conditions and Forest Plan standards and guidelines are not being met.

Summary

Site-specific existing and desired condition descriptions have been developed for benchmark sites and key monitoring areas in both uplands and riparian areas on all allotments, and include, among other factors, plant species composition and amount of bare soil. These site-specific benchmark and key area existing and desired conditions are tiered to the descriptions above and are included in chapter 2 for each allotment (see table 5); they are used to describe the need for action in particular pastures/units for each allotment.

Based on a comparison of existing and desired conditions for all six allotments, the following needs were identified:

- Improve livestock management so that it is consistent with the Forest Plan.
- Improve bank stability and increase riparian vegetation diversity and abundance in specific areas so spring and stream health, wildlife habitat, and riparian ecosystem conditions are moving toward desired conditions.
- Improve administration of the French Creek Allotment and minimize conflicts with private landowners, where feasible and practical.

Proposed Action

The Black Hills National Forest proposes to continue to authorize grazing by domestic livestock, with some modifications, on the Bull Flats, French Creek, Lithograph, Lower Beaver, Tepee, and Water Draw Allotments administered by the Hell Canyon Ranger District. The proposed action is designed to maintain or improve resource conditions in rangeland health, vegetation, and watershed conditions relative to livestock grazing. Some grazing practices would be changed to resolve grazing-related resource issues. The proposed action also provides for alternate adaptive management actions to be taken if resource conditions do not move toward the desired conditions in an acceptable timeframe.

A maximum of 6,455 animal months (AMs; calculated as one cow/calf pair or one bull for 30 days) or equivalent would be authorized on a total of 105,900 acres. Maximum allowable forage utilization would range from 40 to 50 percent depending on the vegetation type and the current range conditions. Seasons of use are determined for each allotment and are described in chapter 2, alternative 3, for each allotment; these can vary by allotment depending on site-specific rainfall patterns, range readiness, allotment permitted numbers and utilization levels, among other factors. An overall season of use is identified for each allotment and/or pasture, but can vary annually depending on conditions for that year. The following improvements would be implemented:

- 1 to 1.5 miles of new fence built to split pastures and 0.5 miles of drift fence converted to permanent fence;
- 8 miles of new pipeline to improve water availability and distribution;
- 16 additional stock tanks to improve livestock distribution;
- 4 stock tanks removed or relocated to address resource concerns; and
- 14 springs, ponds, riparian areas or cultural resource sites protected (this total includes new fences or expansion of existing fences).

A map of each allotment is included in appendix A.

The proposal includes an adaptive management approach to livestock management based on monitoring resource conditions. The proposal includes a monitoring plan for each allotment designed to focus on specific areas with livestock-related resource problems (see appendix B). If monitoring results indicate that resource problems persist, adaptive management options are identified that would be implemented to affect improvement in resource conditions (see table 5).

Decision Framework

After reviewing the proposed action and all alternatives and the environmental analysis, and after considering additional public comments, the responsible official will reach a decision that is in accordance with the purpose of and need for this project. The decision will include, but would not be limited to:

- Whether or not to authorize livestock grazing on all or some of the allotments
- If the decision is made to authorize livestock grazing:
  - What will be the acceptable range of kind, class, number, season of use, and adaptive management practices?
  - What livestock grazing system and management practices will be implemented?
  - What measures will be taken to improve resource conditions?
  - What monitoring will be used to help make adaptive changes over time?

Management on each allotment would be implemented through an allotment-specific allotment management plan prepared based on the alternative selected in the decision. The allotment management plan is the implementation document by which the Forest Service communicates to the permittee and others the management objectives and planned actions to accomplish those objectives. The allotments currently under permit in the project area are being operated under old allotment management plans; these would be revised based on the decision made.

A decision will not be made until a 30-day public review and comment period for this EA is completed. After the 30-day review period, one or more separate decision notices would be issued after an analysis of all comments is completed. A 45-day appeal period may begin after issuance of the decision notice(s), if necessary.

Public Involvement

Scoping

This proposal was listed in the Black Hills National Forest Schedule of Proposed Actions in October 2009. The proposal was provided to the public and other agencies for comment during scoping from late-September through late-October 2009. The letter was directly mailed to 52 individuals, groups, and agencies, and to 31 tribal governments, and was posted on the Black Hills National Forest website. A news release was also issued and appeared in the *Rapid City Journal* on October 2, 2009. Consultation with the State Historic Preservation Office and with the South Dakota Department of Game, Fish and Parks is on-going.

Eleven responses to scoping were received via letter, fax, and email. Scoping results were used to confirm issues analyzed in this document and identify a reasonable range of project alternatives.

EA Distribution

This EA has been distributed to those that responded to the September/October 2009 scoping effort or to any one of the schedule of proposed action postings, and to pertinent agencies and tribes. Availability of the EA for a 30-day notice and comment period was advertised as a legal notice in the *Rapid City Journal*, a news release, and through publication on the Forest website.

Issues

Scoping is used to identify issues that relate to effects of the proposed action. Issues may come from the public, Forest Service, or from another agency. An issue is a dispute or debate about effects on the physical, biological, social, or economic resource as a result of implementing the proposed action. The Forest Service separated the issues into three groups: key issues, non-key issues, and relevant resources used for tracking.

Key issues are resource impacts directly or indirectly caused by implementing the proposed action. These issues create the need to develop mitigation measures or alternatives. Key issues may be related to existing conditions or to implementation of alternatives. Key issues can drive creation of alternative ways to implement the proposal while still meeting the purpose and need for the project, or can be addressed through development of project design features or mitigation measures to the proposed action. After reviewing comments and concerns raised during the scoping period, the ID team (interdisciplinary team) identified two key issues that can be addressed either through creation of an alternative or through development of project-specific design features.

Non-key issues are those that are: (1) outside the scope of the project; (2) already decided by law, regulation, Forest Plan, or other higher level decision; (3) irrelevant to the decision to be made; or (4) conjectural and not supported by scientific or factual evidence. The Council for Environmental Quality (CEQ) NEPA regulations require this delineation in sec. 1501.7, "…identify and eliminate from detailed study the issues which are not significant or which have been covered by prior environmental review (sec. 1506.3)…" The comments provided during scoping and how they were categorized are included in appendix C.

Relevant resources used for tracking are those resource concerns that are not considered significant (key), but are necessary to understand the full extent of the alternatives. Relevant resources used for tracking provide additional information for the analysis, but do not drive formulation of alternatives. Project design criteria have been developed for each alternative to address concerns for these relevant resources, as shown in chapter 2. Indicators have been developed for each of these to measure adverse and beneficial impacts and to compare and contrast alternatives. Relevant resources are discussed fully in chapter 3 of this EA, and include Soil and Water Quality, Range Resources, Botany, Wildlife, Fisheries, Cultural Resources, Socioeconomics, and Climate Change.

The two key issues identified were (1) Riparian Area Health and (2) Range Improvements and Cost.

Riparian Area Health. Commentors felt that due to the limited nature of riparian areas in the southern Black Hills, more should be done to address and improve conditions. Commentors mentioned Forest Plan direction for protection and management of these areas and ensuring a proactive approach. Riparian health and improved protection and management of riparian areas is part of the purpose and need for this project and is addressed by the proposed action. Riparian health is also addressed by the no-action (no grazing) alternative. Project design features applicable to all action alternatives have been developed to ensure protection and enhancement of riparian areas in the project area.

Measurement Indicators: The measurement indicators for this issue include miles of improved stream and riparian health and number of improved areas of concern. Measurement indicators for monitoring include stubble height on key species within the greenline and streambank alteration (short-term monitoring) and results of multiple indicator method (MIM) monitoring for long-term monitoring.

Range Improvements and Cost: Commentors questioned the expenditure of funds on lengthy pipelines and other improvements when less costly methods might be used. Some commentors questioned how expenditures are weighed against other factors such as natural resource stewardship and social aspects. Several alternatives were considered (see chapter 2) that would potentially reduce cost of improvements and address this issue, but would not necessarily meet the purpose and need for action. Livestock grazing and economics are included in chapter 3 with a comparison of costs by alternative.

Measurement Indicators: The measurement indicators for this issue include total number of range improvements and cost.

CHAPTER 2 – ALTERNATIVES

This chapter describes alternatives considered for the Hell Canyon Range 2010 Project. It describes each alternative considered in detail (that are then discussed in Chapter 3), as well as those that were initially considered, but eliminated from detailed study. This chapter also presents the alternatives in comparative form, sharply defining differences between each alternative and providing a clear basis for choice among options by the decision maker and public. Appendix A includes maps of proposed actions for each allotment. Table 7 summarizes how the alternatives considered in detail would address project objectives, and table 8 at the end of this chapter summarizes the environmental consequences of implementing alternatives considered in detail.

Alternatives Considered in Detail

Alternative 1 – No Action

Under the no-action alternative, livestock would no longer be authorized within the project area and each allotment would be vacated. Existing permits would be phased out after giving permittees notice as provided for in the Forest Service Handbook (FSH) 2209.13, chapter 10, section 16.13, R2 Interim Directive of 1/20/2004 which says, "…the authorized officer shall provide one year's written notice before the modification takes effect, except in emergency situation." Improvements such as fences, gates, and pipelines would be removed as time and funding allow. Improvements such as stock tanks, spring developments, and other water features used by wildlife would not be removed. This alternative provides an environmental baseline for evaluation of the action alternatives.

Alternative 2 – Current Management

Livestock grazing would continue as prescribed in current allotment management plans (AMPs) or annual operating instructions (AOIs) as implemented over the last 3 to 5 years. Current management is described below for each allotment. The Water Draw Allotment, which has an AMP but currently has no permit, would continue to be managed as a vacant allotment.

While current management has changed over time to better address certain situations and known problems, there are areas where this management has been unsuccessful in meeting or moving toward desired conditions from the Forest Plan. Total animal months would remain as currently permitted. Current grazing management systems for all allotments would continue. Existing improvements and those currently approved would be maintained as assigned in term grazing permits and would be reconstructed as necessary. New improvements not currently authorized in an existing AMP would not be developed. Current on-the-ground management of all six allotments would continue under alternative 2 and adaptive management would not be used to address changing conditions.

Bull Flats Allotment

A total of 83 cows with calves are currently permitted to graze from June 1 to October 15 each year on the Bull Flats Allotment. This would continue under alternative 2. The allotment would be managed as a four-pasture deferred-rotation-grazing system, as shown in table 3. The term grazing permit is issued to one permittee.

This allotment currently has the following range improvements: 2 spring developments (Lindstrom and Castle Springs); 2 vertical wells (Lightning Well and Y-4); 19 ponds; 10 tanks; 34 miles of fence; and 4 miles of pipeline.

French Creek Allotment

A total of 182 cows with calves are currently permitted to graze from June 1 to September 30 each year. This would continue under alternative 2. The allotment would be managed as a three-pasture deferred-rotation-grazing system, as shown in table 3. Term grazing permits are issued to three permittees.

The French Creek Allotment currently has the following range improvements: 11 spring developments; 9 ponds; 7 tanks; and 12 miles of fence.

Lithograph Allotment

A total of 271 cows with calves are permitted to graze from June 1 to October 31 each year. This would continue under alternative 2. The allotment would be managed as a three-pasture deferred-rotation-grazing system, as shown in table 3. Term grazing permits are issued to two permittees.

The Lithograph Allotment currently has the following range improvements: 5 spring developments; 3 vertical wells; 26 ponds/reservoirs; 20 tanks; and 25 miles of fence.

Lower Beaver Allotment

A total of 580 cows with calves are permitted to graze on the Lower Beaver Allotment. This would continue under alternative 2. Term grazing permits would be issued to six permittees. The allotment has eight pastures, as shown in table 3. Two of these pastures (Thompson Canyon and Kennedy Canyon) are grazed separate from the others. Thompson Canyon is a small pasture across the stateline in Wyoming, and Kennedy Canyon is another small pasture, primarily on private land, at the extreme southwest end of the Lower Boles Pasture (figure 1 and appendix A). The other six pastures are grazed in three pairs (Lower Boles and Roby, Summit Ridge and Moon, Wilson Place and Buck Springs) as two-pasture deferred-rotation systems. Livestock are permitted in the Kennedy Canyon Pasture from April 1 to May 31; in the Thompson Canyon pasture from May 1 to June 1, and in the other six pastures from June 11 to September 30 each year.

The Lower Beaver Allotment currently has the following range improvements: 32 spring developments; 71 ponds/reservoirs; 23 tanks; 3 storage tanks; 24 miles of fence; and 5 miles of pipeline.

Tepee Allotment

A total of 375 cows with calves are permitted to graze from June 1 to October 31 each year (for three pastures) and 50 cows with calves are permitted to graze from May 1 to

May 31 each year in the Hill Pasture, as shown in table 3. This would continue under alternative 2. The Deadhorse and Gillette Canyon pastures would be run together with Antelope Ridge Pasture as a two-pasture deferred-rotation-grazing system and the Hill Pasture is run individually. Term grazing permits are issued to four permittees.

The Tepee Allotment currently has the following range improvements: 8 spring developments; 15 dugouts/reservoirs; 32 ponds/reservoirs; 22 tanks; 3 vertical wells (Blacktail, Sawmill, and Tepee); 30 miles of fence; and 5.25 miles of pipeline.

Water Draw Allotment

Between 1991 and 2001, one term grazing permit was issued to one permittee for the Water Draw Allotment. The most recent term permit was for 78 cows with calves permitted to graze from June 1 to October 31 each year in a three-pasture deferred-rotation-grazing system. However, for administrative reasons, permitted numbers for the Water Draw Allotment were permanently shifted to the Hell Canyon Allotment in 2001. The Water Draw Allotment was not grazed in 2002–2003 and 2006–present. It was used during portions of 2004 and 2005 to accommodate livestock from the Elk Mountain Allotment when that allotment was burned by wildfire.

The Water Draw Allotment currently has the following range improvements: 6 spring developments; 15 ponds/reservoirs; 5 tanks; 26 miles of fence; and 0.06 miles of pipeline.

Livestock are currently not being grazed on the Water Draw Allotment and there is no current permit. This would continue under alternative 2.

Table 3. Current grazing management on all allotments that would continue under alternative 2

Units	Grazing System	Permitted Livestock Numbers	Permitted Season of Use	Animal Months (AMs)[1]	Allowable Utilization	Type of Grazing Permit
Bull Flats Allotment						
Brash Castle Rock King Tut Michaud	4-pasture deferred rotation	83 cow/calf pairs/ (92 cow/calf pairs currently)	June 1–October 15 (June 1–Sept 30 currently)	374/ actual use currently is 368	50%/ 40% on browse in riparian areas[2]	Term
French Creek Allotment						
Pope Springs North Pole French Creek	3-pasture deferred rotation	182 cows/calf pairs	June 1–Sept 30	728	50%/ 40% on browse in riparian areas[2]	3 separate term permits
Lithograph Allotment						
North South East	3-pasture deferred rotation	271 cow/calf pairs/ (actual use is 251 cow/calf and 29 yearlings)	June 1–Oct 31	1,364/ actual use is 1,263 for cow/calf and 102 for yearlings	50%	2 separate term permits
Lower Beaver Allotment						
Moon Summit Ridge	2-pasture deferred rotation	297	June 11–Sept 30	1,093	50%	6 individual term permits
Lower Boles Roby	2-pasture deferred rotation	80	June 11–Sept 30	295	50%	
Buck Springs Wilson Place	2-pasture deferred rotation	154	June 11–Sept 30	567	50%	
Thompson Canyon		38	May 1–June 1	40	50%	
Kennedy Canyon		11	April 1–May 31	22	50%	
Total		580		2,017		
Tepee Allotment						
Deadhorse Gillette Canyon Antelope Ridge	2-pasture deferred rotation	375 cow/calf pairs	June 1–Oct 31	1,886	50%	4 individual term permits
Hill		33 cow/calf pairs	May 1–31	34	50%	1 term permit
Total		408 cow/calf pairs		1,920		

[1] Animal months (AMs) are calculated as one unit being a cow/calf pair or one bull for a period of 30 days.

[2] In riparian areas, utilization of woody species is limited to browsing 40% of the total individual leaders produced in that year (not to be confused with 40% use on each and every leader produced).

Alternative 3 – Proposed Action, Using Adaptive Management

Livestock grazing would be authorized on the Bull Flats, French Creek, Lithograph, Lower Beaver, Tepee, and Water Draw Allotments. Some current grazing practices, as described in "Alternative 2 – Current Management," would be changed to resolve grazing-related resource issues.

A maximum of 6,455 AMs or equivalent would be authorized on a total of 105,900 acres. Maximum allowable forage utilization would range from 40 to 55 percent depending on the vegetation type and the current range conditions, as described in more detail for each allotment and in project design criteria.

Proposed improvements include the following:

- 1 to 1.5 miles of new fence built to split pastures and 0.5 miles of drift fence converted to permanent fence
- 8 miles of new pipeline to improve water availability and distribution
- 16 new stock tanks and 35 new dugouts to improve livestock distribution
- 4 stock tanks removed or relocated to address resource concerns
- 14 springs, ponds, riparian areas or cultural resource sites protected (this total includes new fences or expansion of existing fences)
- 2 new spring developments

Fences would be built over the 10-year permit period based on priority and as funds become available. Maps of each allotment showing proposed improvements are provided in appendix A.

Monitoring would occur over time on each allotment. Monitoring results would be used by the ID team and the District Ranger to determine if adjustments would be needed to ensure adequate progress is being made toward desired conditions. Monitoring is described in more detail later in this section; a monitoring plan for each allotment is included in appendix B.

Alternative 3 (proposed action) is based on the principle of applying adaptive management. A proposed course of action was selected as a starting point believed to best meet or move toward the desired condition. Some practices alone may not meet the desired condition, but in combination with other practices, desired conditions may be met or moved toward being met. For example, a two-unit deferred-grazing system alone may not provide the anticipated result, but when coupled with light grazing intensity and construction of additional water developments, desired conditions may be met. Table 4 lists potential adaptive management options that may be used to address a site-specific need during the course of project implementation. All adaptive management options with the potential to be used are within the scope of effects described in this document.

Table 4. Possible adaptive management options for use with alternative 3 (proposed action)

	Possible Grazing Management Actions
A	Implement different grazing system, and/or change number of pastures (deferred rotation in 2, 3, 4, or more pastures, rest-rotation, short-duration spring grazing, etc.) to meet resource objectives on the allotment (may include use of permittees private land in the rotation).
B	Use water to control livestock distribution (turn water on or off at existing spring developments).
C	Haul water to temporary tanks to influence livestock distribution and obtain use in areas that normally receive light to no use (location of tanks is moved around allotment).
D	Construct new permanent water development to influence livestock distribution (dugouts/ponds, wells, pipeline, tanks, pump, solar).
E	Remove existing water development to influence livestock distribution.
F	Construct fence to exclude livestock from areas of concern (springs, seeps, riparian, R2 sensitive species sites, species of local concern, hardwoods, heritage site, or other).
G	Implement specific dates of use or nonuse to protect areas of concern.
H	Construct permanent fence to influence livestock distribution.
I	Use temporary electric fence for short-term control of livestock distribution.
J	Remove (permanent or temporary) fence to influence livestock distribution.
K	Use of range rider (herding) to control livestock movement (distribution).
L	Change class of animal (i.e., cow/calf to yearling)—do not exceed permitted AMs (stocking rate).
M	Rest from livestock grazing for one or more seasons.
N	Change the permitted livestock number, permitted animal months (AMs) and/or season until demonstrated progress towards desired future condition is made (as evidenced by monitoring and inventory data).
O	Do not allow livestock grazing.
P	Change allotment or pasture boundaries.
Q	Use salt or other supplements to draw livestock toward or away from specific areas.
R	Construct brush barriers to protect sensitive resource area.
S	Move existing water developments, if feasible, away from streams and springs.

Table 5. Alternative 3 proposed actions by allotment

Benchmark (BM) or Area of Concern (AC)	Desired Condition	Existing Condition	Need for Action	Proposed Action	Adaptive Management Options from Table 4
Bull Flats Allotment					
BM Brash Pasture: upland site (T4S, R3E, NENW Sec 4)	Maintain ecological processes; increase western wheatgrass, sedges, and other native perennials; bare ground <5%	87% similarity coefficient; western wheatgrass, sedges, and other native perennials present; bare ground <5%	Moving toward/achieving desired conditions; no need for change	Maintain current management	**B, L, N**
BM Castle Rock: upland site (T4S, R3E SWNW, Sec 7)	Maintain ecological processes; decrease smooth brome and Kentucky bluegrass and increase other perennial grasses and sedges; bare ground <5%	70% similarity coefficient; smooth brome, Kentucky bluegrass, and other perennial graminoids; bare ground <5%	Moving toward/achieving desired conditions; no need for change	Maintain current management	**B, L, N**
AC Castle Rock: North Lightning Creek riparian site (T4S, R3E, NENE Sec 11)	Maintain ecological processes; reduce hummocking, maintain perennial native vegetation; bare ground <5%	Maintaining ecological processes, hummocking, maintaining perennial native vegetation, bare ground <5%	Moving toward/achieving desired conditions; no need for change	Maintain current management	**B, G, L, N**
BM Heinrich Unit: upland site (T4S, R3E, SESE Sec 8)	Maintain ecological processes; bare ground <5%	87% similarity coefficient; western wheatgrass, sedges and other native perennials present; bare ground <5%; this unit is no longer grazed due to intermingled private land	Moving toward/achieving desired conditions; no need for change	Maintain current management	**B, L, N**
BM Michaud Unit: upland site (T4S, R3E, SESW Sec 3)	Maintain ecological processes; decrease Kentucky bluegrass, increase other perennial grasses and shrubs; bare ground <5%	81% similarity coefficient; western wheatgrass, sedges and other native perennials present; bare ground <5%	Moving toward/achieving desired conditions; no need for change	Maintain current management	**B, L, N**
BM King Tut Unit: upland site (T4S, R3E, SWSE Sec 16)	Maintain ecological processes; decrease Kentucky bluegrass; increase other perennial grasses and shrubs; bare ground <5%	78% similarity coefficient; western wheatgrass, sedges and other native perennials present, bare ground <5%	Moving toward/achieving desired conditions; no need for change	Maintain current management	**B, L, N**

Benchmark (BM) or Area of Concern (AC)	Desired Condition	Existing Condition	Need for Action	Proposed Action	Adaptive Management Options from Table 4
BM King Tut Unit: South Lightning Creek riparian site (T4S, R3E, NE Sec 23)	Maintain ecological processes; increase riparian shrubs and hydric vegetation; bare ground <5%	100% young riparian shrubs and 69% hydric vegetation	Moving toward/achieving desired conditions; no need for change	Maintain current management	**G, N, M, L**
French Creek Allotment					
BM French Creek Unit: upland site (T3S, R3E, SESW Sec 13)	Maintain ecological processes; decrease Kentucky bluegrass and undesirable forbs; increase other perennial grasses and sedges; bare ground <5%	74% similarity coefficient; western wheatgrass, sedges and other native perennials present; bare ground <5%	Moving toward/achieving desired conditions; no need for change at this particular site, but change proposed for allotment as a whole	Limited season in French Creek Unit for first 2 years with range rider to address riparian concerns; see below	**B, L, N**
AC, BM French Creek Unit: riparian site French Creek (T3S, R3E, Sec 13, 23, 24; T3S, R4E, Sec 19)	Less than or equal to 26% bank alteration, 74% stable banks; increase riparian shrubs and hydric vegetation	48% bank alteration, 53% stable banks, 0% mature willows, 74% hydric vegetation	Improve banks, riparian shrubs and hydric vegetation	Limited season of use for first 2 years with range rider to address riparian concerns, as described in the narrative description; remove water gap, improve willow exclosure and pump water to upland sites and south to North Pole unit	**I, F, A, L**

Benchmark (BM) or Area of Concern (AC)	**Desired Condition**	**Existing Condition**	**Need for Action**	**Proposed Action**	**Adaptive Management Options from Table 4**
BM North Pole Unit: upland site (T3S, R3E, SWNW Sec 26)	Maintain ecological processes; decrease Kentucky bluegrass and undesirable forbs; increase other perennial grasses and sedges; bare ground <5%	68% similarity coefficient; sedges, Kentucky bluegrass and other perennial graminoids present; bare ground <5%	Moving toward/achieving desired conditions; no need for change at this particular site, but change proposed for allotment as a whole	Reduce permitted livestock by 50 head (132 cows/calves would be permitted)	**B, L, N**
AC North Pole Unit: riparian site (T3S, R3E, Sec 23, 35)	Maintain ecological processes; increase riparian shrubs and hydric vegetation; bare ground <5%	Lack of riparian shrubs, hummocking, and channel widening	Livestock use is impacting riparian area	Build buck and pole exclosure fence around creek, east and west of road 287; Create North Pole Spring #2 exclosure; South Fork French Creek clean out existing dam and fence in willows; construct roadside dugouts and clean out existing; relocate Wabash Spring tank; protect seep area at Danby Spring with option to develop tank outside exclosure	**G, F, K**

Benchmark (BM) or Area of Concern (AC)	**Desired Condition**	**Existing Condition**	**Need for Action**	**Proposed Action**	**Adaptive Management Options from Table 4**
AC North Pole Unit and Pope Springs Unit: riparian site, McKenna Spring (T3S, R4E, SENW Sec 30)	Maintain ecological processes; increase riparian shrubs and hydric vegetation; bare ground <5%	Water tank in channel and hummocks in riparian area	Livestock use is impacting riparian area	Maintain McKenna Spring until an alternate water source can be developed; options would include putting a float on the tanks and running an overflow line down into the draw; if this or other adaptive management options do not resolve the issue, McKenna Spring would be removed from use within 5–10 years	**S, D, F**
BM, AC Pope Springs Unit: upland site (T3S, R4E, SW Sec 16; T4S, R4E, Sec 6)	Maintain ecological processes; decrease Kentucky bluegrass and undesirable forbs; increase other perennial grasses and sedges; bare ground <5%	76% similarity coefficient; Kentucky bluegrass and other perennial graminoids present; bare ground <5%	Moving toward/achieving desired conditions; no need for broad changes	Convert 0.5 mile of drift fence in section 6 to permanent fence	**B, H, L**

Benchmark (BM) or Area of Concern (AC)	Desired Condition	Existing Condition	Need for Action	Proposed Action	Adaptive Management Options from Table 4
AC Pope Springs Unit: riparian site, French Creek (T3S, R4E, N½NW ¼ Sec 29; SWSW Sec 20)	Increase riparian shrubs and native species, stable stream banks	Lack of riparian shrubs, hummocking, and channel widening	Livestock use is impacting riparian area	Develop Ballwood seep; clean out ATV dugout; 1 to 1.5 miles new fence creating North and South Pope Springs pastures along 0.25 mile stretch of French Creek in NWNW Sec 29, 20 and pump water to upland locations north and south of fence; construct roadside dugouts and clean out existing	**B, L, N**
Lithograph Allotment					
BM North Unit: upland site (T4S, R2E, SESW Sec 10)	Maintain ecological processes; decrease blue grama and subshrubs and increase other perennial grasses and forbs; bare ground less than 5%	65% similarity coefficient; western wheatgrass, blue grama, and other native perennials present; bare ground less than 5%	Moving toward/achieving desired conditions; no need for change	Maintain current management	**N, C, A, L**
AC South Unit: riparian site (T4S, R1E SENW Sec 23)	Maintain ecological processes and perennial native vegetation; bare ground <5%	Unprotected riparian area	Livestock use is impacting riparian area	Pipe water downhill to tank in meadow	Build Babcock Spring riparian exclosure
BM South Unit: upland site (T4S, R2E, NESW Sec 30)	Maintain ecological processes; decrease blue grama and subshrubs and increase other perennial grasses and forbs; bare ground less than 5%	68% similarity coefficient; western wheatgrass, blue grama, and other native perennials present; bare ground less than 5%	Moving toward/achieving desired conditions; no need for change	Maintain current management	**N, C, A, L**

Benchmark (BM) or Area of Concern (AC)	Desired Condition	Existing Condition	Need for Action	Proposed Action	Adaptive Management Options from Table 4
BM East Unit: upland site (T4S, R2E, SESW Sec 28)	Maintain ecological processes; decrease blue grama and subshrubs and increase other perennial grasses and forbs; bare ground less than 5%	67% similarity coefficient; western wheatgrass, blue grama, and other native perennials present; bare ground less than 5%	Moving toward/achieving desired conditions; no need for change	Maintain current management	**N, C, A, L**
AC Heritage Site 02030304704-Historic	Maintain integrity and condition of historic structure and associated features	Cattle rubbing up against historic cabin; one wall of cabin collapsed; trails across site	Cattle grazing in area has damaged site; continued grazing without mitigation is likely to destroy the resource	Protect cabin with exclosure fence; discourage cattle congregation by spreading slash	
Lower Beaver Allotment					
BM Buck Springs Unit: upland site (T3S, R1E, SWNE Sec 3)	Maintain ecological processes; decrease sedges and subshrubs and increase other perennial grasses, forbs and shrubs; bare ground less than 5%	72% similarity coefficient; sedges, prairie junegrass, needle-and-thread grass, and other native perennials present; bare ground less than 5%	Moving toward/achieving desired conditions; no need for change	Maintain current management	**A, N, B**
BM Lower Boles Unit:upland site (T3S, R1E, NESE Sec 18)	Maintain ecological processes; decrease blue grama and subshrubs and increase other perennial grasses, forbs and sedges; bare ground less than 5%	72% similarity coefficient; western wheatgrass, blue grama and other graminoids present; bare ground less than 5%	Moving toward/achieving desired conditions; no need for change	Maintain current management	**A, N, B**
BM Moon Unit: upland site (T1S, R1E, SWNE Sec 21)	Maintain ecological processes; decrease Kentucky bluegrass and timothy and increase other perennial grasses and sedges; bare ground less than 5%	69% similarity coefficient; Kentucky bluegrass and perennial graminoids present; bare ground less than 5%	Moving toward/achieving desired conditions; no need for change	Maintain current management	**N, A, B**
BM Roby Unit: upland site (T2S, R1E, SESE Sec 30)	Maintain ecological processes; decrease crested wheatgrass and increase other perennial grasses, forbs and sedges; bare ground less than 5%	70% similarity coefficient; crested wheatgrass, green needlegrass other perennial graminoids present; bare ground less than 5%	Moving toward/achieving desired conditions; no need for change	Maintain current management	**A, N, B**

Benchmark (BM) or Area of Concern (AC)	Desired Condition	Existing Condition	Need for Action	Proposed Action	Adaptive Management Options from Table 4
BM Summit Ridge Unit: upland site (T2S, R1E, NWSE Sec 20)	Maintain ecological processes; decrease sedges and subshrubs and increase other perennial grasses, forbs and shrubs; bare ground less than 5%	68% similarity coefficient; sedges, green needlegrass and other perennial graminoids present; bare ground less than 5%	Moving toward/achieving desired conditions; no need for change	Maintain current management	**A, N, B**
BM Wilson Place Unit: upland site (T2S, R2E, SESW Sec 18)	Maintain ecological processes; decrease Kentucky bluegrass and subshrubs and increase other perennial grasses and forbs; bare ground less than 5%	74% similarity coefficient; Kentucky bluegrass, sedges, and other perennial graminoids present; bare ground less than 5%	Moving toward/achieving desired conditions; need for improved livestock distribution in some areas; no need for change in others	Install Gooseberry Spring tank and pipeline	**A, N, B**
AC Lower Boles and Roby Heritage Site 39CU1119- Prehistoric	Maintain prehistoric features; maintain integrity of subsurface cultural deposits	Stock dam constructed on site sometime after 1991 without consideration to heritage resources; total destruction of some site features; heavy trails and high deflation	Cattle grazing is having an adverse impact to site; stock dam construction destroyed parts of site and contributes to continued destruction; area too heavily used	Backfill stock dam	
AC Moon Heritage Site 39PN0340- Historic and Prehistoric	Maintain prehistoric and historic features; maintain integrity of subsurface cultural deposits	Heavy trails and deflation due to wallowing; adverse only along road leading through site	Cattle grazing is having an adverse impact to site	Spread slash to divert cattle from sensitive area and annually monitor	
Tepee Allotment					
BM Gillette Canyon Unit: upland site #1 (T4S, R2E, SENW Sec 4)	Maintain ecological processes; decrease western wheatgrass, blue grama, and subshrubs and increase other perennial grasses forbs and sedges; bare ground less than 5%	70% similarity coefficient; western wheatgrass, sedges, and other perennial graminoids present; bare ground less than 5%	Moving toward/achieving desired conditions; no need for change	Maintain current management	**A, N, C**

Benchmark (BM) or Area of Concern (AC)	Desired Condition	Existing Condition	Need for Action	Proposed Action	Adaptive Management Options from Table 4
BM Gillette Canyon upland site #2 (T3S, R1E, SWNE Sec 36)	Maintain ecological processes; decrease blue grama and subshrubs and increase other perennial grasses forbs and shrubs; bare ground less than 5%	76% similarity coefficient; western wheatgrass, sedges, and other perennial graminoids present; bare ground less than 5%	Moving toward/achieving desired conditions; no need for change	Maintain current management	**A, N, C**
AC Gillette Canyon Unit: riparian site (T3S, R2E, NWSE Sec 27)	Maintain ecological processes and native perennial vegetation; bare ground <5%	Blacktail Spring #1–unprotected riparian area	Livestock use is impacting riparian area	Develop 2 tanks at Hay Draw and 1 tank at Sawmill	**F**
BM Deadhorse Flats Unit: upland site (T3S, R1E, NESE Sec 12)	Maintain ecological processes; decrease blue grama and subshrubs and increase other perennial grasses forbs and shrubs; bare ground less than 5%	74% similarity coefficient; blue grama, prairie junegrass and other perennial graminoids present; bare ground less than 5%	Moving toward/achieving desired conditions; no need for change	Maintain current management	**A, N, C**
AC Deadhorse Flats Unit: riparian site Lower Deadhorse Springs (T3S, R2E, SWSW Sec 18)	Maintain ecological processes and native perennial vegetation, bare ground <5%	Unprotected riparian area	Livestock use is impacting riparian area	Move tank and expand exclosure	**A, N, F**
BM Antelope Ridge Unit: upland site (T3S, R2E, NWSW Sec 23)	Maintain ecological processes; decrease Kentucky bluegrass and subshrubs and increase other perennial grasses and forbs; bare ground less than 5%	72% similarity coefficient; sedges, prairie junegrass and other perennial graminoids present; bare ground less than 5%	Moving toward/achieving desired conditions; need for improved livestock distri bution in some areas; no need for change in others	Develop Blacktail Spring #2	**A, N, C**
AC Heritage Site 39CU0774-Prehistoric	Maintain prehistoric features; Maintain integrity of subsurface cultural deposit	Deflation around pond; many cattle trails and congregation across site	Cattle grazing has an adverse impact to site	Relocate stock tank	

Benchmark (BM) or Area of Concern (AC)	Desired Condition	Existing Condition	Need for Action	Proposed Action	Adaptive Management Options from Table 4
AC Heritage Site 39CU0846-Prehistoric	Maintain prehistoric features; Maintain integrity of subsurface cultural deposit	Stock tank on site causing congregation; deflation around stock tank; multiple cattle trails	Cattle grazing is damaging the integrity of the cultural deposits	Construct buck and rail fence around sensitive areas	
Water Draw Allotment					
BM North Unit: upland site #1 (T4S, R3E, SESE Sec 6)	Maintain ecological processes; decrease blue grama and subshrubs and increase other perennial grasses forbs, shrubs and sedges; bare ground less than 5%	74% similarity coefficient; blue grama, prairie junegrass and other perennial graminoids present; bare ground less than 5%	Moving toward/achieving desired conditions; additional water is needed to ensure rest rotation pasture system is successful	Implement 3-pasture rest-rotation-grazing system with 252 permitted AMS for the allotment; develop 6 new tanks and pipeline	**A, N, D**
BM North Unit: upland site #2 (T4S, R3E, SWSW Sec 18)	Maintain ecological processes; decrease needle-and-thread grass and increase other perennial grasses, sedges, shrubs and forbs; bare ground less than 5%	76% similarity coefficient; little bluestem, needleand thread and other perennial graminoids present; bare ground less than 5%	Moving toward/achieving desired conditions; no need for change	See above	**A, N, D**
BM South Unit: upland site (T4S, R2E, NENW Sec 26)	Maintain ecological processes; decrease blue grama and increase other perennial grasses, sedges, shrubs and forbs; bare ground less than 5%	80% similarity coefficient; western wheatgrass, blue grama, and other perennial graminoids present; bare ground less than 5%	Moving toward/achieving desired conditions; no need for change	See above	**A, N, D**
BM East Unit: upland site (T4S, R3E, NWSW Sec 29)	Maintain ecological processes; decrease subshrubs and increase other perennial grasses, sedges, shrubs and forbs; bare ground less than 5%	74% similarity coefficient; blue grama, prairie junegrass and other perennial graminoids present; bare ground less than 5%	Moving toward/achieving desired conditions; no need for change	See above	**A, N, D**
BM East Unit: upland site outside exclosure (T4S, R3E, SWSE Sec 20)	Maintain ecological processes; decrease Kentucky bluegrass and increase other perennial grasses, sedges, shrubs and forbs; bare ground less than 5%	87% similarity coefficient; Kentucky bluegrass and other perennial graminoids present; bare ground less than 5%	Moving toward/achieving desired conditions; no need for change	See above	**A, N, D**

Benchmark (BM) or Area of Concern (AC)	**Desired Condition**	**Existing Condition**	**Need for Action**	**Proposed Action**	**Adaptive Management Options from Table 4**
BM East Unit: upland site inside exclosure (T4S, R3E, SWSE Sec 20)	Maintain ecological processes; decrease Kentucky bluegrass and increase other perennial grasses, sedges, shrubs and forbs; bare ground less than 5%	84% similarity coefficient; Kentucky bluegrass and other perennial graminoids present; bare ground less than 5%	Moving toward/achieving desired conditions; no need for change	See above	
AC North Heritage Site 39CU0021-Prehistoric and Historic	Maintain historic and prehistoric features; Maintain integrity of subsurface cultural deposit	Stock tank and spring development on site; fence around spring in disrepair; little evidence of present grazing impacts	Spring development and stock tank on site create high potential for impacts to cultural resources	Reconstruct fence around spring; relocate stock tank	If gravity feed to relocated tank does not work, additonal SHPO consultation would be necessary
AC East Heritage Site 39CU3806-Prehistoric	Maintain prehistoric features; Maintain integrity of subsurface cultural deposit	Fences are located running through the site; little present evidence of grazing impacts	Fence has the potential to bottle-neck the cattle through the site	Remove wire from fence; leave the posts to minimize ground disturbance	
AC South Heritage Site 39CU1048-Prehistoric	Maintain prehistoric features; Maintain integrity of subsurface cultural deposit	Spring and stock tank located on site; some erosion near pond; no current impacts	Canyon and spring produce a very high potential for impacts to cultural resources	Construct fenced exclosures around sensitive areas	

Bull Flats Allotment

Alternative 3, Proposed Action, includes continuation of a four-pasture deferred-rotation-grazing system and current permitted numbers. For the Bull Flats Allotment, Alternative 2 - Current Management and Alternative 3- Proposed Action are the same.

374 AMs would be permitted and a June 1 – October 15 season of use would be authorized, although this would be shortened annually as needed, not to exceed permitted AMs. Maximum allowable utilization would be set at 50 percent. Stubble height standards would be established for key species in riparian areas.

Table 5 shows existing and desired conditions at benchmark monitoring areas and areas of concern on the Bull Flats Allotment that were used in determining that no changes to current management are needed at this time. Table 5 also shows what adaptive management options (Table 4) would be used, however, if issues arise or conditions are not otherwise moving toward desired conditions.

French Creek Allotment

Alternative 3 (proposed action) for the French Creek Allotment includes creation of a four-pasture deferred-rotation-grazing system (two pastures would be created from the existing Pope Springs Unit North Pope Springs Pasture and South Pope Springs Pasture; see appendix A) with a 50-head reduction in permitted numbers (50 head would be moved to the Water Draw Allotment) so that only 132 cows with calves (529 AMs) would be permitted. Livestock would be permitted to graze from June 1 to September 30 annually, except as described below for the French Creek Unit. Maximum allowable utilization would be set at 50 percent. Stubble height standards would be established for key species in riparian areas.

One term grazing permit would be issued to one permittee in the French Creek Allotment. A reduction in permitted numbers and administrative permits would help in reducing administrative challenges due in part to dispersed private land across the allotment. The other two permittees would be issued permits in the Water Draw Allotment and livestock would be moved there (discussed in more detail below).

To address riparian concerns, several actions are proposed. Livestock use in the French Creek unit would be limited to a maximum of 20 days for 2 years with a turn-on date of June 15 (this could be less if stubble height or stream bank alteration monitoring indicates the need). The remaining days of the grazing season would be split between the North Pole, North Pope Springs, and South Pope Springs units. A range rider would keep cattle out of the French Creek riparian area and towards the Church Camp water development, when necessary. Following the 2-year period, livestock move dates would be based on stubble height and/or stream bank alteration monitoring results. In year three, the French Creek Unit would be incorporated into the four-pasture deferred-rotation system with North Pole, North Pope Springs, and South Pope Springs units. If monitoring indicates (see appendix B) by year six of implementation (or 2016 if the proposed action is implemented during the 2011 season) that existing conditions along French Creek are not moving toward desired conditions in a reasonable timeframe, an adaptive management option (see tables 4 and 5) would be implemented. The adaptive management option

selected would include consideration of creating either a riparian exclosure or a riparian pasture along French Creek, or removing livestock completely from the French Creek pasture.

Table 5 shows existing and desired conditions at benchmark monitoring areas and areas of concern on the French Creek Allotment that were used in determining needed changes to current management. Several site-specific improvements/protections are proposed as summarized below:

- 1 to 1.5 miles of new fence to split the Pope Springs Unit into two pastures (this accounts for some additional fence that may be needed near the private land boundary to ensure effectiveness) and 0.5 miles of drift fence converted to permanent fence
- 2 miles of new pipeline to improve water distribution
- 5 new stock tanks and 35 new dugouts to improve livestock distribution
- 1 tank relocated to address resource concerns
- 4 riparian area protections with fence (this total includes new fences and/or expansion of existing fences)
- 1 new spring development

Table 5 also shows what adaptive management options (table 4) would be used if issues arise or conditions are not otherwise moving toward desired conditions.

Lithograph Allotment

Alternative 3 (proposed action) for the Lithograph Allotment includes continuation of the three-pasture deferred-rotation-grazing system and current permitted numbers, as described in alternative 2 (current management), but with a few minor adjustments.

A total of 1,364 AMs would be authorized and a June 1–October 31 season of use would be permitted. Maximum allowable use would be set at 50 percent. Stubble height standards would be established for key species in riparian areas.

Table 5 shows existing and desired conditions at benchmark monitoring areas and areas of concern on the Lithograph Allotment that were used in determining needed changes to current management and what adaptive management options (table 4) would be used if issues arise or conditions are not otherwise moving toward desired conditions.

Several site-specific improvements/protections are proposed as summarized below:

- 0.5 miles of new pipeline to improve water distribution
- one new stock tank to improve livestock distribution
- two riparian area/cultural resource area protections with fence (this total includes new fences and/or expansion of existing fences)

Maintenance of existing improvements would occur over time as described later in this chapter under “Design Criteria.” As funding becomes available for maintenance on the

Lithograph Allotment, priority for additional resource protection would be given to Piper Spring and Chipmunk Spring.

Lower Beaver Allotment

Alternative 3 (proposed action) for the Lower Beaver Allotment includes continuation of the current deferred rotation grazing system and current permitted numbers, as described in alternative 2 (current management), but with a few minor adjustments.

The two-pasture deferred-rotation-grazing system for six pastures and the single use pasture system for Thompson and Kennedy Canyon pastures would continue and 2017 AMs would be permitted. A June 11–September 30 season of use would continue for six pastures, with May 1–June 1 for Thompson Canyon and April 1–May 31 for Kennedy Canyon. Maximum allowable use would be set at 50 percent. Stubble height standards would be established for key species in riparian areas.

Table 5 shows existing and desired conditions at benchmark monitoring areas and areas of concern on the Lower Beaver Allotment used in determining needed changes to current management and what adaptive management options (table 4) would be used if issues arise or conditions are not otherwise moving toward desired conditions.

Several site-specific improvements/protections are proposed as summarized below:

- 0.15 miles of new pipeline to improve water distribution
- one new stock tank to improve livestock distribution
- Backfill nonfunctional stock dam and spread slash to enhance protection of sensitive cultural sites

Maintenance of existing improvements (including reconstruction of the Stateline fence) would occur over time as described later in this chapter under “Design Criteria.” As funding becomes available for maintenance on the Lower Beaver Allotment, priority for additional resource protection would be given to Barrel Spring, Sidehill Reservoir, and Moon Reservoir #2.

Tepee Allotment

Alternative 3 (proposed action) for the Tepee Allotment includes continuation of the current grazing system and current permitted numbers as described in alternative 2 (current management), but with a few minor adjustments.

The two-pasture deferred-rotation-grazing system and single pasture use of the Hill pasture would continue and 1,920 AMs would be permitted. A June 1–October 31 season of use would continue for three pastures, with May 1–31 season for the Hill pasture. Maximum allowable use would be set at 50 percent. Stubble height standards would be established for key species in riparian areas.

Table 5 shows existing and desired conditions at benchmark monitoring areas and areas of concern on the Tepee Allotment used in determining needed changes to current management and what adaptive management options (table 4) would be used if issues arise or conditions are not otherwise moving toward desired conditions.

Several site-specific improvements/protections are proposed as summarized below:

- 1.6 miles of new pipeline to improve water distribution
- 3 new stock tanks to improve livestock distribution
- 2 tanks relocated to address resource concerns
- 2 riparian area/cultural resource area protections with fence (this includes new fences and/or expansion of existing fences)
- 1 new spring development

Water Draw Allotment

Alternative 3 (proposed action) for the Water Draw Allotment includes issuing a new permit for a total of 50 cows with calves to two permittees that are currently using the French Creek Allotment. The allotment would be run in a three-pasture rest-rotation system. Several improvements are proposed including constructing approximately six new stock tanks, approximately 3.8 miles of pipeline, and maintenance and reconstruction of several fences and water developments that were damaged or destroyed by the Jasper Fire (2000) and Roger Shack Fire (2001). Spring sites with the capacity to be operational would be made functional before livestock are allowed on the allotment. This includes repairing existing or building new exclosure fences to ensure spring sources and/or cultural resources (e.g., Lithograph, Log Trough, Stockade, Stockade #2, A&E in section 13, and Water Draw) are protected. These sites would be reviewed onsite with an ID team (including specialists in range, wildlife, hydrology, and archeology) to determine if any changes to existing exclosures are needed and if so, to what extent.

Site-specific improvements are proposed as summarized below:

- 3.8 miles of new pipeline to improve water distribution
- 6 new stock tanks to improve livestock distribution
- 1 tank relocated to address resource concerns
- 6 riparian area/cultural resource area protections with fence (this total includes new fences and/or expansion of existing fences)

A total of 252 AMs would be permitted with a June 1–October 31 season of use. Maximum allowable use would be set at 50 to 55 percent. Stubble height standards would be established for key species in riparian areas.

Table 5 shows existing and desired conditions at benchmark monitoring areas and areas of concern on the Water Draw Allotment and what adaptive management options (table 4) would be used if issues arise or conditions are not otherwise moving toward desired conditions.

Maintenance of existing improvements would occur over time as described later in this chapter under “Design Criteria.”

Project Design Criteria to Ensure Environmental Protection

The design criteria and allowable use levels listed below include features that would be implemented to avoid, minimize, or eliminate adverse impacts that might result from implementation of alternatives 2 and 3. These design criteria are integral to, and are considered part of, the action alternatives; analysis of effects presented in chapter 3 is based on implementation of these non-discretionary features. No mitigation actions are required to implement the action alternatives because the analysis of effects (chapter 3) does not indicate the need for any additional protective measures.

Appendix D includes a list of relevant standards and guidelines from the Forest Plan and Region 2 Watershed Conservation Practices (USDA Forest Service 2006) that were used in development of the lists below. These practices were reviewed during project development and in the creation of the monitoring plan. Design criteria, allowable use levels, Forest Plan standards and guidelines, and watershed conservation practices form the foundation for implementation of the action alternatives.

Design Criteria

- Acceptable type of livestock to be grazed is cattle. Acceptable classes of livestock are cow with/without calf, bull and yearling.
- Use salting to influence livestock distribution patterns. Do not salt within 0.25 mile of water sources, eligible heritage sites, or developed recreation sites, without prior approval.
- Maintain existing range improvements as assigned in the term grazing permits. Most range improvements would be constructed by the permittee with the Forest Service providing most of the materials. As funding becomes available, priority for additional resource protection would be given to evaluating and implementing needed maintenance/re-design at existing spring/stream/water source improvements that are listed in the proposed action description for some allotments (previously in this chapter). Other sites where routine maintenance needs have been identified by the ID team are in the project file and would be referenced during annual permittee meetings.
- Reconstruct/replace existing range improvements as their useful life expectancy is amortized or to respond to natural disasters.
- Evaluate range readiness annually and adjust turn-on date as needed.
- Evaluate utilization and adjust pasture move dates and move-off dates based on allowable use standards.
- Roads providing access to rangeland improvements would be evaluated and maintained as needed on a case-by-case basis.

- Locate new livestock/wildlife water sites out of hardwood communities when feasible.
- Livestock would be moved by the permittee when proper use criteria for upland rangelands and stubble height for riparian areas are reached and continued use would exceed Forest Plan guidelines and standards.
- Sensitive resource areas (e.g., cultural resource sites, sensitive plant locations and snail species of local concern and/or other sensitive wildlife habitat areas) would be identified and mapped for each allotment. Management activities that have the tendency to concentrate grazing pressure or livestock use in these areas (e.g., salting, watering, and gathering) would be avoided.
- Prior to any work in a riparian area containing northern leopard frogs, a district biologist would be consulted.
- If Black Hills redbelly snakes are observed or hibernacula found during implementation of any activities in the project area, a district biologist would be consulted. If a hibernacula/breeding site is found, a buffer may be established around the riparian area and the hibernacula.
- Ground-disturbing activities such as installation of water developments, pipelines, fences or exclosures would require both heritage resource and sensitive species surveys and approval by a Forest Service archeologist, botanist, and wildlife biologist prior to construction.
- Tribes would be notified if culturally significant artifacts or burial sites are found during project implementation.
- When long-term drought situations occur, range permittees would be notified in writing that reductions in season or livestock numbers may be anticipated.
- Grazing in post-wildfire situations would be evaluated by an ID team based on burn severity, vegetative regrowth, and management objectives.
- Defer prescribed burn areas from livestock grazing for a portion or all of the following growing season to ensure regrowth of forage species.
- Do not construct new range improvements within 0.5 mile of active goshawk nests from April 1 through August 15, or until the nest has failed or fledglings have dispersed.
- Maintain long-term ground cover, soil structure, water budget, and flow patterns in wetlands to sustain their ecological function, per “404” regulations
- Wildlife escape ramps would be added to all stock tanks where needed and would be maintained by the permittee.
- Sensitive species or species of local concern located after permit issuance would be protected based on active coordination between permittees and the Forest Service.

- Any new fences constructed or any fences maintained would be designed and built so that they do not create unnecessary or unreasonable barriers or hazards for wildlife and people; recommendations from the South Dakota Department of Game, Fish and Parks would be considered and a district biologist consulted.
- Water would not be developed in areas where sensitive species or species of local concerns are found in riparian/aquatic habitat.

Utilization Levels

Allowable Use and Residual Levels

Livestock and wild herbivore allowable forage use or residual levels on rangelands by grazing system and range condition are shown in table 6; these are from the Forest Plan (standard 2505):

Table 6. Proper allowable use guidelines (percent utilization by weight each year)

Season of Use	Satisfactory Condition (%)	Unsatisfactory Condition (%)
Continuous Use Spring/Summer	0–45	0–40
Continuous Use Fall/Winter	55–60	0–55
Deferred Rotation	0–50	0–45
Rest Rotation	0–55	0–50

Residual levels (or remaining height of key plant species) would be prescribed for riparian areas. Residual levels would be based upon specific objectives for the location in question and would consider season of use and range conditions.

Utilization of willows, shrubs, woody vines or young deciduous trees (such as aspen, birch, and oak) in any year by livestock or wildlife would be limited to browsing 40 percent of the total individual leaders produced in that year (not to be confused with 40 percent use on each and every leader produced).

Livestock would be removed from the grazing unit or allotment when further utilization on key areas in that year would exceed proper allowable use or prescribed residual level in the Forest Plan, AMP, or AOI for either grass and forbs or shrubs.

Monitoring

Monitoring and evaluation are key elements of adaptive management. Monitoring helps determine how Forest Plan and NEPA decisions are being implemented, whether implementation is achieving the desired outcome, or whether changes in management are needed. Through monitoring, the Forest Service can measure whether or not desired conditions are being achieved in an appropriate timeframe. Through adaptive management, allotment management plans can remain dynamic, relevant, and useful over many years.

Two types of monitoring are associated with AMPs: implementation monitoring and effectiveness monitoring. Implementation (short-term) monitoring would measure whether or not Forest Plan standards and guidelines are being met, while effectiveness (long-term) monitoring would evaluate how effective management actions are at moving

toward or achieving the desired conditions. Budgets, personnel, and resource condition would determine the scope and degree of rangeland monitoring activities. A realistic implementation monitoring strategy would be to monitor all of the allotments using both Forest Service and permittee monitoring. Much of the implementation monitoring is actually the responsibility of the permittee. However, Forest Service range managers and other specialists, such as botanists, wildlife biologists, and archeologists, also monitor compliance with Forest Plan standards and guidelines. Upland and riparian monitoring areas would be the focus of effectiveness monitoring which is primarily the responsibility of Forest Service personnel. However, grazing permittees are always welcome to participate in effectiveness monitoring.

All methods shown in the Interagency Technical Guides and the R2 Rangeland Analysis and Management Training Guide are approved for possible use in monitoring efforts. The Wyoming Rangeland Monitoring Guide is also approved for use by permittees. The following methods would generally be used. Appendix B includes monitoring plans for each allotment.

Rangeland Implementation (Short-term) Monitoring

Short-term range monitoring techniques would vary depending on the resources being monitored. Monitoring would take place at key areas of livestock use on each allotment. All agency monitoring methods can be used in monitoring efforts. The following monitoring techniques would generally be used alone, but sometimes in combination:

Range Readiness: Indicators used to determine rangeland readiness are soils and vegetation conditions. Rangelands are generally ready for grazing when soils have become firm after winter and spring precipitation, and when plants have reached the defined stage of growth, at which time grazing may begin under the specific management plan without long-lasting damage.

Ocular Utilization Estimate: Ocular estimates provide a visual estimate of utilization of riparian and upland herbaceous or browse species. Estimates are based on a description representing a broad range (class) of utilization rather than a precise amount (USDA Forest Service 1996b).

Stubble Height: Adequate stubble height on streamside areas is needed at the end of the grazing period or at the end of the grazing season for maintenance of plant vigor and stream bank protection and to aid in holding sediments for rebuilding degraded stream banks. Measurements of the residual amount of *Carex* spp. are taken along the greenline. Specifically, 3 to 4 inches of residual *Carex* spp. are required for spring pastures and 4 to 6 inches for summer and fall pastures (USDA Forest Service 1996b).

Photographs and Photo-points: Photographs are extremely useful in documenting change on the landscape. Photos should capture the essence of the plot, point, or transect, including important characteristics and features of the site. Photos need to include enough of the horizon-line to allow the photographer to easily repeat the photograph from the same angle at a different time.

Rangeland Effectiveness (Long-term) Monitoring

The most important role of monitoring is to determine whether management is successful at maintaining or moving rangeland resources towards desired conditions. Determining trend toward or away from allotment objectives allows rangeland managers to accurately determine the relative success of the management system and to adjust management to speed the accomplishment of objectives. Trend for a variety of rangeland resource parameters may need to be monitored.

The long-term condition of riparian and upland grass and forb resources would be monitored at benchmark areas on each allotment. All Agency monitoring methods can be used in monitoring efforts. The following monitoring techniques would generally be used as needed:

Cover-Frequency Index (CFI): The cover-frequency transect is commonly used to provide quantitative measurements of canopy cover and frequency by plant species, ground cover, and production by life form for inventory and monitoring purposes (USDA Forest Service 1996b).

Photographs and Photo-points: Photographs are extremely useful in documenting change on the landscape. Photos should capture the essence of the plot, point, or transect, including important characteristics and features of the site. Photos need to include enough of the horizon-line to allow the photographer to easily repeat the photograph from the same angle at a different time.

Green Line/Cross Section: Green line/cross sections are used to describe and quantify the distribution of riparian communities within the riparian area. A series of paced transects are established both perpendicular and parallel to the stream in order to measure the intercept of plant communities within the riparian area (USDA Forest Service 1996b).

Multiple Indicator Method (MIM): This protocol combines observations of up to ten indicators (including greenline, streambank stability, livestock use on woody plants, woody species regeneration, stubble height, and streambank alteration) along the same transect. These indicators provide quantitative data to assess the current condition and trend of the streambanks, channels, and vegetation, as well as to provide data needed to refine and make annual changes to livestock management in order to meet long-term management objectives (Burton et al. 2007).

SamplePoint Photomonitoring: "SamplePoint" is a manual image-analysis program designed to facilitate vegetation cover measurements from nadir digital images of any scale. Operating essentially as a digital point frame, the software loads images, places classification points on the image, and stores classification data to a database as the user classes each point. Functional use is not limited to vegetation classification. Measuring percent occurrence of objects from digital images can save time and expense compared to conventional field measurements. SamplePoint provides the user with a single-pixel sample point and the ability to view and identify the pixel context. Accuracy is comparable with the most accurate field-methods for ground-cover measurements (Rangelands Resources Research Unit- Cheyenne, Fort Collins).

A specific monitoring plan for each allotment is included in appendix B. Documentation of rangeland monitoring results would be maintained in the allotment files at the respective district office.

Watershed Conservation Practices

Watershed conservation practice effectiveness monitoring would be conducted in allotments where necessary; this monitoring would also be used as water quality monitoring. Watershed conservation practices are described in appendix D.

Other Resource Monitoring

The following methods would be used to ensure that livestock grazing is compatible with other resource objectives in accordance with Forest Plan direction and other laws:

Heritage Site Monitoring: All National Register of Historic Places eligible sites will be monitored on a 1 to 5 year basis in accordance with the SHPO concurrence letters for livestock grazing to verify that management practices are being implemented.

Rare Plants: Surveys for R2 sensitive and SOLC plants are ongoing. If new occurrences are found, the district botanist and range personnel will need to coordinate to ensure the plants and their habitat are protected.

Alternatives Considered but Eliminated from Detailed Study

Consideration of alternative ways to achieve the purpose and need for action were explored by the ID team, considering environmental effects of the proposed action and issues brought forward during scoping. Potential alternatives were dismissed from further analysis if they did not meet the purpose and need for taking action, conflicted with Forest Plan direction or other laws or regulations, were duplicative of alternatives considered in detail, or determined to be components that would cause unnecessary environmental harm or unreasonable cost.

Develop additional water in the Pope Springs Unit and North Pole Unit of French Creek; use salt/mineral placement to distribute livestock and continue grazing current numbers.

Some actions are currently in-progress or planned for these pastures to address the need for additional water, as discussed at the beginning of chapter 3. Additional water sources and the use of other adaptive management strategies are a component of alternative 3 (proposed action), analyzed in detail in this document.

Use range riding or other less costly methods to achieve desired conditions than lengthy pipelines that impact natural undeveloped springs and are expensive.

Range riding is proposed as part of alternative 3 (proposed action) to reduce grazing impacts in sensitive areas; it is also one of the management options available under adaptive management for alternative 3. Range riding is not a viable alternative to pipelines, but is a viable alternative to fencing and the Forest Service agrees it can be an

effective management technique to reduce the cost and maintenance of fences. This is part of alternative 3 (proposed action).

Establish grass banks, swing pastures, temporary pastures, and short duration grazing or other methods to provide more flexibility for changing environmental conditions/climate change.

The use of temporary pastures, short-duration grazing, and other methods are grazing management options available under alternative 3 (proposed action) using adaptive management. The Forest Service agrees these types of approaches can be helpful in some instances when environmental conditions change or other factors require changes in management. In addition, as part of alternative 3 (proposed action), a rest-rotation grazing system would be established, providing a fully rested pasture annually that allows for added flexibility in management.

The Forest Service does not believe that any one of these six allotments is large enough to truly function as a grass bank. Proposed grazing strategies on all six allotments provide the flexibility to change livestock distribution, add pastures, use short-duration grazing systems, or reduce livestock stocking, among other options, if conditions warrant. If drought occurs, or a wildfire or other environmental conditions change, the Forest Service has the discretion to alter livestock grazing management to ensure Forest Plan standards and guidelines are met. For these reasons, this alternative, as a stand-alone alternative, was dismissed from further detailed analysis, recognizing that adaptive management options under alternative 3 (proposed action) provide options for pasture rotations, short-duration grazing, and other methods to address changing environmental conditions as needed.

Create a more landscape-scale approach to livestock management—combine all allotments to provide more flexibility in management.

The Forest Service does not agree that combining all allotments would provide more flexibility for management; creating larger allotments would actually be a step backward for the Agency, because historically, allotments were large and this often created problems with livestock distribution and administration. Smaller allotments are easier to manage and provide added flexibility to the Agency and the permittee when resource issues arise or changes in management are needed. For these reasons, this alternative was dismissed from further detailed analysis.

Vacate French Creek Allotment due to the exorbitant cost required for needed riparian area protections and monitoring and to minimize current and anticipated future conflicts with private land owners.

This is addressed by alternative 1 (no action) (no grazing) alternative.

No new springs would be developed; undeveloped springs are rare in the southern Black Hills and protecting those that remain would provide enhanced protection of this dwindling resource.

The Forest Service recognizes that many springs are already developed. Currently developed springs comprise the majority of the pipeline and other spring development

proposals included as part of alternative 3 (proposed action). The Forest Service also agrees that retaining undeveloped springs in their natural state without development is appropriate, wherever feasible. This is included as part of alternative 3 (proposed action) and is also addressed by alternative 1 (no action).

No livestock grazing in the Fanny Boles Research Natural Area.

The Forest Plan states in section III, page 17, that livestock grazing will not increase in the Fanny Boles Research Natural Area until a management plan is developed for this area. Maintaining livestock access to the area, as proposed as part of alternative 3 (proposed action) and alternative 2 (current management), is consistent with the Forest Plan. When a management plan is developed for the research natural area, reconsideration of livestock grazing and its appropriateness would be made at that time. However, due to steep terrain and the predominance of mountain mahogany in this area, it currently receives only incidental livestock use. This is not expected to change under either of the action alternatives. For these reasons, this alternative was dismissed from further detailed analysis.

Reduce stocking to meet the purpose and need instead of costly range improvements to achieve desired results more quickly.

The Forest Service disagrees that reduced stocking is a viable alternative to range improvements such as pipelines or fences; regardless of the number of livestock permitted on an allotment, providing water through pipelines or tanks and restricting movement to areas through fencing would still be necessary whether 10 head or 100 head were present. However, the Forest Service agrees that reducing stocking rates is an effective management option to meet certain desired conditions. Reduced stocking on the French Creek is part of alternative 3 (proposed action) for this reason. Long-term monitoring results in key areas and benchmark sites on the other allotments does not indicate the need for reduced stocking at the present time in these allotments, instead showing the need for site-specific protection measures for individual spring sites or riparian areas only. However, reducing the stocking rate is an option for any allotment under adaptive management if future monitoring results indicate the need.

The Forest Service recognizes that range improvements are expensive. The cost of improvements is shared with the permittee (often through cost-sharing and labor) and is not funded solely by the Agency.

Table 7. Comparison of alternatives by components, primary project objectives and key issues

	Alternative 1 – No Action	Alternative 2 – Current Management	Alternative 3 – Proposed Action
Alternative Components			
Description	No livestock grazing would be permitted on the allotments. Existing permits would be phased out. This alternative provides an environmental baseline for evaluation of the action alternatives.	Livestock grazing would continue as prescribed under current allotment management plans and annual operating instructions.	Adaptive management would be used to focus on the end results for the resource, as opposed to selecting one specific course of action that would not be deviated from over time. Adaptive management options are describes in tables 4 and 5.
Permitted numbers	0	6,403 AMs/ 1,491 cow/calf pairs	6,455 AMs/ 1,491 cow/calf pairs
Range improvements	Unneeded fences, gates, and other improvements would eventually be removed.	Existing improvements would be maintained and reconstructed as needed. New improvements not currently authorized in an existing allotment management plan would not be developed.	Existing improvements would be maintained and reconstructed as needed. Some existing improvements would be removed or relocated (4 stock tanks) and some new improvements would be built (2 miles of fence; 8 miles pipeline; 16 stock tanks; 14 spring/riparian area protections; 2 spring developments). If new improvements and management do not achieve the desired conditions, additional improvements (tables 4 and 5 and design criteria) would be built.
Grazing management	Not applicable because livestock grazing would not be permitted on the allotments.	Deferred rotation grazing systems on 5 allotments would continue. The Water Draw Allotment would remain vacant and would not be grazed. Deferred rotation utilization guidelines in table 6 would be applied. Livestock management decisions would be based on achieving Forest Plan objectives and guidelines and the desired conditions shown in table 2.	Deferred rotation grazing systems would continue on 4 allotments. The Water Draw Allotment would be grazed by 50 head in a 3-pasture rest-rotation system The French Creek Allotment would be grazed as a 4-pasture deferred-rotation system with some changes in season of use. Rest rotation and deferred rotation utilization guidelines in table 6 would be applied.

	Alternative 1 – No Action	**Alternative 2 – Current Management**	**Alternative 3 – Proposed Action**
		Permitted numbers of livestock may be adjusted in order to meet or move toward the desired conditions.	Livestock management decisions would be based on achieving Forest Plan objectives and guidelines and the desired conditions shown in tables 2 and 5. Permitted numbers of livestock may be adjusted in order to meet or move toward the desired conditions.
Monitoring	Not applicable because livestock grazing would not be permitted on the allotments.	Alternatives 2 and 3 are the same. Implementation and effectiveness monitoring would occur at benchmarks and areas of concern as shown in appendix B. Utilization guidelines are shown in table 6. Specific monitoring direction would be in the AOI.	
Project Objectives			
Improve livestock management so that it is consistent with the Forest Plan	Consistent with Forest Plan for resource management and protection, but does not achieve Forest Plan Goal 3—providing sustainable commodity uses and productive use of range forage.	Generally consistent with Forest Plan, but does not meet Forest Plan standards and guidelines in all areas, particulary in riparian areas; would not achieve standards and guidelines and desired conditions for riparian areas and wildlife habitat as well or as quickly as alternative 3.	Is most consistent with Forest Plan direction by providing for commodity uses in an acceptable manner, improved resource conditions, and movement toward or maintenance of desired conditions in a reasonable timeframe.
Improve bank stability and increase riparian vegetation diversity and abundance in specific areas so spring and stream health, wildlife habitat, and riparian ecosystem conditions are moving toward desired conditions	Met; these resource conditions would improve in the short- and long term.	Not met; these resource conditions would not move toward desired conditions in a reasonable timeframe with no change in current management.	Met; proposed actions and adaptive management options would address these resource concerns.
Improve administration of the French Creek Allotment and minimize conflicts with private land owners, where feasible and practical	Met; removal of livestock from this allotment would remove the conflict.	Not met; current conflicts would remain.	Met; movement of 2 permittees to the Water Draw Allotment, reduction in head and proposed actions would address this concern.
Key Issues			
Riparian Health *Measurement indicators*:	9.81 miles improved (90%)/ 29 areas of concern improved (100%)	1.64 miles improved (15%)/ 5 areas of concern improved (17%)	9.81 miles improved (90%)/ 16 areas of concern improved (55%)

	Alternative 1 – No Action	**Alternative 2 – Current Management**	**Alternative 3 – Proposed Action**
miles of improved stream and riparian health; number of improved watershed areas of concern			
Range Improvements and Cost *Measurement indicators*: total number of range improvements; total cost (cost of improvements and maintenance; does not include administration or monitoring costs)	0 new range improvements. $0 spent on new range improvements and maintenance. $672,810 spent by USFS over 10 years on removal of improvements and continued maintenace on some kept for wildlife. Over long term, cost would be eliminated.	5 new range improvements (for heritage resource protection). $24,430 spent on new range improvements but resource concern areas would not be addressed except for heritage resource concern areas. $70,440 spent over 10 years by USFS. Costs would continue over long term.	4 stock tanks removed/relocated; 2 miles of fence (1 – 1.5 miles of fence and 0.5 miles of drift fence converted to permanent fence); 8 miles pipeline; 16 stock tanks; 14 spring/riparian area protections; and 2 spring developments would address resource concern areas. $165, 140 spent over 10 years by USFS. Costs would continue over long term.

Table 8. Summary of environmental impacts

Relevant Resource Tracking Issue	Alternative 1 – No Action	Alternative 2 – Current Management	Alternative 3 – Proposed Action
Soil and Water			
Acres of detrimentally impacted soils	0 acres; 100% improvement in acres of detrimentally impacted soils due to livestock	262 acres; no improvement in acres of detrimentally impacted soils due to livestock	316 acres; 20% increase in acres of detrimentally impacted soils due to livestock
Miles of improved stream and riparian area health	9.81 miles improved (90%)	1.64 miles improved (15%)	9.81 miles improved (90%)
Number of improved areas of concern	29 areas of concern improved (100%)	5 areas of concern improved (17%)	16 areas of concern improved (55%)
Rangeland Vegetation			
Rangeland condition and trend	Overall improvement in rangeland condition and trend, at least in the short term	Maintenance and/or improvement of current rangeland condition and trend; areas would progress toward desired conditions at different rates; resource concern areas would remain the same or may improve slowly over the long term	Overall improvement in rangeland condition and trend, particularly noticeable in resource concern areas; areas would progress toward desired conditions at different rates, but would achieve desired conditions more quickly than alternative 2
Noxious weeds	Risk of noxious weed introduction/spread would decrease with removal of daily operations and activities; some invasive species may increase with removal of grazing over the long term	Risk of noxious weed introduction/spread would remain unchanged due to continued risk of introduction through daily operations and activities, minimized through adherence to Forest Plan standards and guidelines	Risk of noxious weed introduction/spread would increase due to new improvements, but this would be minimized by adherence to project design features and Forest Plan standards and guidelines
Botany			
Sensitive species and species of local concern (SOLC)	No direct effects to sensitive or SOLC species; short-term improvement in suitable habitat for all species; potential for indirect loss of habitat with increased fine fuel and increased risk of wildfire over long term Implementation of Atlernative 1 may adversely impact 7 sensitive plants but is not likely to result in a trend toward federal listing or loss of viability range-wide	Localized, direct effects to sensitive and SOLC species habitat from livestock trampling and indirectly through degraded riparian habitat conditions in some areas Implementation of alternative 2 may adversely impact 7 sensitive plants, but is not likely to result in a trend toward Federal listing or loss of viability range-wide	Localzied, direct effects to sensitive and SOLC species from livestock trampling, minimized through project design features; habitat improvement due to improved riparian habitat conditions Implementation of alternative 3 may adversely impact 7 sensitive plants, but is not likely to result in a trend toward Federal listing or loss of viability range-wide

Relevant Resource Tracking Issue	Alternative 1 – No Action	Alternative 2 – Current Management	Alternative 3 – Proposed Action
Wildlife			
Sensitive, species of local concern, management indicator species (MIS), migratory birds and Partners and Flight (PIF), demand species	Riparian-dependent species habitat would improve the most under this alternative; increase in upland ungulate browse and bird nesting and deer fawning cover No impact to 16 sensitive species and beneficial impacts to 3 sensitive species All 17 SOLC and 7 MIS populations would persist; habitat improvement due to removal of grazing impacts All 5 migratory bird and 1 PIF population would remain stable; habitat improvement due to removal of grazing impacts Elk and deer populations would remain stable; habitat improvement due to removal of grazing impacts	No change in riparian-dependent species habitat or upland habitat No impact to 13 sensitive species; may impact 6 sensitive species, but would not result in a trend toward Federal listing or loss of viability All 17 SOLC and 7 MIS populations would persist All 5 migratory bird and 1 PIF population would remain stable, but direct effects from nest trampling and cover reduction would continue Elk and deer populations would remain stable; localized adverse effects would continue due to loss of some forage and cover from livestock use	Riparian-dependent species habitat would improve more than under alternative 2 No impact to 13 sensitive species; may impact 6 sensitive species, but would not result in a trend toward Federal listing or loss of viability All 17 SOLC and MIS populations would persist; habitat improvement due to riparian area protections and management changes All 5 migratory bird and 1 PIF population would remain stable; habitat improvement due to riparian area protections and management changes Elk and deer populations would remain stable; habitat improvement due to riparian area protections and management changes
Fisheries			
Native and recreational fisheries	No adverse direct effects to fish; short- and long-term beneficial effects due to improved riparian habitat conditions along Ruby Creek and French Creek	Negligible, localized direct effects possible due to trampling of fish eggs and larvae; localized adverse impacts at stream sites would persist	Negligible, localized direct effects possible due to trampling of fish eggs and larvae; long-term beneficial effects due to improved riparian habitat conditions along Ruby Creek and French Creek, but would not be achieved as quickly as under alternative 1
Cultural Resources			
Determination under section 106 of the National Historic Preservation Act	No undertaking and therefore no effect	No adverse effect	No adverse effect

Relevant Resource Tracking Issue	Alternative 1 – No Action	Alternative 2 – Current Management	Alternative 3 – Proposed Action
Socioeconomics			
Present net value—all allotments combined	Permittees: $0 USFS: ($672,810)	Permittees: $545,250 USFS: ($53,740)	Permittees: $435,320 USFS: ($150,370)
Climate Change			
Methane production contribution to greenhouse gas emissions and impacts to ecosystem resiliency	No methane production from livestock and therefore no contribution to greenhouse gas emissions Would maintain and likely improve resiliency of habitat which may improve the ability for the project area to function better under changing climatic conditions	Methane production due to enteric fermentation from domestic livestock, but this would not be measurable at the regional or global scale Would maintain resiliency of habitat; would not measurably improve current conditions	Methane production due to enteric fermentation from domestic livestock, but this would not be measurable at the regional or global scale Would maintain and likely improve resiliency of habitat which may improve the ability for the project area to function better under changing climatic conditions; application of adaptive management would enhance this effect

CHAPTER 3 – ENVIRONMENTAL CONSEQUENCES

This chapter section is organized by resource and describes aspects of the environment likely to be affected by implementation of alternatives (affected environment), and the environmental effects (direct, indirect, and cumulative) that would result from implementing the alternatives (environmental consequences). Together, these descriptions form the scientific and analytical basis for comparison of alternatives presented in chapter 2.

Methodology

The impact analysis and conclusions contained in this chapter were based on Forest staff knowledge of the resources and site, review of existing literature and Agency studies, information provided by specialists within the Forest Service and other agencies, and professional judgment. The methodology section at the beginning of each resource heading describes any additional specific data collection/analysis or other methods used for that resource.

Potential impacts in this chapter are described in terms of type (direct, indirect, cumulative; and are the effects beneficial or adverse?), context (are the effects site-specific, local, or even regional?) duration (are the effects short-term or long-term?), and intensity.

Direct effects occur at the same time and in the same locations as actions that cause them. Indirect effects are those that occur at a later time or in a different location than the causal actions. Cumulative impacts result from the additive impacts of past, present, and reasonably foreseeable future actions in or near the area.

For purposes of this analysis, short-term effects are those expected within the next 1 to 10 years (throughout the course of project implementation) and long-term effects are those expected between 10 and 20 years or more unless specifically defined in individual resource sections below.

Past, Present, and Reasonably Foreseeable Future Actions

Cumulative impact is the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes the action (40 CFR 1508.7).

The baseline used for cumulative effects analysis is the current condition. The cumulative effects analysis does not attempt to quantify effects of past human actions by adding up all prior actions on an action-by-action basis. There are several reasons for not taking this approach. First, a catalog and analysis of all past actions would be impractical to compile and unduly costly to obtain. Current conditions have been impacted by innumerable actions over the last century (and beyond), and trying to isolate individual actions that continue to have residual impacts would be nearly impossible. Second,

providing details of past actions on an individual basis would not be useful to predict cumulative effects of the proposed action or alternatives. By looking at current conditions, we are sure to capture all residual effects of past human actions and natural events, regardless of which particular action or event contributed those effects. The Council on Environmental Quality issued an interpretive memorandum on June 24, 2005, regarding analysis of past actions, which states, "agencies can conduct an adequate cumulative effects analysis by focusing on the current aggregate effects of past actions without delving into the historical details of individual past actions." The cumulative effects analysis in this EA is also consistent with Forest Service National Environmental Policy Act (NEPA) Regulations (36 CFR 220.4(f). For these reasons, the analysis of past actions in this section is based on current environmental conditions.

The area of cumulative impact for most resources was chosen to be the allotment boundary and not the watershed boundary because perennial water is minimal in the project area and allotments occur within only small portions of any one watershed. However, the area of cumulative impact may differ depending on the resource affected. For example, wildlife populations cross allotment boundaries. If a different cumulative impact area is chosen for a specific resource, it is discussed in that specific resource section below. Other allotments on the district are under relatively new allotment management plans.

On-going, in-progress, and planned actions, as well as other on-going management activities occurring within the allotments, are summarized briefly in table 9. Timber sales with decision dates before 2005 were not listed individually in the table because these actions are complete and are reflected in current conditions, as stated above. Wildfires that occurred before 2005 were also not listed because their effects are also reflected in the current condition, as also stated above.

How these on-going, in-progress, and planned activities influence current conditions is discussed in the affected environment sections of each specific resource section.

Table 9. On-going, in-progress, and planned activities considered for the Hell Canyon Range 2010 Project

Allotment	Range Improvements[1]	Vegetation and Fuels Management	Other Activities
Bull Flats	n None	n Noxious weed treatment	n Recreation: developed camping (Comanche Park), dispersed camping, OHV use, hunting, hiking, camping n Travel management planning and potential reduction in roads
French Creek	n Upper French Creek fen exclosure n North Pole spring improvement and exclosure n Ruby Spring dam cleanout n Birch Tree seep cleanout and development of dugout n Warren Gulch spring development n Spring seep development n Section 6 spring exclosure and tank/pipeline development	n Noxious weed treatment n Goat Timber Sale n Waball Timber Sale n Wabash Timber Sale	n Recreation: dispersed camping, OHV use, hunting, hiking, camping n Travel management planning and potential reduction in roads n Cattail land exchange (land removed from the French Creek Allotment)
Lithograph	n None	n Noxious weed treatment	n Recreation: dispersed camping, OHV use, hunting, hiking, camping n Travel management planning and potential reduction in roads
Lower Beaver	n Lower Boles pipeline and tank system installation n Bacon Spring maintenance and exclosure n Sled Spring pipeline system n Summit Springs Unit pipeline and tanks n Summit Spring and pond improvement n Sherwood Spring improvement	n Noxious weed treatment n Sherwood Timber Sale n Briggs Vegetation Management Project n Hell Canyon Maintenance Burn	n Recreation: dispersed camping, OHV use, hunting, hiking, camping n Travel management planning and potential reduction in roads

Allotment	Range Improvements[1]	Vegetation and Fuels Management	Other Activities
Tepee	n Middle Antelope Spring cleanout n Mud Spring reservoir cleanout	n Noxious weed treatment n Hell Canyon Maintenance Burn n Jasper Tree Planting	n Recreation: dispersed camping, OHV use, hunting, hiking, camping n Travel management planning and potential reduction in roads
Water Draw	n None	n Noxious weed treatment n Hell Canyon Maintenance Burn	n Recreation: dispersed camping, OHV use, hunting, hiking, camping n Travel management planning and potential reduction in roads n Cattail land exchange (land added to Water Draw Allotment)

[1] All in-progress and planned range improvements (with documented decisions) are also shown on the allotment maps in appendix A.

The specialist reports used in preparation of this EA are:

- Soils and Water Report (Gonyer 2010)
- Rangeland Vegetation Report and methane production calculation sheet (Bindel 2010a and 2010b)
- Wildlife Report and Biological Assessment and Evaluation (Clark 2010a and Clark 2010b)
- Botany Report and Biological Assessment and Evaluation (Englebert 2010; Scott 2010)
- Fisheries Report (Hirtzel 2010)
- Cultural Resource Report (Engelhart 2010)
- Socioeconomics Report (Reedy 2010)

Other resources (forest vegetation, recreation, lands and minerals, fire and fuels, and visual resources would not be measurably affected by proposed actions and no issues were identified regarding these resources during internal or public scoping. These resources were therefore dismissed from further detailed analysis, as documented in the project record.

Soil and Water

Methodology

GIS (geographic information systems) coverages available for the Black Hills National Forest were used to identify hydrologic unit boundaries, topography, precipitation and

climate, geology, soils, slopes, streams, drainage networks, floodplains, riparian/wetlands, beneficial uses, watershed conditions, and water quality and quantity.

During field surveys, conducted from 2007 to 2009, streams were classified as perennial, intermittent, or ephemeral, and connected disturbed areas (CDAs) and areas of concern were identified and mapped. CDAs are areas that contribute sediment to streams or wetlands causing degradation of physical function or water quality, or increased peak flows that may alter physical channel processes. Areas of concern are those areas where bank trampling, hummocking, and unnaturally short vegetation occur. In order to determine soil conditions, USDA Forest Service Region 2 Soil Health Assessments (Page-Dumroese et al. 2009) were completed at strategic locations across the allotments.

Interdisciplinary Proper Functioning Condition (PFC) evaluations were performed and baseline information was gathered using Multiple Indicator Monitoring (MIM), both in 2008. PFC was used to determine the functionality and trend for riparian areas. Functional ratings are either "proper functioning condition", "functional—at risk", "nonfunctional", or "unknown". If the rating is "functional—at risk" then trend is assessed with values of "upward", "downward", or "not apparent". A complete description of the use of this survey is found in the Bureau of Land Management's technical reference publications (BLM 1993 and 1994).

Baseline information used to assess impacts to the soil and water resource was provided by Forest Service specialists using professional judgment.

Implementation of the action alternatives can affect soil productivity by compacting and eroding the soil. Compaction can decrease the infiltration rates and plant growth. Erosion can remove the critical layers of the soil affecting soil productivity and plant growth. Areas showing direct effects are areas that cattle tend to concentrate and stay in for extended periods of time such as at water developments, salting locations, livestock trails, and shading areas. Streams and riparian areas can also be affected by the implementation of the action alternatives. Streams can be affected by changes in channel morphology and water quality. Water quality has several parameters that can be affected; temperature/oxygen, sediment, nutrients, and pathogens. Riparian/wetlands areas are associated with water and can also be affected.

To compare alternatives, three indicators will be used; one related to soils and two related to riparian areas and streams; these are:

- Acres of detrimentally impacted soils (the Forest Plan establishes standards and guidelines for soils: standard 1103 includes a threshold for detrimental soil disturbance in any land unit at 15 percent (USDA Forest Service 2006).
- Miles of improved stream and riparian area health
- Number of improved areas of concern

The analysis area for cumulative effects was bounded in space as the allotment boundaries, for reasons described at the beginning of this chapter. The cumulative effects analysis was bounded in time by the duration of the allotment management plan, approximately 10 to 15 years into the future.

Affected Environment

A watershed is defined as "the catchment area or drainage basin from which the waters of a stream or stream system are drawn" (Gove 1996). The term watershed describes an area of land that drains downslope to the lowest point. The water moves through a network of drainage pathways, both underground and on the surface. Generally, these pathways converge into streams and rivers, which become progressively larger as the water moves on downstream, eventually reaching an estuary and the ocean (Watershed Definition 2003). Hydrologic Unit Code (HUC) 6 watersheds are generally 10,000 acres to 50,000 acres in size. HUC 7 watersheds are generally 5,000 to 10,000 acres in size (the next size smaller within a HUC 6 watershed). A watershed is made up of different components, including soils, springs and streams, floodplains, wetlands, beneficial uses, watershed condition, and water quality and quantity. These watershed components are discussed where applicable for each allotment, with a few exceptions:

- Watershed condition classes as presented in the Forest Plan (USDA Forest Service 1997) would not change with implementation of any of the alternatives. These Forest Plan condition classes are more like risk classes; many of the factors (e.g., erosive soils and steep slopes) used in determining watershed ratings would not change with management actions. Most watersheds in the project area are in condition class II (Bull Flats, French Creek, most of Lower Beaver, most of Tepee and the Water Draw Allotments) and a small portion of the Lower Beaver and Tepee Allotments are in condition class I (see glossary). These classes would not change with implementation of any of the alternatives.
- Stream flow and flow regime would not be measurably affected by implementation of any of the alternatives because these important components of aquatic ecosystems can only be altered by major changes in cover type or ground cover, dense road networks, or water projects.
- Stream connectivity would not be measurably affected by implementation of any of the alternatives because no new in-stream barriers or removal of existing in-stream barriers are proposed under the alternatives. All existing road and stream crossings that are identified as CDAs would remain in their current condition.
- Floodplains would not be measurably affected by implementation of any of the alternatives. No changes would occur to the physical features of floodplains with or without livestock grazing. All alternatives would meet the requirement of Executive Order 11988 for Floodplain Management.

Bull Flats Allotment

The Bull Flats Allotment is located within parts of four HUC 7 watersheds and one HUC 6 watershed. Table 10 shows the relationship of the Bull Flats Allotment to the HUC 6 watershed.

Soils. There are 19 different soil map units within the Bull Flats Allotment. Four of these represent approximately 85 percent of the allotment. Three of the soil map units have a very high erosion hazard rating (due to steepness of slope) and comprise 16 percent of the allotment. Soils within meadows or grasses are often unique and different from soils that support timber stands. Seven of the soil map units, representing 5 percent of the

allotment, generally support native grasses. Thirteen soil map units generally support trees, which is most of the area. Six soil map units were visited on the ground specifically to conduct a soil health assessment. Observations indicated that soils are healthy and functioning properly; there were no indications of erosion, compaction, or loss of organic matter/ground cover at the sites.

Soil impacts as a result of livestock grazing are occurring on less than 1 percent of the allotment, or approximately 30 acres (table 10). These include watering areas, saltlicks, cattle trails, and cattle shading areas and, for purposes of this analysis, are considered detrimentally impacted soils.

Water. There is an estimated 21 miles of drainages within the allotment; 19 miles of these are ephemeral, less than a mile is perennial, and less than a mile is intermittent. Primary drainages include Layton Canyon, Lightning Creek, and Pleasant Valley Creek. The only riparian areas are along Lightning Creek. The southern section is in excellent riparian condition (and was assigned a "robust" stream health rating and is at Proper Functioning Condition (PFC)) and the northern section is recovering from past impacts (and was assigned an "At-Risk" rating moving towards Robust and is at PFC).

There are 1.30 miles of mapped linear wetlands and 1 acre of mapped polygon wetlands, both classified as palustrine. Based on aerial photo interpretation, knowledge of the area, and professional judgment, these are not considered jurisdictional wetlands.

No streams or waterbodies within the allotment are listed in the South Dakota 303(d) Waterbody List (SD DNR 2008 and 2010). Since streams within the allotment are not listed, it is assumed that the water quality standards are being met, however no known monitoring or investigations have been completed to verify this assumption. There are no connected disturbed areas on the Bull Flats Allotment.

Areas of Concern. There are no areas of concern.

French Creek Allotment

The French Creek Allotment is located within parts of six HUC 7 watersheds and two HUC 6 watersheds (table 10).

Soils. There are 19 different soil map units within the French Creek Allotment. Three of these represent approximately 89 percent of the allotment. Two of the soil map units have a very high erosion hazard rating (due to steepness of slope) and comprise 6 percent of the allotment. Soils within meadows or grasses are often unique and different from soils that support timber stands. Ten of the soil map units, representing 6 percent of the allotment, generally support native grasses. Nine soil map units generally support trees, which is most of the area.

Six soil map units were visited on the ground specifically to conduct a soil health assessment. Observations indicated that soils are healthy and functioning properly, even though some areas showed signs of heavy grazing. There were no indications of erosion, compaction or loss of organic matter/ground cover at the sites.

Table 10. Affected environment summary by allotment

Allotment	HUC 6 Watersheds (percent of watershed in allotment)	Acres of Detrimentally Impacted Soils	Connected Disturbed areas (CDAs)	Stream Health Ratings[1]	Miles of Perennial or Intermittent Streams	Number of Areas of Concern
Bull Flats	Upper Pleasant Valley Creek (30%)	30	0	Lightning Creek: Robust and At-Risk	1.64	0
French Creek	Upper Pleasant Valley Creek (9%) Upper French Creek (14%)	29	5	French Creek: Diminished Ruby Creek: At Risk	6.62	4
Lithograph	Whoopup Creek (<1%) Middle Pass Creek (14%) Tepee Canyon (27%)	53	0	Not applicable; no streams	0	8
Lower Beaver	Beaver Creek-Rats Valley Creek (18%) Roby Canyon (38%) Whoopup Creek (13%)	65	0	At-Risk for 4 springs; Robust for one spring	1.67	6
Tepee	Whoopup Creek (35%) Roby Canyon (2%) Upper Pass Creek (14%) Middle Pass Creek (2%) Tepee Canyon (11%)	85	0	At-Risk for short sections originating at springs	0.28	5
Water Draw	Upper Pleasant Valley Creek (4%) Lower Pleasant Valley Creek (1%) Middle Pass Creek (25%) Pass Creek-East Pass Creek (<1%)	24	0	At-Risk for short sections originating at springs	0.67	6
Total		**286**	**5**		**10.88**	**29**

[1] See the glossary for definitions of these ratings.

Soil impacts as a result of livestock grazing are occurring on less than 1 percent of the allotment, or approximately 29 acres (table 10). These include watering areas, saltlicks, cattle trails, and cattle shading areas and, for purposes of this analysis, are considered detrimentally impacted soils.

Water. There are an estimated 22 miles of drainages within the allotment; over 15 miles of these are ephemeral, a little over 2 miles are perennial, and a little over 4 miles are intermittent. Primary drainages include Bugtown Gulch, Crow Creek, French Creek, Joe Gulch, Lightning Creek, Ruby Creek, South Fork French Creek, and Warren Gulch. Stream health ratings were assigned for French Creek and Ruby Creek. The upper section of French Creek is grazed, has a water gap that is impacted, and has several low water crossings. The middle section is grazed and has some placer mining impacts. The lower section is not grazed, but the channel has been channelized by placer mining. All of French Creek stream health is considered "Diminished." PFC evaluations indicate Proper Functioning Condition at all sites evaluated except for one, which was Functional-At Risk with an upward trend (contributing factors to this designation include mining activities and road encroachment). Ruby Creek only occurs on a small portion of National Forest. This section is grazed and there are a couple of locations along the stream that act like water gaps. Stream health on this section is considered At-Risk. PFC evaluations indicate the sites are in proper functioning condition. The difference in the stream health rating and PFC evaluation indicate differences in assessment techniques and can be interpreted to mean that basic ecologic and hydrologic functions of the riparian area are being met but there is still room for improvement.

There are approximately 7 miles of mapped linear wetlands and 3 acres of mapped polygon wetlands classified as palustrine and riverine. Based on aerial photo interpretation, knowledge of the area, and professional judgment, most of these areas are not considered jurisdictional wetlands. However, two additional areas were identified as wetlands; one is a wetland created by a rock sill and the other is a fen with a floating mat.

One stream, French Creek, is listed in the South Dakota 2010 303(d) Waterbody List as being impaired, meaning that it is not meeting water quality standards for its beneficial use as a cold water marginal fishery and limited contact recreation. The impairment is from levels of dissolved oxygen caused by drought-related impacts and natural sources (SD DNR 2008 and 2010). The state will be completing a full assessment of French Creek in summer 2010 which should provide updated information on this situation. There are five connected disturbed areas along French Creek (table 10). Three of these are at low water crossings where gravel was used to harden the crossings, and two of these are old stream crossings that are contributing sediment to the stream.

Areas of Concern. There are four areas of concern on the French Creek Allotment, all associated with springs (McKenna, North Pole, North Pole 2, and Upper French Creek fen). The Soil and Water Report (Gonyer 2010) provides more detail on these areas.

Lithograph Allotment

The Lithograph Allotment is located within parts of eight HUC 7 watersheds and three HUC 6 watersheds (table 10).

Soils. There are 18 different soil map units within the Lithograph Allotment. Five of these represent approximately 91 percent of the allotment. Four of the soil map units have a very high erosion hazard rating (due to steepness of slope) and comprise 22 percent of the allotment. Soils within meadows or grasses are often unique and different from soils that support timber stands. Ten of the soil map units, representing 18 percent of the allotment, generally support native grasses. Eight soil map units generally support trees, which is most of the area.

Five soil map units were visited on the ground specifically to conduct a soil health assessment. Observations indicated that soils are healthy and functioning properly; there were no indications of erosion, compaction, or loss of organic matter/ground cover at the sites.

Soil impacts as a result of livestock grazing are occurring on less than 1 percent of the allotment, or approximately 53 acres (table 10). These include watering areas, saltlicks, cattle trails, and cattle shading areas and, for purposes of this analysis, are considered detrimentally impacted soils.

Water. There is an estimated 78 miles of drainages within the allotment, all of them ephemeral. Hence, no stream health ratings were assigned. Primary drainages include Hell Canyon, Schenk Canyon, and Tepee Canyon.

There are less than 0.5 miles of mapped linear wetlands and less than 1 acre of mapped polygon wetlands, both classified as palustrine. Based on field visits, aerial photo interpretation, knowledge of the area, and professional judgment, these are not considered jurisdictional wetlands.

No streams or waterbodies within the allotment are listed in the South Dakota 303(d) Waterbody List (SD DNR 2008 and 2010) and this is consistent with the fact that there are no perennial or intermittent streams within this allotment. There are no connected disturbed areas on the Lithograph Allotment.

Areas of Concern. There are eight areas of concern, all associated with springs (Piper, Babcock, Baldwin, Jumpoff, Lost, Flag Hill, Chipmunk, and McKenna springs). Perennial water is lacking on this allotment and springs and wet areas are unique and limited resources that are currently being impacted. The Soil and Water Report (Gonyer 2010) provides more details on these areas.

Lower Beaver Allotment

The Lower Beaver Allotment is located within parts of 14 HUC 7 watersheds and 3 HUC 6 watersheds (table 10).

Soils. There are 26 different soil map units within the Lower Beaver Allotment. Six of these represent approximately 77 percent of the allotment. Six of the soil map unit have a very high erosion hazard rating (due to steepness of slope) and comprise 30 percent of the allotment. Soils within meadows or grasses are often unique and different from soils that support timber stands. Twelve of the soil map units, representing 5 percent of the allotment, generally support native grasses. Thirteen soil map units generally support trees, which is most of the area.

Seven soil map units were visited on the ground specifically to conduct a soil health assessment. Observations indicated that soils are healthy and functioning properly; there were no indications of erosion, compaction, or loss of organic matter/ground cover at the sites.

Soil impacts as a result of livestock grazing are occurring on less than 1 percent of the allotment, or approximately 65 acres (table 10). These include watering areas, saltlicks, cattle trails, and cattle shading areas and, for purposes of this analysis, are considered detrimentally impacted soils.

Water. There are an estimated 97 miles of drainages within the allotment; over 95 miles of which are ephemeral, a little over 1 mile is perennial, and less than 0.5 mile is intermittent. Primary drainages include Boles Canyon, Buck Springs Canyon, Getty's Canyon, Kinney Canyon, Meadow Draw, Redbird Draw, Roby Canyon, Sherwood Canyon, Thompson Canyon, and Whoopup Creek. Stream health ratings were assigned to five springs on the allotment that comprise short perennial stream stretches. Four of these were assigned an At-Risk rating (Sherwood, Sled, Summit, and Thomson springs) and one was assigned a Robust rating (Blowout Spring).

There are approximately 28 miles of mapped linear wetlands and a little over 3 acres of mapped polygon wetlands, classified as both palustrine and riverine. Based on aerial photo interpretation, knowledge of the area and professional judgment, these are not considered jurisdictional wetlands.

No streams or waterbodies within the allotment are listed in the South Dakota 303(d) Waterbody List (SD DNR 2008 and 2010). Since the streams are not listed, it is assumed that the water quality standards are being met, however no known monitoring or investigations have been completed to verify this assumption. There are no connected disturbed areas on the Lower Beaver Allotment.

Areas of Concern. There are six areas of concern, all associated with springs (Sled, Barrel, Old Road, Indian, Summit, and Sherwood springs). Perennial water is limited on this allotment and springs and wet areas are unique and limited resources that are currently being impacted. The Soil and Water Report (Gonyer 2010) provides more detail on these areas.

Tepee Allotment

The Tepee Allotment is located within parts of 13 HUC 7 watersheds and 5 HUC 6 watersheds (table 10).

Soils. There are 20 different soil map units within the Tepee Allotment. Nine of these represent approximately 93 percent of the allotment. Four of the soil map units have a very high erosion hazard rating (due to steepness of slope) and comprise 22 percent of the allotment. Soils within meadows or grasses are often unique and different from soils that support timber stands. Nine of the soil map units, representing 8 percent of the allotment, generally support native grasses. Thirteen soil map units generally support trees, which is most of the area.

Eight soil map units were visited on the ground specifically to conduct a soil health assessment. Observations indicated that soils are healthy and functioning properly; there

were no indications of erosion, compaction, or loss of organic matter/ground cover at the sites.

Soil impacts as a result of livestock grazing are occurring on less than 1 percent of the allotment, or approximately 85 acres (table 10). These include watering areas, saltlicks, cattle trails, and cattle shading areas and, for purposes of this analysis, are considered detrimentally impacted soils.

Water. There is an estimated 102 miles of drainages within the allotment, the vast majority of which are ephemeral; only approximately one-third of a mile is perennial and no drainages are intermittent. Primary drainages include Buck Springs Canyon, Gillette Canyon, Hay Draw, Hell Canyon, Hop Draw, Tepee Canyon, West Hell Canyon, and West Tepee Canyon. Perennial streams are very short segments beginning at springs and flowing only a short distance. These areas have been developed for livestock watering sites with some partially fenced. Consequently, these areas are impacted. Stream health rating at these sites is considered At-Risk.

There are 21 miles of mapped linear wetlands and 3.5 acres of mapped polygon wetlands, all classified as palustrine. Based on aerial photo interpretation, knowledge of the area and professional judgment, these are not considered jurisdictional wetlands.

No streams or waterbodies within the allotment are listed in the South Dakota 303(d) Waterbody List (SD DNR 2008 and 2010). Since the streams are not listed, it is assumed that the water quality standards are being met, however no known monitoring or investigations have been completed to verify this assumption. There are no connected disturbed areas on the Tepee Allotment.

Areas of Concern. There are five areas of concern, all associated with springs (Deadhorse, Poplar, Gould, Townley, and Blacktail springs). Perennial water is limited on this allotment and springs and wet areas are unique and limited resources that are currently being impacted. The Soil and Water Report (Gonyer 2010) provides more details on these areas.

Water Draw Allotment

The Water Draw Allotment is located within parts of five HUC 7 watersheds and four HUC 6 watersheds (table 10).

Soils. There are 10 different soil map units within the Water Draw Allotment. Three of these represent approximately 87 percent of the allotment. Three of the soil map units also have a very high erosion hazard rating (due to steepness of slope) and comprise 16 percent of the allotment. Soils within meadows or grasses are often unique and different from soils that support timber stands. Four of the soil map units, representing 9 percent of the allotment, generally support native grasses. Six soil map units generally support trees, which is most of the area.

Five soil map units were visited on the ground specifically to conduct a soil health assessment. Observations indicated that soils are healthy and functioning properly; there were no indications of erosion, compaction, or loss of organic matter/ground cover at the sites.

Soil impacts as a result of livestock grazing are occurring on less than 1 percent of the allotment, or approximately 24 acres (table 10). These include watering areas, saltlicks, cattle trails, and cattle shading areas and, for purposes of this analysis, are considered detrimentally impacted soils. Since it has been several years since this allotment has been grazed, these detrimentally impacted areas are improving and currently approaching zero.

Water. There are an estimated 29 miles of drainages within the allotment, the vast majority of which are ephemeral; only a little over 0.5 mile is perennial and none are intermittent. Primary drainages include Hell Canyon, Layton Canyon, Lithograph Canyon, S&G Canyon, and Water Draw Spring. Perennial streams within this allotment are very short segments beginning at springs and flowing only a short distance. These areas are important as water sources for wildlife, and wildlife use is evident. Stream health ratings at these sites are At-Risk. PFC evaluations indicate the sites are in Proper Functioning Condition. The difference in the stream health rating and PFC evaluation indicate differences in assessment techniques and can be interpreted to mean that basic ecologic and hydrologic functions of the riparian area are being met but there is still room for improvement.

Mapped linear wetlands and mapped polygon wetlands are extremely limited (0.09 miles and 0.17 acres, respectively) and they are classified as palustrine. Based on aerial photo interpretation, knowledge of the area, and professional judgment, these are not considered jurisdictional wetlands.

No streams or waterbodies within the allotment are listed in the South Dakota 303(d) Waterbody List (SD DNR 2008 and 2010). Since the streams are not listed, it is assumed that the water quality standards are currently being met, however no known monitoring or investigations have been competed to verify this assumption. There are no connected disturbed areas on the Water Draw Allotment.

Areas of Concern. There are six areas of concern, all associated with springs located within three drainages (Lithograph Canyon, four areas along an unnamed tributary to Hell Canyon, and Water Draw). Perennial water is limited on this allotment and springs and wet areas are unique and limited resources that are currently being impacted. The Soil and Water Report (Gonyer 2010) includes more details on these concern areas.

Environmental Consequences

Alternative 1 – No Action

Direct and Indirect Effects Common to All Allotments

Soils. Detrimentally impacted soils due to livestock grazing would be reduced to zero on all allotments as the impacts from livestock trailing and congregation areas, for example, recover over time. This would occur on all allotments. Ground cover would increase initially in the short term and potential for soil erosion would be reduced. Soil bulk density (compaction) characteristics would improve, and infiltration rates would increase (to the extent that these have been affected by domestic grazing).

Studies comparing soil on ungrazed plots with plots of various grazing levels show higher infiltration of precipitation under ungrazed conditions (Holecheck et al. 1995). Infiltration is maximized by live vegetation and litter cover, and results in storage of the

precipitation in the soil. Maximum vegetation and litter cover also keep erosion lower on ungrazed compared to grazed sites. However, the difference in infiltration is not statistically significant when heavy grazing is avoided (Holechek et al. 1995). Orr (1960) conducted a study in the Black Hills on three bluegrass meadow sites showing signs of heavy grazing use and soil compaction. Four years of exclusion from livestock resulted in an increase in infiltration and decrease in summer runoff on two of the three sites.

A reduction in detrimental soil disturbance would occur most rapidly under alternative 1 when compared to alternatives 2 and 3.

Water. Allotments with the most riparian areas (French Creek and Bull Flats) would experience indirect, beneficial effects to water resources through a short-term, substantial improvement in riparian area conditions that would be sustained over time; desired conditions would be achieved in the long term on these allotments. All areas of concern on these allotments would improve over time.

The Lithograph, Lower Beaver, and Tepee Allotments would experience gradual improvement in riparian area conditions as well, but these improvements are expected to be more gradual due to the existing level of wildlife use of these riparian areas that would continue with implementation of alternative 1. Wildlife use of riparian areas is more concentrated on these allotments because water sources are quite limited. Bull Flats and French Creek Allotments have more available water and wildlife impacts are spread out over larger areas. The Water Draw Allotment also has limited water sources and experiences riparian area impacts from wildlife but, because livestock have not grazed this allotment for several years, riparian areas are in better condition currently and would likely continue to improve with implementation of alternative 1.

Livestock feces would no longer be deposited directly in streams or within upslope areas, so there would be fewer effects on surface water quality. As vegetative cover increases, filtering mechanisms would be enhanced to trap more sediment, resulting in less sediment delivered to streams. However, permanent removal of grazing may not guarantee maximum herbaceous cover because the accumulation of litter over a period of years may eventually retard forage production (Buckhouse 1993 [in EPA 2003]).

There would be no direct effects on the aquatic ecosystems from sediment and bed and bank stability because there would be no livestock grazing with this alternative. No new direct damage to streambanks and channel morphology due to hoofshear would be expected. However, the effects of increased sediment delivery may be seen long after disturbed sites have revegetated (USDA Forest Service 2006) and stream channels may take decades to recover from severe morphologic changes. There would be a positive indirect effect because areas of localized steambank trampling and channel widening would begin to revegetate and stabilize; subsequently, sediment input would decrease and bed and bank stability would increase. Stream health would generally improve on all currently grazed perennial and intermittent streams except for some sections of streams, such as French Creek, that was impacted with placer mining.

There would be no expected direct or indirect effect on aquatic ecosystems due to temperature and dissolved oxygen change with alternative 1 because there would not be any livestock grazing with this alternative.

Direct and Indirect Effects Specific to Individual Allotments

Bull Flats Allotment

Stream/riparian health would improve on all 1.64 miles of stream due to the removal of livestock grazing and use in riparian areas. The southern section of Lightning Creek would improve, but would remain at Robust stream health, and the northern section of Lightning Creek would continue to improve gradually with stream health moving from At-Risk towards Robust. PFC would continue to be maintained. There were no areas of concern on this allotment.

French Creek Allotment

Stream/riparian health would improve on 5.55 miles of stream currently grazed (1.07 miles of French Creek is not grazed and the stream health on this section of stream is not influenced by grazing and will remain diminished because of placer mining). French Creek stream health would gradually improve from a Diminished rating to an At-Risk rating (short-term change) and over the long term, to a Robust rating. PFC would continue to be maintained and would achieve PFC at the site where it is currently Functional-At Risk with an upward trend. Ruby Creek stream health would gradually improve from At-Risk to Robust (long term) and would continue to be maintained at PFC. The four areas of concern on this allotment would improve over time with the removal of the impacts from livestock. Wildlife impacts on this allotment are not as great as the other allotments because there is more water available on this allotment; therefore, riparian area improvements and areas of concern improvements would occur more quickly when compared to the other allotments.

Beneficial use of cold water marginal fish life and limited contact recreation affected from dissolved oxygen on French Creek (South Dakota 303(d) Water Body List) would not improve with the absence of grazing. The causes are listed as drought-related impacts and natural sources. Removing livestock from the French Creek Allotment would not affect these causes as livestock grazing does not affect drought.

Lithograph Allotment

There are no streams/riparian areas on the Lithograph Allotment so there are no stream health ratings. The eight areas of concern on this allotment would improve with the removal of the impacts from livestock, but this improvement is expected to be more gradual and realized over the long term instead of the short term due to the existing level of wildlife use in these areas.

Lower Beaver Allotment

Stream/riparian health ratings would improve on all 1.67 miles of stream.

Stream health for the short segment of stream at Blowout Spring would remain Robust. Stream health at the short stream segments at Sherwood, Sled, Summit, and Thomson springs would slowly improve from At-Risk to Robust. The six areas of concern would improve with the removal of the impacts from livestock but the improvement would be slow due to the existing level of wildlife use in these areas.

Tepee Allotment

Stream/riparian health ratings would improve on all 0.28 miles of stream. Stream health ratings on the short segments of streams associated with springs would slowly improve from At-Risk to Robust. The five areas of concern would improve slowly due to the existing level of wildlife use in these areas.

Water Draw Allotment

Stream/riparian health ratings would continue to improve on all 0.67 miles of stream. Stream health ratings on the short segments of stream would slowly improve from At-Risk to Robust and would continue at PFC. The six areas of concern would improve slowly due to the existing level of wildlife use in these areas.

Cumulative Effects Common to All Allotments

Other in-progress, on-going, and planned projects such as timber harvest and off-highway vehicle use (table 9) have the potential to result in impacts to soil and water resources through localized areas of soil compaction, vegetation removal, soil disturbance, and stream crossings that can increase sediment delivery. Livestock would no longer impact soils and stream/riparian areas, but periodic soil impacts would occur over time when timber harvest activities are conducted. These impacts would be temporary and localized and would recover with time; monitoring has shown that detrimentally impacted soils in timber units are well within Forest Plan standards (USDA Forest Service 2009, Thomas 2007a and Thomas 2007b). Off-highway vehicle impacts would decrease from past levels with the approval and implementation of a Forest travel management plan. Wildlife impacts to streams/riparian areas would continue. Combining the beneficial effects to soil and water resources from removal of livestock grazing with these other localized impacts would result in an overall beneficial, but minor, cumulative impact to soil and water resources.

Summary

Under alternative 1, no livestock grazing would be permitted on any of the allotments and current permits would be phased out over 2 years. There would be no direct effects to watershed condition because there would be no livestock grazing. Desired conditions are currently being met in some areas, but localized areas are not meeting desired conditions. Watershed conditions in these areas on all allotments would improve as an indirect result of livestock removal, but the magnitude of the change would vary by allotment; improvements would be more pronounced in riparian areas. Allotments with the greatest number of perennial and intermittent streams would experience the greatest positive change. Allotments would experience increases in ground cover and riparian vegetation over time. Springs, streams, and riparian/wetland areas would improve. Evidence of livestock trampling and hummocking would decrease to unobservable levels over time. The potential for sediment to reach streams via overland flow or unstable streambanks would be reduced. All of these beneficial effects would occur slowly over time and would likely take decades to reach their full potential.

Table 11 summarizes the effects to soil and water from implementation of alternative 1. Implementation of alternative 1 would be consistent with the Forest Plan. All Forest Plan standards and guidelines relating to soil and water resources would be met.

Alternative 2 – Current Management

Direct and Indirect Effects Common to All Allotments

Numerous studies have shown that livestock grazing results in adverse impacts to soil and water resources, and there is little evidence to support beneficial effects (Clary and Webster 1989). Direct and indirect effects from livestock grazing to watershed resources would occur on all allotments, except Water Draw, which would continue to be managed as a vacant allotment. Because these allotments would continue to be managed as they have been over the last 3 to 5 years, watershed conditions would generally remain unchanged; areas that are in good condition now would remain so and areas not currently meeting desired conditions would remain so or would decline over time. Because long-term monitoring at established upland benchmarks on all allotments are indicating stable or improving trends in rangeland condition, desired conditions in many areas are currently being met; this would continue with implementation of alternative 2. Localized areas, however, are experiencing effects, particularly riparian areas, and these impacts would also continue. The potential for sediment to reach streams via overland flow or from unstable streambanks would remain low and unchanged, except in localized areas.

Localized impacts from livestock grazing would be greater on the French Creek Allotment than on the Lithograph, Lower Beaver, and Tepee Allotments, due to the greater amount of streams and riparian/wetland areas. Riparian stubble height would not be an indicator as to when to move livestock. Evidence of trampling and hummocking from livestock grazing would remain unchanged. Ground cover would remain unchanged.

Soils. Soil erosion is not currently an issue in the project area. Alternative 2 would maintain upland vegetation communities and soil resource conditions by adhering to utilization standards for the uplands, as prescribed in the Forest Plan. Soil erosion would continue to be minimal on all allotments.

Soil productivity could be reduced due to soil compaction from concentrated livestock grazing. Soils most susceptible to soil compaction are primarily forested areas and not primary grazing land, reducing the potential for this effect to be widespread. Most any soil could be compacted under the right conditions, particularly where animals tend to congregate (livestock trails, watering sites, salt licks, and shaded areas) during certain moisture conditions. Generally, these are small isolated areas already receiving impacts, and these areas are less than 15 percent of any of the allotments, as prescribed in the Forest Plan.

Detrimentally impacted soils due to livestock grazing would remain at their current levels due to implementation of alternative 2, with one exception: these acres would be reduced to zero on the Water Draw Allotment because livestock would not be grazed (table 11).

Water. In general, livestock grazing across the Forest has resulted in localized impacts to riparian areas (water quality, stream bank vegetation and stability, channel morphology, and sediment input, USDA Forest Service 2005a). While current management on these six allotments has resulted in stable or improving trends in many areas, particularly in the uplands, continuing current management under alternative 2 would not promote increased bank stability adjacent to aquatic habitats in all areas and would not maintain filtering function of riparian areas adjacent to water in all areas; these Forest Plan guidelines

(guidelines 2505 and 2506) would not be met in all areas. Livestock can increase sediment delivery to streams through crossing streams and trampling stream banks while looking for water and forage, but this sediment generation is usually minimal. However, if animals spend a lot of time in the same area of the stream, stream banks could become unstable. This could cause failure of the stream banks with large amounts of sediment being generated. Stream bank instability is expected to increase over time in localized areas where livestock impacts are already occurring.

Livestock feces would be deposited directly in streams and upland areas, with potential for effects to water quality. With adequate vegetative cover, filtering mechanisms would be sufficient to trap sediment and nutrients before reaching drainage systems. It is expected that these effects would be minimal with implementation of alternative 2. Beneficial uses of the streams and water quality standards would continue to be met with implementation of alternative 2.

Implementation of alternative 2 would not result in improvements in areas of concern or streams/riparian areas that are currently experiencing detrimental impacts from livestock grazing. Current conditions would continue and in many areas this would result in static stream health ratings; areas currently At-Risk or Diminished would likely remain so, just as those areas in Robust condition would remain so.

Direct and Indirect Effects Specific to Individual Allotments

Bull Flats Allotment

Stream/riparian health would remain in its current condition on all 1.64 miles of stream with implementation of alternative 2 and continued livestock use. Because these riparian areas along Lightning Creek are in good condition (Robust rating on the southern section and at PFC) or improving (At-Risk on the northern section but has been improving over time and is at PFC), it is possible that trends could continue upward and additional improvements could result over the long term. In the short term, stream health ratings would remain unchanged and PFC would continue to be maintained.

French Creek Allotment

Stream/riparian health would not improve on the 5.55 miles of stream currently grazed (1.07 miles of French Creek is not grazed and the stream health on this section of stream is not influenced by grazing) because livestock would continue to impact streams. Stream health on French Creek would remain at a Diminished rating. Ruby Creek stream health would remain at an At-Risk rating. PFC would continue to be achieved on French Creek and Ruby Creek and would maintain the current upward trend on French Creek. Conditions at two of the four areas of concern (North Pole Spring and Upper French Creek fen; see table 9) would improve because plans are currently in-progress to exclude livestock from these areas. The two other areas of concern on this allotment would not improve because of continued livestock impacts at current levels.

Lithograph Allotment

There are no streams/riparian areas on the Lithograph Allotment, so there are no stream health ratings on this allotment. Eight areas of concern on this allotment would not improve over time because of continued livestock and wildlife impacts at current levels.

Lower Beaver Allotment

Stream/riparian health would not improve on most of the 1.67 miles of stream because livestock and wildlife would continue to impact streams. Stream health for the short segment of stream at Blowout Spring would remain Robust. Four areas of concern (Sherwood Spring, Sled Spring, Summit Spring, and Thomson Canyon) would gradually improve from At-Risk to Robust because of the source water protection measures recently implemented (see table 9). The other three areas of concern on this allotment would not improve over time because of continued impact at the current levels.

Tepee Allotment

Stream/riparian health would not improve on any of the 0.28 miles of stream because livestock and wildlife would continue to impact these areas. Stream health on the short segments of streams at springs would remain At-Risk. All five areas of concern would not improve over time because of continued impact at the current levels.

Water Draw Allotment

Because the Water Draw Allotment would remain vacant and would not be grazed under alternative 2, direct/indirect impacts to water resources are the same as those for alternative 1.

Cumulative Effects Common to All Allotments

Implementation of alternative 2 would result in continued short- and long-term direct/indirect effects to soil and water resources as described above. Adding these effects to the direct/indirect effects from other in-progress, on-going, and planned projects on these allotments such as timber harvest and off-highway vehicle use (table 9) has the potential to result in cumulative impacts to soil and water resources through localized areas of soil compaction, vegetation removal, soil disturbance, and stream crossings that can increase sediment delivery. Livestock would continue to impact soils and stream/riparian areas; these same drainage systems could also be impacted during timber harvest activities. Soil disturbance and compaction from these activities would be temporary and localized and would recover with time; monitoring has shown that detrimentally impacted soils in timber units are well within Forest Plan standards (USDA Forest Service 2009, Thomas 2007a and Thomas 2007b). Off-highway vehicle impacts would decrease from past levels with the approval and implementation of a Forest travel management plan. Wildlife impacts to streams/riparian areas would continue. Combining these localized effects from continued livestock grazing with these other localized effects would result in an overall minor cumulative impact to soil and water resources, minimized through adherence to project-specific design criteria and Forest Plan standards and guidelines.

Summary

Under alternative 2, livestock grazing would be permitted on the Bull Flats, French Creek, Lithograph, Lower Beaver, and Tepee Allotments and would continue at current levels. Livestock would not be permitted on the Water Draw Allotment and the allotment would remain vacant. Impacts to soil and water resources on the allotment would be the same as those described for alternative 1.

Because these allotments would continue to be managed as they have been over the last few years, watershed conditions would generally remain unchanged; areas that are in good condition now would remain so and areas that are not currently meeting desired conditions would remain so or would decline over time. Because long-term monitoring at established upland benchmarks on all allotments are indicating stable or improving trends in rangeland condition, desired conditions in many areas are currently being met and this would continue with implementation of alternative 2. Localized areas, however, are experiencing effects, particularly in riparian areas, and these impacts would continue.

Table 11 summarizes the effects to soil and water from implementation of alternative 2. Implementation of alternative 2 would be consistent with Forest Plan standards and guidelines for soil resources but would not meet all Forest Plan standards and guidelines for water resources in all areas; Forest Plan Standard 2505 would not be met in all areas at all times because current annual operating instructions do not prescribe riparian residual levels. Forest Plan Standard 1301 would not be met because stream health would not improve in all areas.

Alternative 3 – Proposed Action

Direct and Indirect Effects Common to All Allotments

Watershed resources would be affected on all allotments with implementation of alternative 3. Because improved management would be implemented where needed, watershed conditions would improve over time; proposed range improvement projects and additional monitoring would occur. Some improvements would exclude livestock from some areas. Monitoring trigger points would be established for short-term monitoring sites (appendix B) so that livestock would be moved based on riparian stubble height and upland vegetation utilization; this would result in improved riparian and upland conditions over the current condition. Long-term monitoring of riparian areas would determine if existing conditions are moving toward desired conditions; adaptive management options (table 4) would be implemented when necessary. Because of these proposed actions, springs, streams, and riparian areas would improve overtime. Evidence of trampling and hummocking from livestock grazing would decrease. Ground cover would improve. The potential for sediment to reach streams via overland flow or from unstable streambanks would decrease. Stream bank stability would improve adjacent to aquatic habitats and maintain filtering function of riparian areas adjacent to water due to the implementation of proposed range improvements, enhanced monitoring, establishment of trigger points, and implementation of adaptive management options when needed.

Soil erosion is not currently an issue on any of the allotments and this is not expected to change with implementation of alternative 3. Detrimentally impacted soils due to livestock grazing would increase slightly on all allotments (table 11) due to implementation of proposed improvements on each allotment, as discussed for each allotment below. Soil compaction would occur in these areas and in existing congregation areas such as shading and watering sites. Acres of soils detrimentally impacted by livestock would increase from 286 acres under the existing condition to 316 acres under alternative 3. However, this would still be well within acceptable thresholds for detrimentally impacted soils, as defined in the Forest Plan.

Direct and Indirect Effects Specific to Individual Allotments

Bull Flats Allotment

The Bull Flats Allotment would be managed as previously described for alternative 2; no change in permitted numbers or seasons of use is proposed and no range improvements are proposed. The only difference between alternative 2 and 3 is in the application of adaptive management and enhanced monitoring under alternative 3. Therefore, impacts to soil and water resources would essentially be the same as those described for alternative 2; however, the ability to implement adaptive management options if issues arise would provide for enhanced protection of soil and water resources and a faster rate of improvement where existing conditions are not currently meeting desired conditions.

French Creek Allotment

Alternative 3 proposed actions for French Creek are designed to improve resource conditions. However, because of the implementation of new range improvements (e.g., stock tanks and dugouts) which would disturb and compact soils and/or create new livestock congregation areas, detrimentally impacted soils would increase by approximately 20 acres to a total of 49 acres. This would still be less than 1 percent of the allotment.

Stream/riparian health would improve on the 5.55 miles of stream available to grazing. French Creek stream would gradually improve from Diminished to At-Risk and eventually to Robust, but would take longer to improve than alternative 1. Ruby Creek stream health would also gradually improve and would move from At-Risk to Robust over the long term. PFC would continue to be achieved on French Creek and Ruby Creek and would maintain the current upward trend at one site on French Creek. Three of the four areas of concern (North Pole Spring, North Pole Spring 2, and Upper French Creek Fen) would improve over time with the reduced AMs and the implementation of proposed improvements.

Of the 5.55 miles of stream available to livestock, grazing would be removed from 0.56 miles of French Creek when the Pope Spring Unit is split into two units. A water gap of 0.10 miles on French Creek would be combined with the rest of French Creek (2.59 miles) when water is developed on the North Pole Unit. This would result in substantial improvement in riparian conditions in this area.

Beneficial uses on French Creek (cold water marginal fish life and limited contact recreation, as defined in South Dakota 303(d) Water Body List) would not be affected by livestock grazing; French Creek is not meeting these beneficial uses due to drought-related impacts and other natural sources, not livestock grazing.

Lithograph Allotment

Alternative 3 proposed actions for Lithograph are designed to improve resource conditions. However, because of the implementation of new range improvements (e.g., stock tanks) which would disturb and compact soils and/or create new livestock congregation areas, detrimentally impacted soils would increase by approximately 1 acre to a total of 54 acres. This would still be less than one percent of the allotment.

There are no streams/riparian areas on the Lithograph Allotment so there are no stream health ratings on this allotment. Two of the eight areas of concern on this allotment (Piper Spring and Chipmunk Spring) would improve with implementation of proposed source water protections. The other six areas of concern would continue to be impacted and not improve over time because of continued impact at the current levels; there are no proposed actions at these sites.

Lower Beaver Allotment

Alternative 3 proposed actions for Lower Beaver are designed to improve resource conditions. However, because of the implementation of new range improvements (e.g., stock tanks) which would disturb and compact soils and/or create new livestock congregation areas, detrimentally impacted soils would increase by approximately 1 acre to a total of 66 acres. This would still be less than 1 percent of the allotment.

Stream/riparian health would improve on 1.67 miles of stream because riparian stubble height standards would be applied to this allotment. Stream health for the short segment of stream at Blowout Spring would remain Robust. Four areas of concern (Sherwood Spring, Sled Spring, Summit Spring, and Thomson Canyon) would gradually improve from At-Risk to Robust because water protection measures have recently been implemented in these areas. The other three areas of concern would continue to be impacted with continued livestock grazing; no specific actions are proposed at these sites.

Tepee Allotment

Alternative 3 proposed actions for Tepee are designed to improve resource conditions. However, because of the implementation of new range improvements (e.g., stock tanks and spring development) which would disturb and compact soils and/or create new livestock congregation areas, detrimentally impacted soils would increase by approximately 2 acres to a total of 87 acres. This would still be less than 1 percent of the allotment.

Stream/riparian health would improve on some of the 0.28 miles of stream because source water protection would be implemented. The stream health on the short segments of streams at springs at two sites would improve from At-Risk to Robust. The other three areas would remain at At-Risk. Of the five areas of concern on this allotment, two (Deadhorse Spring and Blacktail Spring) would improve over time because of the exclusion of livestock. The other three areas of concern would continue to be impacted with continued livestock grazing; no specific actions are proposed at these sites.

Water Draw Allotment

With implementation of proposed range improvements, detrimentally impacted soils would increase from 24 acres to 30 acres due to creation of additional disturbed areas with the implementation of new range improvements. This would still be less than one percent of the allotment.

Stream/riparian health would improve on some of the 0.67 miles of stream because of the source water protection measures that are planned. The stream health on the short segments of stream that are proposed for fencing would improve and would move toward a Robust rating while the sections not protected would remain At-Risk. PFC would

continue to be maintained. The source areas for the six (6) areas of concern would be protected from livestock.

Adaptive Management. Alternative 3 incorporates adaptive management options into the list of possible actions that could be implemented. Adaptive management that follows Forest Plan standards, watershed conservation practices and design criteria and responds to the appropriate trigger points would have beneficial effects to soil and water resources when compared to implementation of alternative 2. Research seems to indicate that the ability to control the location and duration of grazing and the degree of forage utilization is more important than the use of any particular grazing system (Clary and Webster, 1989); for these reasons, providing the flexibility to change management quickly when intended results are not achieved provides enhanced success in meeting project objectives. Appendix E summarizes the potential direct/indirect and cumulative effects from implementation of any one or group of possible adaptive management options.

Cumulative Effects Common to All Allotments

Implementation of alternative 3 would result in short- and long-term direct/indirect effects to soil and water resources as described above. Adding these effects to the direct/indirect effects from other in-progress, on-going, and planned projects on these allotments, such as timber harvest and off-highway vehicle use (table 9) has the potential to result in cumulative impacts to soil and water resources through localized areas of soil compaction, vegetation removal and soil disturbance, and stream crossings that can increase sediment delivery. Livestock would continue to impact soils and stream/riparian areas, but these effects would be less than those from alternative 2; these same drainage systems could also be impacted during timber harvest activities. Soil disturbance and compaction from these activities would be temporary and localized and would recover with time; monitoring has shown that detrimentally impacted soils in timber units are well within Forest Plan standards (USDA Forest Service 2009). Off-highway vehicle impacts would decrease from past levels with the approval and implementation of a Forest travel management plan. Wildlife impacts to streams/riparian areas would continue. Combining the localized effects to soil and water resources from livestock grazing under alternative 3 with these other localized impacts would result in an overall minor cumulative impact to soil and water resources. The impacts would be minimized through adherence to project-specific design criteria and Forest Plan standards and guidelines.

Summary

Under alternative 3, livestock grazing would be permitted on all allotments. Impacts to soil and water resource conditions on all allotments would occur, but these effects would be less than those for alternative 2 due to improved livestock management. The only exception is for the Water Draw Allotment where livestock use would not occur under alternatives 1 and 2, but would occur under alternative 3.

For soils, this alternative would be consistent with the Forest Plan. All standards and guidelines relating to soil would be met, particularly Forest Plan Standard 1103 which states no more than 15 percent of any land unit can be in a detrimentally impacted state, because all allotments would have less than 1 percent in a detrimentally impacted state.

Implementation of alternative 3 would be consistent with Forest Plan standards and guidelines for both soil and water resources.

Table 11 summarizes the direct/indirect effects from alternatives 1, 2, and 3 using the measurable indicators. Of all the alternatives, alternative 1 would result in the fewest impacts to soil and water resources and would result in no impacts over the long term to soil and water resources with the removal of livestock grazing. Alternative 3 would result in improved livestock management when compared to alternative 2 and would minimize long-term impacts, particularly those related to riparian/stream conditions. Alternative 3 would move allotments toward desired conditions at a faster rate than alternative 2 and would be more successful in meeting Forest Plan standards and guidelines when compared to alternative 2.

Table 11. Comparison of alternatives by soil and water measurement indicators

Allotment	Acres of Detrimentally Impacted Soils				Miles of Improved Stream/Riparian Health				Number of Improved Areas of Concern			
	Existing Condition	Alt 1	Alt 2	Alt 3	Existing Condition	Alt 1	Alt 2	Alt 3	Existing Condition	Alt 1	Alt 2	Alt 3
Bull Flats	30	0	30	30	1.64	1.64	1.64	1.64	0	NA	NA	NA
French Creek	29	0	29	49	6.62	5.55	0	5.55	4	4	2	3
Lithograph	53	0	53	54	0	NA	NA	NA	8	8	0	2
Lower Beaver	65	0	65	66	1.67	1.67	0	1.67	6	6	3	3
Tepee	85	0	85	87	0.28	0.28	0	0.28	5	5	0	2
Water Draw	24	0	0	30	0.67	0.67	0	0.67	6	6	0	6
Total	**286**	**0**	**262**	**316**	**10.88**	**9.81 (90%)**	**1.64 (15%)**	**9.81 (90%)**	**29**	**29 (100%)**	**5 (17%)**	**16 (55%)**

Rangelands

Methodology

The most recent field surveys to evaluate rangeland conditions within the project area were conducted between 2001 and 2009 by Black Hills National Forest employees. These data include cover frequency monitoring using the cover frequency index method. The 2008 and 2009 data were compared to historical data to determine any substantial shifts in plant species composition or changes in soil health (stability, condition, and litter components). These data were then compiled and compared to NRCS classifications (potential vegetation communities based on soil type). Determination of desired condition was then based on what would be attainable. Desired conditions may include "naturalized" species such as Kentucky bluegrass (*Poa pratensis*) and timothy (*Phleum pratense*) because they have grown there for many years and are established within the community. The degree of similarity between existing and desired plant communities gives an estimate of vegetation management status. With a similarity coefficient score of 65 percent or greater, the range condition is considered satisfactory (USDA Forest Service 1996c).

In 2008 and 2009, ocular plant composition data were collected by soil map unit on each allotment to determine species composition. These data were collected following the protocols established in the Rocky Mountain Region Rangeland Analysis and Management Training Guide (USDA Forest Service 1996).

Trend is determined where possible by comparing historical records (e.g., transects data, inspection records, and photographs) with current conditions to determine if conditions have generally improved, declined, or stayed the same (stable).

Streams/riparian areas were evaluated using "Proper Functioning Condition" (PFC) surveys and baseline monitoring data was collected using Multiple Indicator Monitoring (MIM) in 2008 on Bull Flats, French Creek, and Water Draw Allotments.

Livestock grazing can result in short- and long-term changes in rangeland vegetation (vegetation composition and structure) and can impact the quality of livestock forage (both beneficially and adversely). Proposed improvements can alter livestock movement patterns and influence distribution. The magnitude of the influence of grazing depends on the timing, frequency, and intensity of use, and the associated management practices, including the level of permittee interest and involvement.

In order to compare the alternatives, the following measureable indicators have been developed:

- Changes in rangeland and riparian conditions and trends (based on benchmark and key area monitoring)
- Changes in noxious weed introduction and spread

Suitable and capable rangelands and stocking levels for each allotment are described in the next section. The description of alternative 2 in chapter 2 provides a summary of current management on each allotment. The Rangeland Vegetation Report (Bindel

2010a) provides additional detail on historic conditions, monitoring results, and current conditions for each allotment.

Affected Environment

Rangeland vegetation is defined in the Region 2 Rangeland Analysis and Management Training Guide (RAMTG) (USDA Forest Service 1996) as land producing or capable of producing native forage for grazing and browsing animals, and lands that have been revegetated naturally or artificially to provide a forage cover that is managed like native vegetation. Rangeland vegetation includes all grasslands, forblands, shrublands, and those forested lands that can support an understory of herbaceous or shrubby vegetation that provides forage for grazing or browsing animals.

Community Types. These six allotments are predominately Ponderosa Pine/Western Wheatgrass Woodland community type, grading to Ponderosa Pine/Common Juniper Woodlands on the northwestern portion. Many of these Ponderosa Pine/Common Juniper communities have a very strong graminoid component, which according to Marriott and Faber-Langendoen (2000) is not typical for this community type. In the drier, more southern portions of the project area the ponderosa pine community types are accompanied by Ponderosa Pine/Rocky Mountain Juniper Woodlands and Rocky Mountain Juniper/Little-Seed Ricegrass Woodland community types (Marriott and Faber-Langendoen 2000).

Mountain Mahogany/Side-Oats Shrubland (Marriott and Faber-Langendoen 2000) makes up approximately 10 percent of the Lower Beaver Allotment and is scattered along the western edge of the Tepee Allotment and through the central portion of the Lithograph Allotment.

The woodlands/shrublands described above are classified as warm slope, cool slope, or shallow ridge grazable woodlands by the Natural Resource Conservation Service (NRCS), based on soil type. Grazable woodlands are those forested sites that produce enough of an understory to provide forage for grazing animals. The NRCS describes the warm slope/cool slope/shallow ridge grazable woodlands as sites with an overstory of ponderosa pine with little bluestem, big bluestem, sideoats grama, sedges, and bluegrasses in the understory.

Two large, stand-replacing fires have occurred within the project area within the past 9 years. As a result, 63 percent of the grazable woodlands in the Water Draw Allotment, 79 percent in the Tepee Allotment, 25 percent in the Lithograph Allotment, and 41 percent in the Lower Beaver Allotment have been substantially altered. While classified as forested sites according to soil, these sites are now dominated by shrubs, forbs (often weedy species), graminoids, and standing dead ponderosa pine. These areas are littered with down woody debris and those that did not have a strong graminoid component pre-fire have patchy areas of bare soil. Shrubs present include dogbane, western snowberry, serviceberry, wild rose and russet buffaloberry.

White Spruce Alluvial Black Hills Forest (Marriott and Faber-Langendoen 2000) is present along French Creek. This alluvial bottom and the north facing white spruce slopes have the potential of providing habitat for Region 2 sensitive species and Black Hills National Forest plant species of local concern, although no individuals were found

during botanical surveys (see Botany section later in this chapter). Pockets of quaking aspen and paper birch are minor components throughout this portion of the project area.

Soil types that support rangeland sites (as opposed to supporting forests) are a minority in these six allotments. The Lithograph Allotment has the greatest amount of rangeland with 13 percent of the allotment being classified as either shallow or silty range sites. These sites are dominated by native perennial graminoids such as western wheatgrass, needle-and-thread, prairie junegrass, and threadleaf sedge. Despite the large fires in the recent past, many of these sites are experiencing pine encroachment. These non-forested sites with soils derived from limestone parent material are believed to be potential habitat for the R2 sensitive species prairie moonwort and narrowleaf grapefern and occur on the Lower Beaver and Tepee Allotments.

Ocular plant composition studies were conducted across the project area to determine an estimate of understory species composition. The data indicate native graminoids are a major component of the understory across all soils types, although many of the overflow range sites support a large amount of introduced perennial grasses (Kentucky bluegrass, smooth brome, and timothy) and/or the shrub western snowberry. Details of species composition for each allotment are included in the Botany Report (Englebert 2010) and the Rangeland Vegetation Report (Bindel 2010a).

The community composition of rangeland vegetation in the project area has been altered from pre-settlement conditions by several factors such as suppression of fire and past agricultural practices. Some of the open parklands (grass upland) within the project area were plowed during the resettlement and homestead era of the 1930s and 1940s. These areas were taken out of crop or hay production and allowed to return to native grasses. Few areas were seeded to crested wheatgrass and smooth brome in later years.

The majority of grazing available on the allotments occurs on woodland and upland sites. Grazable woodlands are those forested sites that produce enough of an understory to provide forage for grazing animals. However, woodland and uplands may be considered unsuitable for grazing based on low production, steepness of slope, inaccessible areas due to topography, or limited access to water.

Suitable and Capable Rangelands. Suitable rangelands are those rangelands where there is no Forest Plan or other binding decision to preclude the permitting of livestock grazing. Management area designations in the project area include those in Table 1. All of the Management Areas in the project area allow livestock grazing. Examples of areas within these allotments that are not suitable for grazing include certain administrative sites, mineral production areas, exclosures, and areas closed to grazing by decision. Range capability is a tool used at the project level to identify where forage is available and how management can affect use of that forage. Capability and suitability were determined for each allotment using the "Regional Desk Guide for Determination of Rangeland Suitability for Livestock Grazing" (USDA Forest Service 2004) and are summarized in the Rangeland Vegetation Report (Bindel 2010a).

Capable acres for this analysis area were reviewed using the latest GIS data available. Factors such as tree canopy cover, vegetative type and production, slope and aspect are used, in combination with previous actual use adjustments over the years on each allotment, to determine carrying capacity. However, range capability is a modeling tool

only and may not portray an accurate assessment of on the ground conditions. For example, grass production varies based on many factors that are not easily modeled such as local variations in soil type, precipitation, microsites, plant species, etc. In the absence of other information, rangeland inventories done at one point in time are sometimes used to provide general estimates of potential stocking rates of management units. Such inventories have been done in the past on some of the allotments within the project area.

Stocking Rates. Proper stocking rates are site-specific and thus are highly variable. Key factors influencing proper stocking on any given parcel of land include, but are not limited to: permittee management knowledge and effectiveness, topography, water availability, plant communities and their distribution, aspect, slope, forage palatability, current year's precipitation and seasonal distribution, fire (both wild and prescribed), drought, wildlife effects, recreational activities, livestock age and size, and so forth. For any given allotment, the proper stocking rates can and will vary significantly through time depending on these types of variables. Generally, we define the range or variability for proper stocking rates, based on capability/suitability determinations and the other factors mentioned above, but it is nearly impossible to pinpoint one "proper stocking rate". In general, an initial stocking rate may be set but through inventories and monitoring of rangeland conditions, the stocking rate may be adjusted. Additionally, stocking rates are not considered as static; their determined estimate should be periodically considered as part of range management.

The Rangeland Analysis and Management Training Guide (RAMTG) states when resource conditions on some allotments are not meeting or moving towards Forest Plan objectives, rangeland managers should re-evaluate grazing capacity, that is, the amount of livestock use that can be allowed while meeting basic resource needs and associated objectives. Studies to firm up grazing capacity estimates should be conducted for at least a full rotation on rest or deferred systems, and scheduled to allow for vegetative production fluctuations due to climatic conditions. Such estimates are not to be considered static; they should be periodically reviewed and adjusted to bring them in line with changing conditions. Stocking rates should allow a safety margin to provide for low forage producing years, and trend towards objectives is another consideration. Such inventories have been done in the past on the Bull Flats, Lithograph, Lower Beaver and Tepee Allotments. Since that time, the stocking rates have been adjusted according to the resource conditions as described above.

Stocking rates should also be based upon more than one-point-in-time rangeland inventories. Additional adjustments are often needed to account for distance to water, livestock behavior, conifer encroachment or conifer removal (due to timber harvest and fire), and topography. For example, there may be a large meadow with high productivity but due to steep access and long distance to water livestock do not utilize it. Overall, annual monitoring data, long-term trend data as well as field site visits were used to confirm whether current stocking rates are meeting the management objectives and desired conditions for these allotments as discussed below.

Reviews of historic inventories, long-term monitoring, current monitoring, annual monitoring data, and field visits were conducted on the allotments within the project area. A generalized carrying capacity and stocking rate was calculated for the Water Draw Allotment, for purposes of this project, because the allotment has not been used for

several years. For the Bull Flats, Lithograph, Lower Beaver and Tepee Allotments, management objectives and desired conditions are being met or are moving toward desired conditions within the project area and further refinement of stocking rates at this time is therefore unwarranted. For the French Creek Allotment, due to resource needs, a reduction in the stocking rate has been proposed. Table 12 displays suitable and capable rangelands, current stocking rates (Alternative 2, Current Management) and stocking rates proposed under Alternative 3, Proposed Action.

Bull Flats Allotment

The Bull Flats Allotment is described generally in chapter 1 and in the description of "Alternative 2 – Current Management" in chapter 2. Both the Rangeland Vegetation and the Botany Report include common native and non-native grasses and forbs present on the allotment as well as more detail on vegetation types (Bindel 2010a and Englebert 2010). The allotment is characterized by rolling topography and steep canyon slopes covered with patches of thick timber and canyon bottoms of grass. It is predominately a Ponderosa Pine/Western Wheatgrass Woodland community type (Marriott and Faber-Langendoen 2000). There are several natural meadows, but they are experiencing pine encroachment. The King Tut Unit has the most limited productivity of all the units. The large open meadows are in Layton Canyon, Lightning Creek, and in an area around Y-4 Well. Other very small meadows or openings are scattered throughout the allotment. Primary range sites make up only 6 percent of the allotment; 77 percent is grazable woodland and 16 percent is rock outcrop.

The woodlands present in the Bull Flats Allotment are classified by the NRCS as warm slope, cool slope, shallow ridge, rocky sideslope, or silty footslope grazable woodlands, based on soil type.

Table 12. Suitable and capable acres and stocking rates per allotment

Allotment	Capable Acres	Suitable Acres	Alternative 1 Stocking Rate (AMs)	Alternative 2 Stocking Rate (AMs)	Alternative 3 Stocking Rate (AMs)
Bull Flats	7,284	4,983	0	374	374
French Creek	7,292	5,744	0	728	529
Lithograph	12,560	11,413	0	1,364	1,364
Lower Beaver	22,206	21,406	0	2,017	2,017
Tepee	22,104	21,666	0	1,920	1,920
Water Draw	6,881	5,872	0	0	252

Overall, rangeland health/condition is good and the trend in rangeland condition is upward, based on cover frequency studies and professional judgment. There are 7,284 acres capable of grazing and 4,983 acres suitable for grazing (table 12) (Bindel 2010a provides more detail on this determination).

Noxious weeds that are a concern within the allotment are leafy spurge (*Euphorbia esula*), Canada thistle (*Cirsium arvense*), and common tansy (*Tanacetum vulgare*). Widespread patches of leafy spurge can be found along Layton Canyon with a few occurrences in Griffiths Canyon, along US Highway 16, and along FS Roads 273 and

307. Herbicide treatments and biological control releases have been completed at these sites in addition to areas within the Michaud, Comanche, and Henderson timber sales.

French Creek Allotment

The French Creek Allotment is described generally in chapter 1 and in the description of "Alternative 2 – Current Management" in chapter 2. Both the Rangeland Vegetation and the Botany Reports include common native and non-native grasses and forbs present on the allotment, as well as more detail on vegetation types (Bindel 2010a and Englebert 2010). The allotment is characterized by generally rolling terrain with wooded slopes and bluegrass stringer bottoms. The dominant woodland community type is Ponderosa Pine/Western Wheatgrass (Marriott and Faber-Langendoen 2000). French Creek, Ruby Creek, and Crow Creek are three perennial water sources that flow through this allotment. Woodlands are classified by the NRCS as warm slope, cool slope, shallow ridge, or silty footslope grazable woodlands, based on soil type.

Only a small percentage of the French Creek Allotment is classified as rangeland (5 percent) and it supports a sparse overstory of ponderosa pine, with an understory that is a mix of cool season and warm season grasses. 89 percent of the allotment is grazable woodland and 6 six percent is rock outcrop.

Overall rangeland health/condition is good and trend in rangeland condition is upward, based on cover frequency studies and professional judgment. There are 7,292 acres capable of grazing and 5,744 acres suitable for grazing (table 12) (Bindel 2010a provides more detail).

Leafy spurge and Canada thistle are the dominant noxious weed species in the allotment. Common tansy is a species of concern. Areas within the allotment that have been the focal point of weed treatment include French Creek and areas within active and recently active timber sales.

Lithograph Allotment

The Lithograph Allotment is described generally in chapter 1 and in the description of "Alternative 2 – Current Management" in chapter 2. Both the Rangeland Vegetation and the Botany Reports include common native and non-native grasses and forbs present on the allotment as well as more detail on vegetation types (Bindel 2010a and Englebert 2010). The allotment is characterized by rolling topography and steep canyon slopes covered with patches of thick timber and canyon bottoms of grass. The dominant tree species on the allotment is ponderosa pine. There are several natural meadows, but pine is encroaching. Other very small meadows or openings are scattered throughout the allotment. This allotment has the greatest amount (18 percent) of rangeland out of the six allotments within the project area. 60 percent of the allotment is classified as grazable woodland; 22 percent is rock outcrop.

The woodlands present in the Lithograph Allotment are classified by the NRCS as warm slope, cool slope, and shallow ridge, based on soil type. Mountain Mahogany/Side-Oats (*Cercocarpus montanus/Bouteloua curtipendula*) Shrubland (Marriott and Faber-Langendoen 2000) is present in limited quantity in the central portion of the Lithograph Allotment.

Overall rangeland health/condition is good and the trend in rangeland condition is stable, based on cover frequency studies and professional judgment. There are 12,560 acres capable of grazing and 11,413 acres suitable for grazing (table 12) (Bindel 2010a provides more detail).

The major weed-related concerns for the Lithograph Allotment come from seven patches of spotted knapweed found along the Mann Road (FS Road 270.1) and along the Schenk Turn Off (FS Road 270.1A). Other areas of concern are along the US Highway 16 corridor and the eastern boundary of the allotment in the Jasper Fire Area. Weed species observed on the allotment include Canada thistle, hound's tongue, musk thistle, common mullein, black henbane, yellow toadflax, leafy spurge and caragana.

Lower Beaver Allotment

The Lower Beaver Allotment is described generally in chapter 1 and in the description of "Alternative 2 – Current Management" in chapter 2. Both the Rangeland Vegetation and the Botany Reports include common native and non-native grasses and forbs present on the allotment as well as more detail on vegetation types (Bindel 2010a and Englebert 2010). The allotment is characterized by rolling topography and steep canyon slopes covered with patches of thick timber and canyon bottoms of grass. There are several natural meadows, but pine is encroaching. Other very small meadows or openings are scattered throughout the allotment. Only 6 percent of the allotment is classified as rangeland; 65 percent is grazeable woodland; 29 percent is rock outcrop.

The woodlands present in the Lower Beaver Allotment are classified by the NRCS as warm slope, cool slope, shallow ridge, high woodland, woodland, or silty footslope grazable woodlands, based on soil type.

Overall rangeland health/condition is good and the trend in rangeland condition is upward, based on cover frequency studies and professional judgment. There are 22,206 acres capable of grazing and 21,406 acres suitable for grazing (table 12) (Bindel 2010a provides more detail).

The most recent formal weed inventory was done in 2004 after the Jasper Fire. Large amounts of Canada thistle and hound's tongue were found on the eastern side of the allotment and the western edge of the Jasper Fire. The majority of the noxious weeds within the allotment occur along the right-of-way. Sulfur cinquefoil, spotted knapweed, and diffuse knapweed also occur on the allotment.

Tepee Allotment

The Tepee Allotment is described generally in chapter 1 and in the description of "Alternative 2 – Current Management" in chapter 2. Both the Rangeland Vegetation and the Botany Reports include common native and non-native grasses and forbs present on the allotment as well as more detail on vegetation types (Bindel 2010a and Englebert 2010). The allotment is characterized by rolling topography and steep canyon slopes and ridges covered with patches of thick timber and canyon bottoms of grass. The dominant tree species on the allotment is ponderosa pine. There are several natural meadows, but pine is encroaching. Other very small meadows or openings are scattered throughout the allotment. Only 9 percent of the allotment is classified as rangeland; 69 percent is grazable woodland, and 22 percent is rock outcrop.

Woodlands present in the Tepee Allotment are classified by the NRCS as warm slope, cool slope, shallow ridge, or silty footslope, grazable woodlands, based on soil type.

Overall rangeland health/condition is good and the trend in rangeland condition is upward, based on cover frequency studies and professional judgment. There are 22,104 acres capable of grazing and 21,666 acres suitable for grazing (table 12) (Bindel 2010a provides more detail). Some of the private lands are managed under private land grazing permits.

Parts of the allotment were surveyed and treated for noxious weeds in 2004 as part of the Jasper Fire inventory and treatment. The most commonly seen noxious weed on this allotment is Canada thistle; there is also common mullein, black henbane, hound's tongue, musk thistle, and leafy spurge.

Water Draw Allotment

The Water Draw Allotment is described generally in chapter 1 and in the description of "Alternative 2 – Current Management" in chapter 2. Both the Rangeland Vegetation and the Botany Reports include common native and non-native grasses and forbs present on the allotment as well as more detail on vegetation types (Bindel 2010a and Englebert 2010). The allotment is characterized by moderately rough terrain covered predominately with ponderosa pine interspersed with open grass parks. Hell Canyon drainage runs from northeast to southwest and is located on the west side of the allotment; the drainage creates a natural boundary with steep cliff rim rock a majority of its distance. Only 9 percent of the allotment is classified as rangeland, 76 percent is grazable woodland, and 15 percent is rock outcrop.

Woodlands present in the Water Draw Allotment are classified by the NRCS as warm slope or cool slope grazable woodlands, based on soil type (Marriott and Faber-Langendoen 2000).

Overall rangeland health/condition is good and the trend in rangeland condition is upward, based on cover frequency studies and professional judgment. There are 6,881 acres capable of grazing and 5,872 acres suitable for grazing (table 12) (Bindel 2010a provides more detail).

Canada thistle and leafy spurge are the dominant noxious weed species in the area, although other noxious weeds observed include plumeless thistle, common mullein, black henbane, bull thistle and hound's tongue, spotted knapweed.

Environmental Consequences

Summary of Livestock Grazing Impacts to Rangeland Vegetation

Rangeland Condition and Trend. A grazed plant's vigor and production is enhanced by three management considerations: (1) timing of grazing in relation to plant growth, (2) frequency of use, and (3) intensity of use (Holechek et al. 1995). The setting and effect of these management actions is further described.

Critical growth stages vary among forage species. In general, a time of low energy reserves for a plant is during rapid growth and development of flowers. Current thinking suggests that grazing at those times can be compensated. Favorable plant growth

conditions to restore food reserves before winter provides such compensation (Briske and Richards [in Bedunah and Sosebee 1995]; Coyne et al. [in Bedunah and Sosebee 1995]). This can be accomplished by the use of pastures in a rotation, allowing plants to grow without being grazed at the same time each year.

Grazing by one kind of animal at the same time every year generally drives species composition away from the forage preferred by that animal. Another reason to manage timing of use is that grazing animal's preference changes with the season of use. This is predicted by the changing palatability and nutrition levels throughout the year of each forage species. Rotation of grazing provides for different levels of use on most species between years. Those species preferred in most seasons and providing significant amounts of livestock forage (or having other high resource values) are key species to manage (Society for Range Management 1989, Holechek et al. 1995). Key species should be abundant, productive, and palatable (Holechek et al. 1995).

Given equal abiotic conditions, intensity of grazing affects the speed at which a plant can reproduce meristems (the growing points of a plant). For example, if the meristem at the top of the plant remains intact (light intensity grazing), then regrowth is most rapid (Briske and Richards [in Bedunah and Sosebee 1995]). Another consideration is that some plant parts cannot manufacture food as rapidly as others. Leaf sheaths (at the base of each leaf), stems, and older leaves frequently have lower rates of food production than younger leaves (Briske and Richards [in Vavra et al. 1994]). This indicates the speed of plant recovery from grazing would, in part, be proportionate to the amount of younger leaves present. Both intensity and frequency of grazing use affect the presence or absence of younger leaves.

High frequency and intensity of use is likely to result in lower reproductive ability, changes in growth form, and the eventual loss of an individual (Holechek et al. 1995). When individual plants are lost, they may be replaced by species which have a competitive advantage because they are either not being grazed or are adapted to heavy grazing.

Frequency and intensity of grazing does not occur evenly throughout a given pasture. Major influences on livestock use are topography, distance to water, and kind and availability of forage (Holechek et al. 1995). Additionally, regrowth of herbaceous forage is preferred because it is higher in palatability and nutrition levels when compared to original growth (Anderson et al. 1990). These tendencies towards uneven use can be mitigated by location and use of water developments, fences, and salt/mineral; by use of herding or a different class or breed of livestock; and by changing the season of grazing. Livestock tend to use uplands more in the early summer and fall, when temperatures are cooler. Higher concentrations of livestock in some areas due to water developments or fencing strategies may result in development or continuation of trail erosion and loss or damage of individual plants due to trampling.

Trampling has a direct effect to plants as animals (both wild and domestic) cut, bruise, and break plant structures during walking and running. The degree of plant damage changes according to the plant's moisture content, elevation of growing points, physical strength of leaves, and flexibility of plant parts (Edmond 1966 [in Heady and Child 1994]). Dry plant materials tend to break rather than bend under the hoof, so late seasonal

effects often exceed growing season damage for many species. The breakage may be desirable if it lays dead grass materials on the soil surface where decomposition occurs rapidly, or it may be undesirable if it results in loss of soil protection. In general, rhizomatous grasses resist trampling more than do bunchgrasses (Heady and Child 1994).

The effects of grazing can be managed by controlling the timing, frequency, and intensity of use. The main focus is to allow the grazed plants time to recover vigor, produce seed (in at least some years), and establish new production. The timing and duration of recovery is based on the growth requirements of the key species and the amount of defoliation that has been allowed. Some methods of managing for healthy grazed plants include: using complete rest for an entire season; limiting the amount of utilization that is allowed; changing the number of animals and/or season grazed; using multiple pastures and grazing them at different times of the year between years; use of herding, salt, and water developments to distribute grazing pressure over the land.

High numbers of big game animals, especially elk, can have a significant effect on herbaceous vegetation. Dietary preferences of elk and deer overlap those of livestock (Brewer et al. 2007; Torstenson et al. 2007). Grazing management of forage by the Forest Service takes wildlife grazing use into consideration. Management of elk and deer numbers is under the control of the South Dakota Game Fish and Parks on the Bull Flats, French Creek, Water Draw, Tepee, and Lithograph Allotments, and the majority of the Lower Beaver Allotment is under the control of the Wyoming Fish and Game Department in the Wyoming portion of the Lower Beaver Allotment. Currently there appears to be no conflicts on these six allotments between wildlife and livestock grazing use. This would be expected to continue under current management provided elk and deer numbers do not substantially increase in the project area.

Portions of the project area are used as hunting areas. Hunters and other recreationists often leave gates open. Livestock may then wander into pastures where they have already grazed or into pastures that should be rested until later in the season. This can cause additional use in excess of allowable use standards already met, or consumption of forage that should have been available for use later in the season.

Alternative 1 – No Action

Direct and Indirect Effects

Rangeland Condition and Trend. Livestock would be removed from the project area under alternative 1; therefore, the direct effects of domestic livestock grazing would be eliminated. However, wildlife grazing and browsing would continue. The amount of wildlife use would vary, but overall utilization of grass, forbs, and shrubs is expected to be substantially lower with implementation of alternative 1 due to the removal of domestic livestock. There are several factors affecting wildlife preference including palatability and relative nutritional value. It is likely that wildlife use would continue to be high in some areas and low in other areas.

Those plant species previously grazed by livestock would initially respond to livestock removal with an increase in vigor, production, and abundance. An increase in litter would also occur because of decreased grazing and utilization. Those plants not previously grazed would either maintain or decrease their level of vigor and production due to increased competition. An overall increase in biomass production would occur in the

short term. However, over the long term, this biomass increase would become static or may decline over time until a disturbance event (e.g., fire or ungulate grazing). This is expected because nutrients required for plant growth increasingly become tied up in live plant material and litter (Coyne et al. 1995). Over time plants that had been grazed in the past lose palatability and become decadent as past-years growth is not broken down, and inter-plant spacing becomes wider.

Rates of change in plant composition, abundance, and distribution in the project area over time is dependent on a variety of factors, such as depth of soil and available moisture (Holecheck et al. 1995) and changes would differ over time and between sites.

Studies in the Black Hills have shown similar levels of biomass production on grazed and ungrazed sites, but in prairie communities both total production and grass production were notably greater on the ungrazed sites (Pase and Thilenius 1968).

Forage plants that decrease in response to grazing would increase in the absence of livestock grazing. Some plants that spend energy to avoid being grazed (e.g., those with poisonous compounds or spines) would no longer have a competitive advantage. However, not all species that increase in response to grazing, such as western snowberry (*Symphoricarpos occidentalis*), would decline with the removal of livestock. Those forage plants that withstand grazing well, such as Kentucky bluegrass, timothy (*Phleum pratense*) and blue grama, may remain relatively abundant. In Pase and Thilenius' (1968) study of Kentucky bluegrass communities, one of three protected bottomland sites had a greater composition of Kentucky bluegrass than their grazed counterparts. Laycock (1994) concluded that Kentucky bluegrass sites in Colorado mountain parks are very stable.

Recent studies comparing grazed and ungrazed mixed-grass prairie in North Dakota (DeKeyser et al. 2009; Murphy and Grant 2005) have shown that the invasive species, smooth brome (*Bromus inermis*), and Kentucky bluegrass replaced the native grasses and native forbs that were historically part of those communities when livestock were removed from these areas for over 30 years.

It is unlikely that species composition would achieve its pre-European settlement state (Holechek et al. 1995; Pieper 1994; Laycock 1994). Factors such as precipitation, fire, wildlife use, site potential, and current conditions, influence species composition at any given time after the removal of grazing (Holechek et al. 1995; Pieper 1994; National Research Council 1994).

Under Alternative 1, short-term range condition and trend would improve across most sites. This upward trend would be the result of an increase in plant vigor, production and abundance. Rangeland condition at any given site is affected by a multitude of environmental variables and current conditions. The initial upward trend of individual sites in response to the removal of livestock grazing would vary according to its current condition and species composition. The most prominent increase in short-term trend would likely be evident on sites having deep, moist, soils, while sites occurring on shallow soils would be expected to have a less prominent increase in range condition and trend. This is expected due to relative proportions of available water and site production potential of deep and shallow soils.

Under Alternative 1, long-term range condition and trend would be static or possibly decline. Many sites within the project area developed under a sporadic disturbance regime that included natural or human-induced wildfire, light to severe grazing by bison and other large herbivores, and other biotic and abiotic factors that typically influence soil/site development. Extended periods of non-use and/or lack of fire on these rangeland sites could result in excessive litter and changes to the plant community and/or species composition. Desired range condition would be maintained or reached in some areas, but may decline in other areas over the long-term for the reasons described above.

Noxious Weeds. Risk of noxious weed invasion would not increase and may decrease minimally in the long-term with the removal of livestock grazing. Overall, vegetation and litter cover would increase with a removal of domestic livestock grazing, and this would minimize the amount of bare soil (noxious weeds germinate readily in bare soil). By removal of livestock operations on the allotments, and the subsequent removal of corrals, fences, gathering areas, and the need for day-to-day operations, noxious weed risk would also decrease to a minimal degree in the long term. Removal of livestock fences, water developments and associated pipelines may result in some vegetation and soil disturbance, providing a temporary or short-term minimal increase in risk of noxious weed establishment. Current weed management, planned treatments, and monitoring are part of the Black Hills National Forest Noxious Weed Management Plan (2003) and would continue with all alternatives including Alternative 1.

Other on-going, in-progress, and future actions (table 9) would result in the potential to increase noxious weeds through vegetation management activities, travel management activities, and prescribed burning. Timber management activities, for example, disturb soil and have the potential to introduce new species. However, best management practices and project design criteria apply to all projects on the Forest for the purpose of reducing the spread of noxious weeds. Application of these practices for other projects would minimize the potential for substantial spread. In addition, there is a noxious weed treatment plan being implemented district-wide that is in progress to target these species and minimize new occurrences.

Cumulative Effects

The cumulative effect of eliminating livestock grazing on National Forest System lands would be to improve or maintain desired conditions in the short-term, but to become neutral or decline in condition in the long-term.

The Black Hills evolved under a periodic disturbance regime that included natural or human-induced wildfire, light to severe grazing by bison and other large herbivores, and other biotic and abiotic factors that typically influence soil/site development. The suppression of wildfire has led to conifer encroachment into meadows and dense stands of timber to dominate parts of the project area. Conifer encroachment causes the plant community to shift to an understory dominated by plants that are more shade tolerant and are usually less palatable and desirable to both livestock and wildlife. This shift also causes a loss of species diversity in meadows and openings. Future and ongoing timber and fuels management projects would allow for the recovery of these meadows and

openings, thereby having a neutral cumulative effect to the rangeland resource over the long-term.

Other on-going, in-progress and future actions (Table 9) would result in overall neutral effects to rangeland condition and trend. Adding these effects to those direct/indirect effects described above would result in overall neutral cumulative effects.

The cumulative effects to the risk of noxious weed introduction and dissemination within the project area in the long-term in conjunction with livestock removal would result in an overall neutral to minor/minimal decrease in risk of noxious weed introduction and spread.

Alternative 2 – Current Management

Direct/ Indirect Effects

Rangeland Condition and Trend. Under the current management alternative, vegetation on rangelands would progress at different rates toward desired conditions. The condition and trend of the soil and vegetation would likely be maintained or be improved. Ecological processes would continue to function properly. Continuing current management includes monitoring of existing benchmark areas to ensure that management actions are working. If monitoring were to show that desired conditions were not being maintained, appropriate action would be taken to move conditions back toward desired.

The effects of grazing can be managed by controlling the timing, frequency, and intensity of use (described in detail above). Existing management practices have and should continue to allow for these considerations to be a part of every decision. Existing stocking rates would allow current soil and vegetation conditions to be sustainably maintained in the long term. Monitoring would ensure that this occurs.

Soil stability and the infiltration of precipitation into the soil can be maintained by grazing practices which provide adequate vegetative and litter cover. Existing grazing management systems and practices are working as these ecological processes are functioning as shown by current monitoring.

If a permittee does a good job of pasture management, the effect is a stable resource where desired conditions can be maintained. Existing management on these allotments has resulted in close communications with the permittees over the years. The permittees have become involved in the management of the rangeland as well as management of their livestock (on the Forest, as well as on their waived private land within the allotments). Good allotment and pasture management has resulted in satisfactory range conditions. Continuation of the existing grazing management, practices, and monitoring should result in maintaining these desired conditions.

No new range structural improvement construction is proposed within the project area under the current management alternative; however, maintenance of existing improvements would continue to occur as needed. There may be some vegetation and soil disturbance associated with some of the maintenance efforts, but the effects would be isolated and confined to the immediate vicinity of the range improvements and reseeding would be done if needed. No loss of site productivity or erosion problems is expected to result from the maintenance of improvements.

Noxious Weeds. Risk of noxious weed invasion would not increase and may decrease minimally in the long-term under the existing grazing conditions. Vegetation and litter cover would remain at or continue to move towards desired conditions which would minimize the amount of bare soil. Bare soil and soil disturbance provide avenues for noxious weed introduction and dissemination. Bare soil thresholds are described for all the benchmark areas. Current weed management, planned treatments, and monitoring are part of the Black Hills National Forest Noxious Weed Management Plan (2003) and would continue with all alternatives including Alternative 2 and 3.

Cumulative Effects

This analysis area is bound in space by the allotment boundaries and is bound in time by about 30 years into the past and the life of the project which is approximately 10 to 20 years into the future. The historical past is relevant to the cumulative effects of this project because those practices had an impact on the current existing condition.

Past, present, and reasonably foreseeable future activities in the Hell Canyon Range 2010 Project area are discussed briefly at the beginning of this chapter; on-going and future actions are shown in table 9.

Population growth in and around the project area could lead to greater numbers of Forest users. OHV and motorcycle use already impacts livestock distribution. ATV operators and other recreationalists often leave gates open. Livestock may then wander into pastures where they have already grazed or into pastures that should be rested until later in the season. This can cause additional use in excess of allowable use standards already met, or consumption of forage meant for use later in the season.

Timber management would continue to open canopies which would maintain grass, forb, and shrub production. This may improve upland vegetation production, although this is not the limiting factor to overall grazing capacity for either livestock or wildlife. However, a decrease in the acres harvested would likely affect future grazing opportunities, especially in places that are currently secondary range areas, whereas prescribed fire would have the opposite effect. While past timber management practices have had an overall positive effect on promoting herbaceous conditions through increased understory vegetation production, introduction and establishment of noxious weeds has occurred in some timber sale areas.

Invasive species monitoring and noxious weed treatment would continue to keep the rangeland resource in the desired condition. Planned treatments and monitoring is part of the Forest Plan and an integral part of the 2003 Noxious Weed Management Plan.

Alternative 3 – Proposed Action

Direct/Indirect Effects

Adaptive management actions under alternative 3 (proposed action) are based on the principle of applying adaptive management. A proposed course of action was selected as a starting point believed to best meet or move toward the desired condition. Some practices alone may not meet the desired condition, but in combination with other practices, desired conditions may be met or moved toward being met. Table 4 (in chapter 2) lists potential adaptive management options that may be used to address a site-specific

need during the course of project implementation. The direct/indirect effects of implementing these options to rangeland vegetation are included in appendix E.

Adaptive management encourages closer communications with the permittees and encourages permittees to become more involved in the management of the rangeland and not just the livestock. If a permittee does a good job of pasture management, desired conditions would be maintained or there would be movement toward desired conditions.

Bull Flats

Because no changes are proposed to the management of the Bull Flats Allotment, direct/indirect effects are the same as those described for alternative 2.

French Creek

The creation of a fourth pasture (the existing Pope Springs Unit would be divided) would improve cattle distribution, allow for additional management flexibility, and provide further protection of French Creek. The division of large pastures can better distribute animals and forage utilization (Heady and Child 1994). As management unit area size increases, effects of uneven grazing patterns through time and space increase (Senft et al. 1985; Stuth 1991; Bailey et al. 1996). Therefore, reducing the management area size through pasture division would likely result in reduced preferential use of specific patches of vegetation resulting in less pressure (both frequency and intensity) on preferred forage. Management flexibility is increased by being able to more precisely control the timing and frequency of defoliation by cattle.

Implementation of alternative 3 would remove approximately 50 acres from the available forage base due to riparian fencing. Water would be pumped to tanks located on either side of the pasture division zone. Individual forage plants immediately surrounding (5 to 10 meters) the stock tanks may be lost or lose vigor due to increased wildlife and cattle presence. Livestock have the tendency to walk along fences and livestock trails may be created along fence lines resulting in the loss of individual plants.

A 50-head reduction in permitted numbers represents a 27 percent reduction in permitted AMs. Studies have shown that stocking rate is the most consistent management variable influencing both plant and animal responses to grazing (Heady 1961; O'Reagain and Turner 1992; Ash and Stafford Smith 1996; Holechek et al. 2001). Existing conditions for upland vegetation would be maintained and/or would improve. The more productive range sites may respond more rapidly, especially those associated with riparian plant communities. Plant communities associated with less resilient shallow and/or rocky soils, and particularly those communities dominated by introduced species, may require more than 15 years to move toward a higher percent desired vegetative composition.

Installing new and relocating water tanks would improve distribution of livestock within the pasture. Permanent water sources serve as focal points for grazing animals (Heady and Child 1994). Distribution of livestock within the pasture would become more even because of the development of new sources of water. Water can be used to attract cattle to little-used forage resources, to divide large herds into smaller ones, and to reduce trailing (Heady and Child 1994). Individual plants immediately surrounding the development (5 to 10 meters) may be lost or lose vigor due to increased wildlife and cattle presence. There may be some vegetation and soil disturbance associated with

installation, but the effects would be isolated and confined to the immediate vicinity of the range improvement; reseeding or hardening of the surface would be done if needed.

Dugouts would be developed to provide additional seasonal watering sites and to help disperse cattle across a pasture. Dugouts are designed to capture seasonal runoff from the surrounding topography or from the roadside. These act essentially as ephemeral ponds providing water for livestock and wildlife. The degree of use of surrounding forage by livestock and wildlife varies with the amount of water present within the dugout at any given point in time and its location relative to other sources of water. There would be detrimental soil impacts to the watering area, but the impacts are small and localized and would be well within the 15 percent detrimental impact standard (see soil and water section of this chapter and the Soil and Water Report (Gonyer 2010)).

Changes in management practices would improve grazing efficiency and reduce any adverse effects on soil and vegetation with the allotment. Due to the need for increased management efforts of French Creek, a one permit operation would be beneficial to increase efficiency on this allotment. There would be greater flexibility in implementing adaptive management decisions in the allotment with one permittee rather than three.

An increase in efficiency relating to management of the allotment by one permit would also be reflected in relationships with adjacent private property owners. The intermingled ownership creates additional complexities in management of livestock. Private property owners often do not understand rules and regulation associated with livestock on Federal lands adjacent to private land. One permittee with one herd of livestock would more likely have open communications between the permittee, private landowner, and the Forest Service.

Limiting livestock use in the French Creek unit to 20 days for 2 years with a later turn-on date of June 15 while being herded by a range rider would improve riparian and upland vegetation in the French Creek unit. This would allow the riparian and streambank conditions to recover and lead to more evenness of upland utilization (because of the range rider). Cattle can learn to avoid places and can remember locations where they have foraged and if the forage resources merit a return visit (Provenza and Balph 1988; Bailey et al. 1989; in Heady and Child 1994).

The vegetation and soils within proposed exclosures would not be directly affected by livestock. These small localized areas would be affected similarly to those discussed under alternative 1 (no grazing).

Lithograph

Alternative 3 (proposed action) for the Lithograph Allotment includes continuation of the three-pasture deferred-rotation-grazing system and current permitted numbers, as described in alternative 2 (current management), but with a few minor adjustments. Effects of potential adaptive management actions are discussed in appendix E.

The vegetation and soils within the proposed exclosure would not be directly affected by livestock. This small (less than 1 acre) localized area would receive effects similar to those discussed under alternative 1 (no action).

Piping the water from Babcock Spring to the meadow downhill would allow the riparian vegetation associated with the spring to recover by drawing grazing ungulates away from

the spring. Overall distribution of livestock within the pasture would improve. Water can be used to attract cattle to little used forage resources, to divide large herds into smaller ones, and to reduce trailing (Heady and Child 1994). Individual plants immediately surrounding the stock tank (5 to 10 meters) may be lost or lose vigor due to increased wildlife and cattle presence. There may be some vegetation and soil disturbance associated with some of the installation efforts, however the effects would be isolated and confined to the immediate vicinity of the range improvement and reseeding or hardening of the surface would be done if needed.

Lower Beaver

Alternative 3 (proposed action) for the Lower Beaver Allotment includes continuation of the current deferred rotation grazing system and current permitted numbers, as described in alternative 2 (current management), but with a few minor adjustments. Effects of potential adaptive management actions are discussed in appendix E.

Installing new or relocating water tanks would improve distribution of livestock within the pasture. Permanent water sources serve as focal points for grazing animals (Heady and Child 1994). Water can be used to attract cattle to little-used forage resources, to divide large herds into smaller ones, and to reduce trailing (Heady and Child 1994). Individual plants immediately surrounding the development (5 to 10 meters) may be lost or lose vigor due to increased wildlife and cattle presence. There may be some vegetation and soil disturbance associated with installation, however the effects would be isolated and confined to the immediate vicinity of the range improvement and reseeding or hardening of the surface would be done if needed.

The particular dugout that is proposed to be backfilled is no longer a crucial water source for livestock. The removal of this dugout should not adversely impact the distribution of cattle within the pasture. There may be some vegetation and soil disturbance associated with some of the backfilling, however the effects would be isolated and confined to the immediate vicinity of the dugout and reseeding of the surface would be done if needed.

Tepee

Alternative 3 (proposed action) for the Tepee Allotment includes continuation of the current grazing system and current permitted numbers as described in alternative 2 (current management), but with a few minor adjustments. Alternative 3 (proposed action) for the Tepee Allotment also includes construction of three new stock tanks and an additional pipeline to improve water. Effects of potential adaptive management actions are discussed in appendix E.

Installing new or relocating existing water tanks would improve distribution of livestock within the pasture. Permanent water sources serve as focal points for grazing animals (Heady and Child 1994). Distribution of livestock within the pasture would become more even due to the development of new sources of water. Water can be used to attract cattle to little-used forage resources, to divide large herds into smaller ones, and to reduce trailing (Heady and Child 1994). Individual plants immediately surrounding the development (5 to 10 meters) may be lost or lose vigor due to increased wildlife and cattle presence. There may be some vegetation and soil disturbance associated with installation, however the effects would be isolated and confined to the immediate vicinity

of the range improvement and reseeding or hardening of the surface would be done if needed.

The proposed exclosures would exclude approximately 2 acres from grazing. Some cattle trailing may occur along exclosure fence lines. Livestock have the tendency to walk along fences and cause bare paths that concentrate and accelerate runoff, detrimentally impacting soils. The degree of impact would vary with soil moisture content, particle size, existing vegetation, and location of the fence on the landscape.

Water Draw

The Proposed Action includes moving the permitted use of two permits from the French Creek Allotment to the Water Draw Allotment for a total of 50 cows with calves. The allotment would be run in a three-pasture rest-rotation system. Several improvements are proposed including constructing approximately six new stock tanks, approximately 3.5 miles of pipeline, and maintenance and reconstruction of several fences and water developments that were damaged or destroyed by the Jasper Fire (2000) and Roger Shack Fire (2001). Spring sites with the capacity to be operational would be made functional before livestock are allowed on the allotment. This includes repairing existing or building new exclosure fences to ensure spring sources (e.g., Lithograph, Log Trough, Stockade, Stockade #2, A&E in Section 13, and Water Draw) are protected. Effects of potential adaptive management actions are discussed in Table 8.

Records of historic grazing rates on the Water Draw indicate that the proposed 252 AMs is a conservative stocking rate for the allotment. Records show that the last continuously held permit on Water Draw was for 78 cow/calf pairs at 393 AMs between 1991 and 1998. The proposed stocking rate is 36 percent lower than the historic rate. Similarity coefficient scores indicate that upland vegetation in Water Draw Allotment is in excellent condition and could accommodate previously permitted stocking rates. In the absence of recent continuous allowable use data (there has been no continuous permitted cattle grazing on the allotment since 1998), an initial stocking rate analysis was performed using NRCS production potential based on soil type, suitable acres, 50 percent allowable use, and current similarity coefficients. Based on this analysis, the proposed 50 head of cattle represent 11 percent of what theoretically could be stocked on the allotment (see Range Specialist Report for calculations).

Installing new water tanks would facilitate proper distribution of livestock within the pasture. Permanent water sources serve as focal points for grazing animals (Heady and Child 1994). Grazing patterns within the pasture would be strongly influenced by sources of water. Water can be used to attract cattle to little-used forage resources, to divide large herds into smaller ones, and to reduce trailing (Heady and Child 1994; Holechek 2004). Individual plants immediately surrounding the development (5 to 10 meters) may be lost or lose vigor due to increased wildlife and cattle presence. There may be some vegetation and soil disturbance associated with installation, however the effects would be isolated and confined to the immediate vicinity of the range improvement and reseeding or hardening of the surface would be done if needed.

The proposed exclosures would exclude approximately 25 acres from grazing. Some cattle trailing may occur along exclosure fence lines. Livestock have the tendency to walk along fences and cause bare paths that concentrate and accelerate runoff, detrimentally

impacting soils. The degree of impact would vary with soil moisture content, particle size, existing vegetation, and location of the fence on the landscape.

Cumulative Effects

Many of the aspects of cumulative effects described for alternative 2 apply to alternative 3 as well, because the analysis area is the same and both alternatives would authorize livestock grazing.

Some adjacent private lands have been developed into ranchettes. Some property owners graze livestock (primarily horses) on these properties. Some overgrazing on private land does occur. It has the same impact of reducing the vegetative cover, increasing the amount of sediment transported into the streams, and increasing the likelihood of noxious weed infestations (as does unmanaged grazing on the Forest). Adaptive management practices would set thresholds for the Forest, and thus would not add to the cumulative effects of these off-Forest grazing activities.

If elk populations increase in the project area, competition for forage would increase because the diets of elk and cattle overlap. As competition increases, adaptive management options would be used as needed to ensure rangeland resources do not trend downward.

The Black Hills evolved under drought. A diverse and healthy plant community curbs the effects of drought. Monitoring and the ability to respond to changing conditions would insure that in drought conditions, rangeland resource would not trend downward. The adaptive management alternative is best positioned to respond to periodic disturbances such as drought or wildfire in that it provides for open communications with permittees and resource specialists.

Summary

The current condition of rangeland within the project area has been reviewed and compared with the desired conditions identified in the Forest Plan, as well as other applicable goals and objectives. All of the allotments in the project area are currently meeting desired condition and trend for rangeland health based on cover frequency studies and professional judgment. However, opportunities for improvement were identified.

Alternative 1 would result in an overall improvement in rangeland condition and trend, at least in the short term. Risk of noxious weed introduction/spread would decrease minimally with removal of daily operations and activities.

Alternative 2 would result in maintenance and/or improvement in rangeland condition and trend; areas would progress toward desired conditions at different rates. Resource concern areas (riparian areas) would remain the same or may improve slowly over the long term. Risk of noxious weed introduction/spread would remain unchanged due to continued risk of introduction through daily operations and activities, minimized through adherence to Forest Plan standards and guidelines.

Alternative 3 would result in an overall improvement in rangeland condition and trend over the long term and would be particularly noticeable in resource concern areas (riparian areas). Areas would progress toward desired conditions at different rates, but

would achieve desired conditions more quickly than alternative 2. Risk of noxious weed introduction/spread would increase due to construction of new improvements, but this would be minimized by implementation of project design features and adherence to Forest Plan standards and guidelines.

The intention of grazing management is to always meet Forest Plan standards and guidelines. Both action alternatives would meet Forest Plan standards and guidelines and the purpose and needs identified in this project. The site-specific concerns identified are best addressed through alternative 3.

Monitoring key areas and benchmarks provides insurance to all other areas of the pasture since key areas have been chosen to show the effects of livestock grazing and its management. If a permittee does a good job of pasture management, the effect is more even distribution of cattle and grazing use across a pasture. Promoting more even use means that previously ungrazed plants would have more chance of being grazed (stimulating growth) and that individually, frequently grazed plants would be grazed fewer times. This system encourages responsible management because it rewards permittees for good management while poor performance is resolved as appropriate.

Livestock grazing is an authorized use of National Forest System lands. Goal 3 of the Forest Plan states that sustained commodity uses should be provided in an environmentally acceptable manner and that rangelands should be maintained in satisfactory range condition. Commodities, including livestock, contribute to the economies of local and regional communities. Because sustained commodity production depends on sustainable ecosystems, the Forest Plan further directs that livestock grazing would occur without impairing the health of ecosystems and in a manner compatible with other Forest uses. Alternative 1 would not provide productive use of range forage under goal 3 of the Forest Plan. Alternatives 2 and 3 would meet goal 3 of the Forest Plan; however, alternative 3 is best suited to achieve this goal and respond to uncertainty and changing conditions over time.

Botany

Methodology

A prefield review of Region 2 sensitive plant species and potential habitat was completed using existing district data; communicating with Forest personnel; and preparing the biological assessments/evaluations for the Forest Plan (USDA Forest Service 1996), the 2001 Phase 1 Amendment to the Forest Plan (USDA Forest Service 2001) and the 2005 Phase II Amendment to the Revised Forest Plan (USDA Forest Service 2005b). Botanical surveys were conducted across various portions of the project area each year from 2004 through 2009 to collect information related to plant communities, assess habitat, and locations of target plant species (i.e., sensitive species, State-listed species, and species of local concern). Hillshade (a GIS model which estimates high probability sensitive plant habitat based on the amount of shade, and therefore moisture), soil mapping data, Forest Resource Information System database, aerial photographs, and topographic maps were all used to identify potential habitat and survey areas.

Livestock grazing can result in changes in habitat quality for plants, and these changes can be both beneficial and adverse depending on proximity of grazing to occupied habitat, season of use, duration of grazing, sensitivity of species involved, and habitat type affected. Impacts to target plant species may be direct (e.g., trampling or grazing) or the impacts may be more indirect (e.g., a change in the microclimate or noxious weed infestation due to disturbance), resulting in a loss of habitat. The following measurement indicators were used to evaluate the effects of implementation of the alternatives:

- changes in habitat quality and population trends for Forest Service Region 2 sensitive plants
- changes in habitat quality and population trends for plant species of local concern (SOLC)

Federally listed plant species were reviewed for applicability to this project (list updated on September 2008 and accessed at http://southdakotafieldoffice.fws.gov/endsppbycounty.htm). No federally listed or proposed plant species occur on the Black Hills National Forest.

South Dakota State-listed species were also reviewed for applicability to this project. Two species occur in the project area, sleepygrass (*Achnatherum robustum*) and Fendler's whitethorn (*Ceanothus fendleri*). Neither of these species is readily grazed by livestock. Cattle generally avoid sleepygrass (Jones et al 2000) and Fendler's whitethorn has a resource value rating of low for livestock grazing (USDA Forest Service 1996) meaning it is "not relished and normally consumed only to a small degree or not at all". Because these species are not usually grazed and they do not appear to be grazed in the project area based on field observations, these species were dismissed from further evaluation (see the Botany Report for more detail [Englebert 2010]).

The proposed Fanny/Boles Research Natural Area (RNA) is located wholly within the Lower Beaver Allotment. The main community type in the 313-acre RNA is Mountain Mahogany/Side-Oats Shrubland. The floristic inventory is currently underway for the RNA, and when completed, the establishment record will be written, followed by the RNA management plan. The RNA management plan will consider appropriateness of livestock grazing along with other uses. Because of the topography of the area (steep and rocky), the RNA currently receives only incidental livestock use. The level of livestock use would not measurably change with implementation of any of the alternatives, therefore impacts to this RNA were dismissed from further evaluation (see the Botany Report for more detail [Englebert 2010]).

Affected Environment

Sensitive Plants. R2 sensitive species are species for which population viability is of concern, as evidenced by current or predicted downward trends in population numbers or density, or by current or predicted downward trends in habitat capability (USDA Forest Service 2009). All R2 sensitive plant species potentially occurring in the Black Hills National Forest were considered in the project area. Seven sensitive species have suitable habitat in the project area (table 13). All other species were dropped from further evaluation due to the lack of suitable habitat in the project area.

Table 13. Sensitive, SOLC, and State-listed plants relevant to the Hell Canyon Range 2010 Project, based on known occurrences or habitat suitability

Common Name	Species	Habitat	Occurrence in Project Area
Sensitive			
Iowa moonwort	*Botrychium campestre*	Variable, open grassy sites with a diverse forb component occurring over limestone derived soils. Range-wide it is considered a grassland species, associated with sandy grassland habitats in prairies, dunes, railroad sidings, and fields over limestone.	Six populations of *Botrychium* occur on the Lower Beaver and Tepee Allotments; believed to be either Iowa moonwort or narrowleaf grapefern or individuals of both species.
narrowleaf grapefern	*Botrychium lineare*	In the Black Hills, variable, open grassy sites with historic disturbances, such as skid trails, known from a deciduous overstory site. Elsewhere in its range, this species has often been documented to occur in areas of road disturbances and other human and natural disturbances.	Six populations of *Botrychium* occur on the Lower Beaver and Tepee Allotments; believed to be either Iowa moonwort or narrowleaf grapefern or individuals of both species.
yellow lady's slipper	*Cypripedium parviflorum*	Habitat in the Black Hills includes stream banks under both spruce and deciduous overstories, moist cliffs (usually north-facing), and moist areas/seeps under white spruce (*Picea glauca*) or mixed conifer forest. Occasionally, found on upper mesic forest slopes. Black Hills occurrences range in elevation from 3,500 to 6,500 feet.	No known occurrences, but potential habitat occurs in the white spruce alluvial community type along French Creek.
trailing clubmoss	*Lycopodium complanatum*	Black Hills known occurrences are located in the northern Black Hills on shaded, north-facing, white spruce dominated slopes often with paper birch (*Betula papyrifera*) or quaking aspen (*Populus tremuloides*). Black Hills occurrences range in elevation from 4,960 to 6,340 feet.	No known occurrences, but potential habitat occurs in the white spruce alluvial community type along French Creek.
large round-leaf orchid	*Platanthera orbiculata*	Black Hills occurrences are found primarily on shady, north-facing slopes in paper birch/hardwood or white spruce forests on moist, rich, humus soil. Black Hills occurrences range in elevation from 4,350 to 6,150 feet.	No known occurrences, but potential habitat occurs in the white spruce alluvial community type along French Creek.
highbush cranberry	*Viburnum opulus* var. *americana*	The large majority of documented Black Hills occurrences is in drainage bottoms or low slopes with moist soil conditions with partial shading. Currently known sites are primarily associated with paper birch/ironwood (*Ostrya virginiana)* and paper birch/hazelnut (*Corylus cornuta)* communities, with or without white spruce or quaking aspen. Black Hills occurrences range in elevation from 3,800 to 5,700 feet.	No known occurrences, but potential habitat occurs in the white spruce alluvial community type along French Creek.
sphagnum, narrowleaf peatmoss	*Sphagnum angustifolium*	*Sphagnum angustifolium* is scattered across northern North America. In the United States, it is known to occur in Alaska and Maine, south to California and across the north-central portion of the country to North Carolina. In the Black Hills it is currently only known to occur in the Rochford Cemetery Fen on the Mystic Ranger District. In Region 2, the species is not known outside of fen habitats (USDA 2007). This site is found at 5,500 feet.	No known occurrences, but the French Creek fen is potential habitat.

Common Name	Species	Habitat	Occurrence in Project Area
SOLC			
pleated gentian	*Gentiana affinis*	In the Black Hills this species is known from limestone areas at elevations from approximately 5,000 to 6,500 feet in moist areas with open conditions.	Possible; suitable habitat exists.
broadlipped twayblade	*Listera convallarioides*	Both known sites are located in Lawrence County on the Northern Hills Ranger District in boreal saturated *Picea glauca*-associated habitat conditions at 5,200 to 6,400 feet. Saturated spruce sites do occur along French Creek in this project area.	Possible; suitable habitat exists.
leathery grapefern	*Botrychium multifidum*	Rangewide, it grows in moist, open or shaded areas, including old pastures, meadows, woodland margins, riverbanks and bottom lands. Most Black Hills occurrences are in mossy, mesic sites dominated by white spruce (*Picea glauca*) or mixed spruce-pine (*Pinus ponderosa*) along small, perennial streams.	Possible; suitable habitat exists.
stiff clubmoss	*Lycopodium annotinum*	Occurrences are associated with high moisture microhabitats within remnant boreal *Picea glauca* and *Betula papyrifera* communities. Current elevation range is 5,100 to 6,300 feet. Spruce/birch do occur along French Creek in this project area.	Possible; suitable habitat exists.
narrowleaf sweet coltsfoot	*Petasites sagittatus*	In the Black Hills, sites are in open to partial shade from 5,400 to 6,750 feet in dry to wet meadows along streams with saturated soils.	Possible; suitable habitat exists.
shining willow	*Salix lucida caudata*	Currently known to exist only on the Bearlodge and Hell Canyon Districts. Associated with open to partially shaded streambanks, shores, wet meadows, and seeps.	Possible; suitable habitat exists.

Plant Species of Local Concern: Species of local concern (SOLC) are species that do not meet the criteria for sensitive status. These include species with declining trends in only a portion of Region 2, or those that are important components of diversity in a local area, for example. Forest Service Manual 2622.01 mandates consideration of species of local concern during project planning. There is potential habitat for five SOLC in the project area, as summarized in table 13. No confirmed populations of any of these species are known from the project area

Environmental Consequences

Alternative 1 – No Action

Direct and Indirect Effects

Sensitive Species. Under alternative 1 (no action) no livestock grazing would occur. Therefore, there would be no direct effects from livestock on the sensitive species and/or its habitat. A possible indirect effect of alternative 1 is the accumulation of plant litter. An accumulation of plant litter could result in an increase in fine fuels which could increase the potential for large-scale fire. This could result in a loss of sensitive plant habitat. An intense fire resulting in high-severity effects, such as deep soil heating, could negatively affect both the belowground and aboveground portions of *Botrychium* individuals.

Species of Local Concern. According to Farrar (2004) it is important to maintain the same level of disturbance for the past several years for members of the genus *Botrychium*. In addition, a species evaluation recently prepared for the Rocky Mountain Region questions that rather than being vulnerable to habitat alterations, *Botrychium campestre* may actually be tolerant of, or dependent on grazing, fire, and other localized soil disturbance (USDA Forest Service 2005b). Therefore, if grazing is removed from the project area, as proposed in alternative 1, there may be detrimental effects to *B. campestre* and *B. lineare*.

Under alternative 1 (no action) no livestock grazing would occur. Therefore, there would be no direct effects from livestock. The probable habitat for these six species along French Creek would be enhanced. A possible indirect effect of alternative 1 is the accumulation of plant litter. An accumulation of plant litter could result in an increase in fine fuels to build and may increase the potential for large-scale fire. Under such conditions, the moist forested sites and riparian areas that do not generally burn could ignite and burn at high temperatures, resulting in a loss of plant habitat.

Alternative 2 – Current Management

Direct/Indirect Effects

Sensitive Species. Alternative 2 proposes to continue grazing as currently permitted. As discussed above, grazing may be a benefit to *Botrychium* species. The Water Draw Allotment (there are no known occurrences of these species in the Water Draw Allotment) would continue to not be grazed.

On all the allotments except Water Draw, there is the possible direct impact of trampling by cattle, but individuals are not likely to be grazed because of the plant's small stature. In addition, because the aboveground phase of the plant is from early April to early June,

it is generally unlikely that most aboveground structures would be subject to grazing or trampling effects, due to the timing of the grazing season. There would likely be enough belowground spores, gametes, juveniles, etc., such that not all of any one occurrence would be affected by livestock trampling (USDA Forest Service 2005b).

Although it is uncertain, these species of the genus *Botrychium* have persisted with disturbances in other areas of their range and have been documented to colonize disturbed areas (Farrar 2004). Hence, the low-level disturbance associated with grazing on all allotments, except the Water Draw Allotment, may create conditions suitable for colonization by *Botrychium campestre* and/or *B. lineare*.

Properly managed livestock grazing may help reduce fine fuel build up, which may decrease the potential for large-scale fires that have the potential to adversely affect sensitive species habitat. Thus, an indirect effect on all allotments, except the Water Draw Allotment, could be protection of sensitive species habitat from large-scale fires. While on the Water Draw Allotment there may be a build-up of fine fuels that could increase the potential for large-scale fire due to the lack of grazing.

Invasion by noxious weeds and other exotic plants can be detrimental to sensitive plant species as invasive species have the ability to out-compete desired plants. While properly managed livestock grazing, as proposed under alternative 2, may improve range conditions and lessen the likelihood of noxious weed invasion. There is also a slight chance the livestock may introduce noxious weeds by transporting seed on all allotments except the Water Draw Allotment (see "Rangelands" section).

Species of Local Concern. Alternative 2 proposes to continue grazing as it is currently permitted. The probable habitat for these species would continue to receive the same level of livestock use they are currently receiving. These areas would not be enhanced if grazing continues as is currently authorized. In addition, there is a possible direct effect from livestock trampling if unknown individuals are present and the grazing continues as prescribed.

Alternative 3 – Proposed Action

Direct/Indirect Effects

Sensitive. Alternative 3 would have the same effects as alternative 2, except as follows.

The Water Draw Allotment would be grazed, therefore the effects stated above for the grazed allotments would apply to the Water Draw Allotment as well.

Some current grazing practices, as described in alternative 2 (current management), would be changed to resolve grazing-related resource issues. While these changes are not expected to have direct effects on known occurrences of these two species, they may enhance the habitat for the species.

Alternative 3 is based on the principle of applying adaptive management. By monitoring the conditions on the allotments and exercising the adaptive management options as needed to resolve grazing-related resource issues, desired conditions would be met or moved towards. As desired conditions (as identified in chapter 2) are met, the habitat for these two species would be enhanced.

Species of Local Concern. Under alternative 3, some current grazing practices would be changed to resolve grazing-related resource issues. Included are practices designed to reduce the livestock utilization of the moist forested sites and riparian areas in the French Creek Allotment. The probable habitat for these six species would be enhanced by the reduction in livestock use. There is a possible direct effect from livestock trampling if unknown individuals are present.

Cumulative Effects Common to All Alternatives

Sensitive Species and Species of Local Concern. The cumulative effects analysis area for these species is the Hell Canyon Range 2010 Project area. Because of the uncertainty related to the species habitat preferences, there may be possible habitat for the species throughout the project area. Effects outside of this area are either minimal or cannot be tracked and defined. This analysis is bounded in time by 10 years into the past and 10 years into the future, which allows for an adequate length of time to record vegetative changes.

Current, on-going, and reasonably foreseeable activities within this area are shown in table 9. Removing timber and thinning existing stands of ponderosa pine may reduce the chance of large-scale fires that may threaten the sensitive plant species habitat. Removing timber and thinning existing stands of ponderosa pine may also create earlier successional conditions that would be beneficial to site colonization by wind-dispersed, spore-producing *Botrychium* species, if the associated mycorrhizal species and other microsite conditions are present.

Any past, present, or foreseeable future activity that causes soil disturbance has the potential to introduce and increase the rate of spread of noxious weeds and other exotic plants. This can be detrimental to sensitive and SOLC plant species, because invasive species have the ability to out-compete desired native plants. The herbicides used in noxious weed control can also be detrimental to *Botrychium* individuals if the above-ground portion of the plants is inadvertently exposed to the herbicides.

An increase in the development and subdivision of private land in the area may lead to an increase in the introduction of exotic plants and noxious weeds. The increase in development of private land could result in direct impacts to sensitive plant species and/or their habitat if they occur in those specific development locations.

In this project area, the primary impacts from recreational use to the sensitive plant species habitat are the negative direct impacts to the vegetation (i.e., removal of vegetation, soil compaction, introduction of invasive species) that result from off-road travel.

All of the above uses are limited in intensity and duration, and therefore when combined with the alternatives analyzed, including the no-action alternative, would not result in measurable cumulative impacts to sensitive and SOLC plant species or their habitat.

Pleated gentian, broadlipped twayblade, leathery grapefern, stiff clubmoss, narrowleaf sweet coltsfoot, and shining willow are likely to persist on the Forest (Forest Plan Phase II Amendment [USDA Forest Service 2005b]). All three alternatives are consistent with the Forest Plan for these species and/or their habitats.

Summary

Implementation of alternative 1 would not result in direct effects to sensitive or SOLC species. There would be a short-term improvement in suitable habitat for all species, but an increased potential for a long term, indirect loss of habitat with increased fine fuel and increased risk of wildfire. Implementation of alternative 1 may adversely impact 7 sensitive plants, but is not likely to result in a trend toward Federal listing or loss of viability range-wide.

Implementation of alternative 2 would result in localized, direct effects to sensitive and SOLC species habitat from livestock trampling and indirectly through degraded riparian habitat conditions in some areas. Implementation of alternative 2 may adversely impact seven sensitive plants, but is not likely to result in a trend toward Federal listing or loss of viability range-wide.

Implementation of alternative 3 would result in localized, direct effects to sensitive and SOLC species from livestock trampling, minimized through project design features; and indirect beneficial impacts due to habitat improvement in riparian areas. Implementation of alternative 3 may adversely impact seven sensitive plants, but is not likely to result in a trend toward Federal listing or loss of viability range-wide.

Alternative 3 provides the best opportunity to enhance habitat for sensitive species and SOLC that are found in riparian and/or moist forested sites, as well as protection of known occurrences of sensitive plants. Alternative 1 also provides opportunity for enhancement of those habitats, but the removal of livestock may result in an increase in fine fuels, increasing the potential for large-scale fires which may indirectly affect rare plant habitat. Alternative 2 does not provide the opportunity for habitat enhancement, while it does provide for the protection of known occurrences of R2 sensitive plants.

Determination of Effects. Implementation of either alternative 1, 2, or 3 may adversely impact sensitive plant individuals of Iowa moonwort, narrowleaf grapefern, yellow lady's slipper, trailing clubmoss, large roundleaf orchid, highbush cranberry, and sphagnum narrow peatmoss, but is not likely to result in a loss of viability in the project area or a trend toward Federal listing or loss of viability range-wide.

Wildlife

Methodology

Wildlife species and population data were collected and compiled from field surveys, District wildlife observation data, South Dakota Natural Heritage Program, Wyoming Natural Diversity Database (WYNDD), the South Dakota Department of Game, Fish and Parks, literature reviews, communication with District personnel, and the Wildlife Report completed for the Phase II Amendment to the Black Hills National Forest Land and Resource Management Plan Revision (USDA Forest Service 2005b, appendix C). Project area field surveys were completed in 2008 and 2009. Any observed Forest Service Region 2 sensitive species, species of local concern (SOLC), management indicator species (MIS), migratory birds, and Wyoming Partners in Flight (PIF) birds were recorded. Surveys for reptiles/amphibians were conducted in June and July and focused on areas near water (springs/seeps). Most of the riparian areas have been surveyed in

past years for the presence of amphibians. Frest and Johannes (2002) conducted surveys for land snail species in this area in 1992 and 1999. Bird surveys have been conducted across the Black Hills National Forest including this project area (Panjabi 2001, 2003, 2004, 2005; Beason et al. 2006; Hutton et al. 2007; Giroir et al. 2007; White and Giroir 2009).

Livestock grazing can result in changes in wildlife habitat quality; these changes can be both beneficial and adverse depending on the proximity of use to occupied habitat, season and duration of use, the sensitivity of species involved, and the habitat type affected. Habitat quality for the following groups of species will be used as an indicator to compare alternative effects:

- Forest Service R2 sensitive wildlife species and SOLC
- MIS
- migratory birds and PIF
- demand species (elk and mule deer)

Federally listed wildlife species were reviewed for applicability to this project (list updated on September 2008 and accessed at http://southdakotafieldoffice.fws.gov/endsppbycounty.htm). No federally listed or proposed wildlife species, or their habitat, occurs in the project area.

Affected Environment

Sensitive. R2 sensitive species are species for which population viability is of concern, as evidenced by current or predicted downward trends in population numbers or density, or by current or predicted downward trends in habitat capability (USDA Forest Service 2009). All R2 sensitive wildlife species potentially occurring in the Black Hills National Forest were considered in the project area. Nineteen sensitive wildlife species occur in, or have the potential to occur in the project area, based on habitat preferences, as shown in table 14. All other species were dropped from further evaluation due to the lack of suitable habitat in the project area.

Species of Local Concern. SOLC are species that do not meet the criteria for sensitive status. These include species with declining trends in only a portion of Region 2, or those that are important components of diversity in a local area, for example. Forest Service Manual 2622.01 mandates consideration of SOLC during project planning. Seventeen SOLC occur in or have the potential to occur in the project area, based on habitat preferences, as shown in table 14.

Management Indicator Species. The Phase II Amendment to the 1997 Forest Plan-FEIS (USDA Forest Service 2005b) lists MIS that need to be considered during project-level planning. This list was reviewed to determine which species have habitat or populations present within the project area. Some MIS have other status (such as sensitive); when an MIS was also listed as a sensitive species, that species was evaluated in this document as a sensitive species. Population viability is not a concern for any MIS species not on the R2 sensitive species list. MIS relevant to this project area are listed in table 14. Maintenance or enhancement of habitat for MIS is a Forest goal, as outlined in the Forest Plan.

Migratory Birds. Many species of migratory birds are of international concern due to naturally small ranges, loss of habitat, observed population declines, and other factors. The Black Hills National Forest recognizes the ecological and economic importance of birds, and approaches bird conservation at several levels by implementing: (1) Forest Plan objectives, standards, and guidelines; (2) a Forest-wide bird monitoring program; and (3) site-specific mitigation and effects analyses for identified species of concern.

Birds applicable to project-level conservation are identified by many sources, including the Endangered Species Act, the Regional Forester's sensitive species list, the Black Hills National Forest MIS and SOLC list, internal and public scoping efforts, the USFWS Birds of Conservation Concern (BCC) (USFWS 2008) and the Wyoming Bird Conservation Plan (PIF Plan) (Nicholoff 2003). The BCC 2008 publication partitions North America into 37 bird conservation regions. The Black Hills is included in Region 17–Badlands and Prairies. Five species have potential to occur in the project area and are not already included as sensitive or SOLC; these are shown in table 14.

Wyoming PIF. The Wyoming Bird Conservation Plan, Version 2.0, was developed by Wyoming Partners in Flight as part of the international Partners in Flight effort. Birds of concern are placed in one of several levels. Level 1 is for bird species that clearly need conservation action (Nicholoff 2003); these were reviewed for applicability to this project. Of all Level 1 species with potential to occur in the project area, only one (Swainson's hawk) is not analyzed as either a sensitive species, SOLC or migratory bird in this section.

Demand Species. Demand species are important local game animals which are not included in other emphasis groups above. Rocky Mountain elk and mule deer are two of these demand species, as shown in table 14.

Rocky Mountain elk are commonly seen in the project area. Providing high-quality winter and transitional habitat for elk on Forest Service lands is the emphasis for MA 5.4 (table 1). MA 5.4 makes up all of the Bull Flats and Tepee Allotments, all but 77 acres of the Water Draw Allotment, and all but 175 acres of the French Creek Allotment. Approximately 87 percent of the Lithograph Allotment is in MA 5.4 and approximately 30 percent of the Lower Beaver Allotment is in MA 5.4. The Rocky Mountain Elk Foundation considers the French Creek, Tepee, Lithograph, and Lower Beaver Allotments crucial year-round elk range (RMEF 2002). The Water Draw and Bull Flats Allotments are mostly within summer range habitat. The Lithograph and Lower Beaver Allotments also provide elk winter range.

Table 14. Sensitive species, SOLC, MIS, migratory birds and PF, and demand species that occur or have the potential to occur in the Hell Canyon Range 2010 Project Area, based on habitat preferences

Species	Scientific Name	Habitat	Occurrence in Project Area
Forest Service Sensitive			
Mammals			
Rocky Mountain bighorn sheep	*Ovis canadensis canadensis*	Open habitats such as grasslands, talus slopes, and rock outcrops where forage plants are abundant and escape cover is nearby (Beecham et Al. 2007).	Introduced to the Black Hills in 1924. There are approximately 385 bighorn sheep in the Black Hills. Since 2001, a group of rams has been observed on the south end of the Lower Beaver Allotment. No other areas within the allotments are known habitat (Benzon, T. 2010. SDGFP, Big Game Biologist; personal communication).
Fringed myotis	*Myotis thysanodes*	Forages on insects in a variety of habitats including grasslands and forested areas. Roosts in a variety of structures including caves, mines, and buildings (Schmidt 2003a).	Jewel Cave (which borders the Water Draw Allotment) is a hibernation site for many bat species. This species has been captured on the Water Draw, Lower Beaver, and Tepee Allotments.
Townsend's big-eared bat	*Corynorhinus townsendii*	Forages on insects in a variety of habitats including forested and wet areas. Roosts in a variety of structures including caves, mines, and buildings (Schmidt 2003b).	Jewel Cave (which borders the Water Draw Allotment) is a hibernation site for many bat species. This species has been captured on the Tepee and Bull Flats Allotments and there is one confirmed hibernation site on the Bull Flats Allotment.
Black-tailed prairie dog	*Cynomys ludovicianus*	Short-grass and mixed-grass prairies (USFWS 2008b).	There is an active prairie dog town in the south tip of the Lithograph Allotment. There are areas within the other allotments that could provide suitable soils for prairie dogs.
American marten	*Martes americana*	Spruce forests with complex, near-ground structure, extending into adjacent ponderosa pine stands (Buskirk 2002).	Suitable habitat occurs on the French Creek Allotment.
Birds			
Bald eagle	*Haliaeetus leucocephalus*	Winter resident in the Black Hills and spring/fall migrant. Usually found near unfrozen water or carrion in winter (Tallman et al. 2002).	There have been no reported bald eagle sightings during the breeding season in the project area. The project area lacks any suitable nesting habitat for the bald eagle. Bald eagles have been sighted by district personnel in all six allotments during winter.
Northern goshawk	*Accipiter gentilis*	Forages in a variety of forested areas and small openings; nests primarily in dense mature conifer forests (Erickson 1987).	Goshawks have been observed on all six allotments. Territories (either historic or recent) occur on Bull Flats, French Creek, Lithograph, Tepee, and Water Draw Allotments

Northern harrier	*Circus cyaneus*	Prairies, open fields and marshes (Tallman et al. 2002).	The open grasslands/meadows within the Lithograph, Lower Beaver, Tepee and Water Draw Allotments provide suitable foraging and nesting habitat; no known occurrences.
Burrowing owl	*Athene cunicularia*	Dry grasslands and pastures, usually associated with prairie dogs or ground squirrels (Tallman et al. 2002).	No known occurrences in the project area; the Lithograph Allotment may provide suitable habitat.
Flammulated owl	*Otus flammeolus*	Open ponderosa pine forests (McCallum 1994).	Suitable habitat present on all six allotments; no known occurrences.
Lewis's woodpecker	*Melanerpes lewis*	Open burned areas with large snags; oak and cottonwood forests (Anderson 2003, Panjabi 2003).	Known to occur on the Lower Beaver, Tepee, Lithograph, and Water Draw Allotments.
Black-backed woodpecker	*Picoides arcticus*	Burned areas with a high density of pre-burn snags; dense and/or mature forests with a high snag density (Anderson 2003, Panjabi 2003).	Known to occur on the Bull Flats, Lower Beaver, Lithograph, Tepee and Water Draw Allotments.
American three-toed woodpecker	*Picoides dorsalis*	Almost exclusively in mature spruce forests (Giroir et al. 2007).	Suitable habitat present on the French Creek Allotment.
Loggerhead shrike	*Lanius ludovicianus*	Open country with scattered, low deciduous thickets (Tallman et al. 2002).	Potential habitat in the Lithograph, Lower Beaver, Tepee, and Water Draw Allotments; no known occurrences.
Grasshopper sparrow	*Ammodramus savannarum*	Found almost exclusively in native mixed-grass prairies (Panjabi 2003).	Known to occur on the Lower Beaver, Tepee, and Water Draw Allotments.
Reptiles and Amphibians			
Northern leopard frog	*Rana pipiens*	Riparian and wetland areas for tadpoles, subadults, and breeding adults; upland habitats for foraging adults (Smith 2003).	Known to occur on the Lower Beaver, Tepee, and French Creek Allotments.
Black Hills redbelly snake	*Storeria occipitomaculata pahasapae*	Wet meadows, woodlands, and forest-meadow edge habitat in the Black Hills (Smith and Stephans 2003).	Known to occur on the French Creek and Lower Beaver Allotments.
Invertebrates			
Cooper's mountain snail	*Oreohelix strigosa cooperi*	Lowland wooded or riparian areas on limestone soils (Frest and Johannes 2002).	One known site on the Tepee Allotment and one on the Lower Beaver Allotment. There is limited suitable habitat in the project area. The Lower Beaver and French Creek (mainly in the French Creek drainage) Allotments provide the most suitable habitat.
Regal fritillary butterfly	*Speyeria idalia*	Tall-grass prairie and extensive grasslands with violets (Royer and Marrone 1992).	Observed on the Lower Beaver Allotment; suitable habitat occurs on the Lithograph, Lower Beaver, Tepee, and Water Draw Allotments.
SOLC			
Mammals			
Northern long-	*Myotis*	Wooded riparian zone in badlands and prairies to higher elevation	Known to occur on the Lower Beaver and

eared myotis	*septentrionalis*	coniferous and deciduous woodlands.	Water Draw Allotments; all allotments provide suitable habitat.
Small-footed myotis	*Myotis ciliolabru*	Variety of habitats ranging from arid desert and badland habitats to riparian zones and grasslands. It is usually associated with rocky areas like bluffs, dissected breaks, ridges, cliffs, and major rock outcroppings within these habitats.	Suitable habitat present.
Long-eared myotis	*Myotis evotis*	Associated with coniferous montane habitats and has been reported foraging among trees and over woodland ponds (Schmidt 2003c). Limited data suggest that the long-eared myotis uses ponderosa pine snags as summer and maternity roosts in other regions (Rabe et al. 1998; Vonhof and Barclay 1997).	Suitable habitat present.
Long-legged myotis	*Myotis volans*	Associated with montane forest. In the Black Hills, this species occurs primarily at elevations between 4,500 and 6,500 feet (Turner 1974). This species has been documented using ponderosa pine snags as summer/maternity roosts in the Black Hills (Cryan et al. 2001).	Suitable habitat present.
Northern flying squirrel	*Glaucomys sabrinus*	A wide variety of woodland habitats, typically dominated by conifers or mixed coniferous/deciduous forests (Wells-Gosling and Heaney 1984). Optimal northern flying squirrel habitat has been reported as cool, moist, mature forest with abundant standing and down snags. It is often most abundant near surface water (swamps and streams) (NatureServe 2006).	Suitable habitat present.
Meadow jumping mouse	*Zapus hudsonius campestris*	Associated with riparian habitats along small streams in meadows and habitats beneath forests with an understory of deciduous shrubs, grasses, forbs and fallen logs; it is presumed to disperse primarily along stream corridors.	Known to occur on the French Creek Allotment and suitable riparian habitat present on all allotments.
Birds			
Sharp-shinned hawk	*Accipiter striatus*	Occur in most forest types across their range; nest almost exclusively in conifers, with the exception of some densely leafed deciduous trees that also provide nest concealment (Platt 1976; Reynolds et al. 1982; Joy 1990).	Known to occur on the Lower Beaver, Tepee, and Water Draw Allotments; all allotments provide suitable habitat.
Cooper's hawk	*Accipiter cooperi*	Known to nest in riparian, conifer, and aspen forests.	Known to occur on the Lower Beaver and Tepee Allotments; all allotments provide suitable habitat.
Broad-winged hawk	*Buteo platypterus*	Deciduous, mixed, or occasionally coniferous forests (Johnsgard 1990); forage in mature to old-growth forests, along forest streams, roads, and openings (Stephens and Anderson 2003).	Suitable habitat present.
Northern saw-whet owl	*Aegolius acadicus*	Nests tend to be in mature forest, while dense sapling-pole-sized stands are preferred for roosting (Johnson and Anderson 2003). Saw-whet owls also utilize dense riparian woodlands for roosting. This species often forages along forest edges, preying on small mammals (Cannings 1993).	Known to occur on the Lower Beaver and Tepee Allotments; all allotments provide suitable habitat.

Pygmy nuthatch	*Sitta pygmaea*	Inhabit mature yellow-pine communities throughout the West (Ghalambor 2003). Pygmy nuthatches prefer old or mature undisturbed forests, but are also known to use open, park-like stands of ponderosa pine (Kingery and Ghalambor 2001).	Known to occur on the Lower Beaver, Tepee, and Water Draw Allotments; all allotments provide suitable habitat.
Invertebrates			
Atlantis fritillary butterfly	*Speyeria atlantis pahasapae*	Riparian areas adjacent to openings, moist meadows and in boreal forests (NatureServe 2006). Endemic to the Black Hills.	Suitable habitat present.
Tawny crescent butterfly	*Phycoides batesii*	Open meadows, stream bottoms, along roads, trails, and riparian woodlands (Stefanich 2001). Found also in mesic forest corridors across an ecotone between mixed-grass meadows or prairie grasslands to adjacent woodlands (Royer and Marrone 1992).	3 confirmed locations in the Water Draw Allotment in 1991. There is a 1978 recording from the French Creek Allotment (District records). All six allotments have suitable habitat.
Callused vertigo (land snail)	*Vertigo arthuri*	Wet, relatively undisturbed forest with closed canopied white spruce or ponderosa pine with a varied understory.	Known to occur in several locations throughout the project area.
Mystery vertigo (land snail)	*Vertigo paradoxa*	Rich lowland wooded sites, quite often in the white spruce community, but occasionally in the ponderosa pine community. The forest canopy is generally closed or nearly so, with well-developed litter and a rich understory.	Suitable habitat present.
Frigid ambersnail (land snail)	*Catinella gelida*	Usually found on limestone, but also on schist soils; colonies were often found in somewhat dry wooded limestone talus, generally near the slope base. They were most often found in rather open ponderosa pine forest.	Known to occur on the Tepee and Water Draw Allotments; suitable habitat present on other allotments as well.
Striate disc (land snail)	*Discus shimekii*	Most often found in litter in rich mesic forest, generally on shaded, north-facing slope bases, often bordering or ranging slightly onto stream floodplains.	Suitable habitat exists; one previous record from the Lithograph Allotment.
MIS			
White-tailed deer	*Odocoileus virginianus*	Very adaptable species that can live in almost any habitat. In South Dakota, this includes grasslands, wetlands, and woodlands (Higgens et al. 2000).	Known to occur.
Golden-crowned kinglet	*Regulus satrapa*	Found almost exclusively in white spruce habitat, but occasionally in habitats with a spruce component (Panjabi 2003).	Known to occur on French Creek Allotment.
Grasshopper sparrow	*Ammodramus savannarum*	Found almost exclusively in native mixed-grass prairies (Panjabi 2003).	Known to occur on Lower Beaver, Tepee, and Water Draw Allotments.
Black-backed woodpecker	*Picoides arcticus*	Burned areas with a high density of pre-burn snags; dense and/or mature forests with a high snag density (Anderson 2003; Panjabi 2003).	Known to occur.
Brown creeper	*Certhia americana*	In the Black Hills, white spruce and late successional pine appears to be the most important habitat type for this species (Panjabi 2001, 2003).	Known to occur.
Ruffed grouse	*Bonasa umbellus*	Variable aged aspen stands, other hardwoods and pine forests provide habitat. Winter habitat is almost exclusively aspen (Tallman	Known to occur.

		et al. 2002; DeGraaf et al. 1991).	
Song sparrow	*Melospiza melodia*	Streamside thickets, particularly shrubby willows, are required for habitat. Occasionally found in adjacent spruce habitat (Panjabi 2003).	Suitable habitat present.
Migratory Birds			
Golden eagle	*Aquila chrysaetos*	Open country from desert grasslands to above timberline. Usually avoids densely forested areas. Typical habitat is grass-shrub, shrub-sapling and/or open coniferous forests (Johnsgard 1990).	Known to occur and suitable habitat present.
Prairie falcon	*Falco mexicanus*	Open, treeless areas such as brush-desert, desert grassland, and other arid regions with nearby cliffs for nesting (Johnsgard 1990); prefer to nest on cliffs with a sheltered ledge.	Known to occur and suitable habitat present.
Upland sandpiper	*Bartramia longicauda*	Open grasslands that range from flats with little vegetation to rich paturelands, hayfields, and alfalfa fields. Typically nests in a depression on the ground.	Known to occur and suitable habitat present.
Red-headed woodpecker	*Melanerpes erythrocephalus*	Deciduous woodlands, especially with beech or oak, lowland and upland habitats, river bottoms, open woods, groves of dead and dying trees, orchards, parks, open agricultural country, savanna-like grasslands with scattered trees, and forest edge and along roadsides.	Known to occur and suitable habitat present.
Pinyon jay	*Gymnorhinus cyanocephalus*	Open ponderosa pine forests with small scattered trees. However, it prefers pinyon-juniper woodlands of the foothills.	Known to occur and suitable habitat present.
PIF			
Swainson's hawk	*Buteo swainsoni*	Mixed to short grassland habitats with scattered trees. Agricultural areas, including irrigated alfalfa fields and pasture, are also preferred for foraging of visible prey.	No known occurrences, but potential nesting and foraging habitat present.
Demand Species			
Rocky Mountain elk	*Cercus elaphus nelsoni*	A wide variety of vegetation types with a preference for forested riparian areas, forested stringers in meadows, and deciduous stands of birch or aspen (SAIC 2003).	Known to occur.
Mule deer	*Odocoilus hemionus*	Open, rugged habitat; meadows and other grass cover types provide forage. Mountain mahogany habitat in the southern Black Hills may play an important role in providing mule deer habitat.	Known to occur.

The Forest has committed (through Forest Plan objective 217) to managing habitat for a total of 4,350 elk, which is the combined population objective establish by the two State game agencies in 1996 (USDA Forest Service 2005b).

The Black Hills deer population is comprised of approximately 75 percent white-tailed deer and 25 percent mule deer (Parrish et al. 1996). There is very little research available on mule deer ecology. Throughout much of the Black Hills, there is not a clear habitat distinction between the two species and their ranges overlap in many areas (Parrish et al. 1996). Mule deer are commonly seen on the Lithograph, Lower Beaver, Tepee, and Water Draw Allotments. Providing high-quality winter and transitional habitat for mule deer on Forest Service lands is an emphasis for MA 5.4.

The Forest has committed (through objective 217) to managing habitat for a combined white-tailed and mule deer population of 60,000 animals in South Dakota. This figure matches the South Dakota Game, Fish and Park's population objective for the Black Hills (USDA Forest Service 2008a).

Environmental Consequences

Table 15 provides a summary of the expected direct/indirect and cumulative effects to sensitive species, SOLC, MIS, migratory birds, PIF, and demand species. The Wildlife Report and Biological Assessment and Evaluation provide more detail on the evaluation of effects to each species (Clark 2010a and 2010b).

Implementation of alternative 1 would result in improvement in riparian-dependent species habitat; this would be greater under alternative 1 than under alternatives 2 or 3. There would also be an increase in upland ungulate browse and bird nesting and deer fawning cover. Implementation of alternative 1 would result in a determination of **no impact** to 16 sensitive species and **beneficial impacts** to 3 sensitive species. All 17 SOLC and 7 MIS populations would persist and habitat conditions would improve due to removal of grazing impacts. All 5 migratory bird populations and 1 PIF population would remain stable and habitat conditions would improve due to removal of grazing impacts. Elk and deer populations would remain stable and habitat conditions would improve due to removal of grazing impacts.

Implementation of alternative 2 would result in no change in riparian-dependent species habitat or upland habitat; existing riparian habitat conditions would not improve. Implementation of alternative 2 would result in a determination of **no impact** to 13 sensitive species. Implementation of alternative 2 **may impact six sensitive species, but would not result in a trend toward federal listing or loss of viability.** All 17 SOLC and 7 MIS populations would persist. All 5 migratory bird populations and 1 PIF population would remain stable, but direct effects from nest trampling and cover reduction would continue. Elk and deer populations would remain stable, but localized, adverse effects would continue due to loss of some forage and cover from livestock use.

Table 15. Summary of effects to wildlife species by alternative

Species	Alternative 1-No Action No Grazing	Alternative 2– Current Management	Alternative 3– Proposed Action with Adaptive Management	Summary and Determination for all Alternatives
Forest Service Sensitive				
Rocky Mountain bighorn sheep	No direct effects. Habitat overlap with livestock in the project area is slight. With no grazing, grasses and forbs along with some browse species may see a short-term increase. In the long term, nutrition and palatability of forage may decrease. The quality and extent of water sources may improve, particularly in the summer months, in the absence of livestock grazing. No cumulative effects are expected.	No direct effects from livestock. Quality and extent of potential water sources, particularly in the summer months, may decrease with livestock grazing. Utilization by livestock could be beneficial for the bighorn sheep by opening grass cover and allowing the establishment and growth of forbs. Heavy utilization could be detrimental by causing noxious weed establishment and spread or through consumption or trampling of important forbs. Adherence to current utilization standards (FP Standard 2505) should provide adequate forage for the Rocky Mountain bighorn sheep. Since no measurable direct or indirect effects are expected, with adherence to the allowable utilization standard, there would be no cumulative effects for the Rocky Mountain bighorn sheep under alternatives 2 and 3.		*All Alternatives*: No Impact. All alternatives allow for the conservation of sheep habitat (Forest Plan objective 221).
Black-tailed prairie dog	No direct effects. With no grazing, indirect and cumulative effects include development of taller grasses which could cause prairie dogs to leave the current town for shorter grass habitat (possibly on adjacent private land). However, prairie dogs and other wildlife species may keep the grass short.	No direct effects from livestock. Livestock grazing could indirectly improve prairie dog habitat in primary grazing areas by reducing grass height and density. This could encourage colonization from nearby towns. Cumulatively, livestock grazing in the future could lead to expansion of black-tailed prairie dog habitat. Recreational shooting does occur within prairie dog towns. There is always a risk of disease (sylvatic plague) that can eliminate local prairie dog populations. Numerous wildfires have influenced five of the six allotments, mainly by creating openings, and increasing the quantity and quality of grassland forage available to livestock and wildlife. This increase in grassland has been beneficial to the black-tailed prairie dog. Future wildfires may be beneficial as well for this species		*All Alternatives*: No Impact. The Forest is meeting objective 237 which prompts the Forest to manage for 200–300 acres of prairie dog towns in at least 3 different towns (USDA Forest Service 2009).

Species	Alternative 1-No Action No Grazing	Alternative 2– Current Management	Alternative 3– Proposed Action with Adaptive Management	Summary and Determination for all Alternatives
Cooper's mountain snail	No direct effects are expected under this alternative. The possibility of mortality due to livestock trampling is eliminated. Indirect effects include increased vegetation and ground cover and an increase in suitable habitat.	Direct effects possible from livestock trampling. Indirect effects through livestock use in riparian areas that can degrade riparian conditions (Bock et al. 1992; Frest and Johannes 2002). Removal of vegetation adjacent to snail colonies may increase predation. Even light grazing appears to have substantial negative impacts on land snail diversity and abundance (Frest and Johannes 2002). Past actions (fire suppression, other forest management activities) have resulted in site-specific changes in suitable habitat; in some areas mesic habitats have reduced and in other areas, these have increased. Management of noxious weeds could adversely impact snails since many herbicides are toxic to land snails (Frest and Johannes 2002), but this is minimized through adherence to Forest Plan standards (e.g., standard 3103e). Past and current off-road motorized traffic has negatively impacted some snail habitat, particularly in the French Creek Allotment. Because alternative 3 provides enhanced protection and management of riparian areas, these direct/indirect impacts would be lessened with implementation of alternative 3.		*Alternative 1*: No Impact. *Alternatives 2 and 3*: May adversely impact individuals, but not likely to result in a loss of viability in the planning area, nor cause a trend toward Federal listing.
Regal fritillary butterfly	No direct effects; possibility of mortality is eliminated. Indirect effects include habitat improvement through an increase in understory grass and forbs. However, larval host plants (i.e., violets) for butterfly species could decline in the absence of grazing.	Direct effects possible from livestock grazing that include crushing butterfly larvae or cocoons and/or covering larvae with manure piles. Indirect effects include a possible increase or decrease in forbs needed by the butterfly species for foraging. The quality and extent of potential watering sources may decrease with cattle grazing particularly in summer months. Utilization by livestock could be beneficial for this butterfly species by opening grass cover and allowing the establishment and growth of violets and nectar-producing forbs. Heavy utilization could be detrimental by causing noxious-weed establishment and spread or through consumption or trampling of important forbs. In the future, regal fritillary butterfly habitat could be cumulatively affected by drought, conifer encroachment in meadows, increases in canopy overstory, and noxious weed infestation.		*Alternative 1*: No Impact *Alternatives 2 and 3*: May adversely impact individuals, but not likely to result in a loss of viability in the planning area, nor cause a trend toward Federal listing. Both alternatives 2 and 3, along with the past, present and future actions, are expected to maintain and/or improve the existing grassland/meadow habitat conditions.

Species	Alternative 1-No Action No Grazing	Alternative 2– Current Management	Alternative 3– Proposed Action with Adaptive Management	Summary and Determination for all Alternatives
Riparian/aquatic species *(fringed myotis, Townsend's big-eared bat, northern leopard frog, Black Hills red belly snake)*	There are no direct effects expected under this alternative since there would be no livestock grazing. Potential indirect effects to bats include changes in insect prey populations; some may increase with no grazing (due to increases in herbaceous growth and water availability) and others may decrease (e.g., *Lepidoptera*). Indirect effects to frogs and snakes include improvements in riparian areas and aquatic habitats with removal of grazing. Available habitat would improve. Because direct/indirect effects would be minimal, no cumulative effects to bats are expected. Past actions have affected riparian habitat quality both positively and negatively. Cumulative effects would be beneficial, overall.	Direct effects to bats are minimized by implementation of project design features for escape ramps. No direct/indirect effects to bat roosts due to livestock. Indirect effects to bats would occur due to the removal of 50% of annual herbaceous growth, which may reduce some insect prey; this effect would be minor because residual levels would be provided (standards/guidelines 2502-2506). Leopard frogs and red belly snakes could be adversely affected directly through possible livestock trampling in suitable habitat (Smith 2003), which can affect many aquatic habitat conditions (Belsky et al.1999; Kauffman et al. 1983; Kauffman and Krueger 1984; Isaak et al. 2003) and increase predation. Direct and indirect effects may be decreased with implementation of project design features. Under alternatives 2 and 3, riparian exclosures would be maintained and monitoring would be accomplished in riparian areas. Under proposed riparian habitat protections and changes in management for alternative 3, habitat for sensitive riparian species would improve. Indirect effects are minimized through a wide variety of standards and guidelines, watershed conservation practices, and State BMPs that protect riparian areas. Numerous objectives, standards, and guidelines strive to maintain or enhance the quality and/or quantity of existing riparian communities, wetlands and wet-meadow areas. Cumulatively, future riparian conditions could be affected by drought, conifer encroachment in riparian areas, increases in canopy overstory, and noxious weed infestation. Excessive livestock grazing added to these effects could result in moderate to severe adverse effects, but this is minimized through adherence to Forest Plan standards and guidelines; excessive grazing is not expected away from water sources with either alternative. Alternative 3 would result in less adverse cumulative effects than Alternative 2.		*All Alternatives*: No impact to bat species. *Alternative 1*: Beneficial impact to northern leopard frog and red belly snake. *Alternatives 2 and 3*: May adversely impact northern leopard frog and red belly snake individuals, but not likely to result in a loss of viability in the planning area, nor cause a trend toward Federal listing.

Species	Alternative 1-No Action No Grazing	Alternative 2– Current Management	Alternative 3– Proposed Action with Adaptive Management	Summary and Determination for all Alternatives
Predatory species *(bald eagle, American marten, northern goshawk, northern harrier, burrowing owl, flammulated owl, loggerhead shrike)*	The removal of livestock from these allotments would have no direct effects to these predatory species. Potential indirect effects of removing 50% of annual herbaceous growth is eliminated, which would likely increase prey availability (increased prey productivity and survival) within riparian areas and upland meadows. Prey species would likely be harder to detect, due to increased cover. The overall available habitat for predatory species would not change substantially if livestock grazing is no longer allowed on these allotments; however, some foraging habitat would be enhanced.	There are no direct effects expected to the bald eagle, American marten, northern goshawk, burrowing owl, flammulated owl, and loggerhead shrike from livestock grazing. There is potential for direct effects to northern harriers if nesting in the project area. Cattle may possibly trample eggs and/or nestlings causing mortality. Indirectly, preferred nesting habitat of the northern harrier may be affected due to grazing. Adherence to current utilization standards (Forest Plan standard 2505) should provide adequate cover for prey species persistence, and therefore, implementation of the proposed action should not cause any indirect effects to the bald eagle, American marten, northern goshawk, burrowing owl, flammulated owl and loggerhead shrike. Continued livestock grazing at moderate levels would also help keep the vegetation structure relatively short and at a desirable level for the burrowing owl. Since there would be no direct effects and no indirect effects are expected to these species, with adherence to the allowable utilization standard, there would be no cumulative effects for the bald eagle, American marten, northern goshawk, burrowing owl, flammulated owl and loggerhead shrike. The northern harrier may suffer direct and/or indirect effects from livestock grazing in the nesting season. Cumulative effects to the northern harrier would include a potential loss of nesting habitat in the future which could be more detrimental due to drought conditions in the project area.		*Alternative 1*: No Impact *Alternatives 2 and 3*: No impact to bald eagle, American marten, northern goshawk, burrowing owl, flammulated owl and loggerhead shrike; may adversely impact individual northern harriers, but is not likely to result in a loss of viability in the planning area, nor cause a trend toward Federal listing.

Species	Alternative 1-No Action No Grazing	Alternative 2– Current Management	Alternative 3– Proposed Action with Adaptive Management	Summary and Determination for all Alternatives
Insectivorous birds *(Lewis's woodpecker, black-backed woodpecker, American three-toed woodpecker, grasshopper sparrow)*	There are no direct or indirect effects expected under this alternative. The overall amount of available habitat for these species would not change substantially if livestock grazing is no longer allowed on these allotments. No grazing would likely decrease *Lepidoptera* insect species over time as grasses expand and forbs, needed for larval host plants, decrease. However, often these species would switch from one source of insect prey to another as these sources become available. Lack of grazing may improve the quality of grasshopper sparrow habitat by not removing 50% of the annual growth resulting in taller grasses. However, this species does require bare ground for foraging. Lack of grazing may in time increase the amount of ground cover and result in a decrease in bare ground. Since there would be no direct or indirect effects to woodpeckers under any alternative, there would be no cumulative effects.	There are no direct effects expected to the Lewis's woodpecker, black-backed woodpecker, or American three-toed woodpecker from cattle and livestock grazing. Snags would not likely be affected by the presence of cattle grazing. However, nests of grasshopper sparrows may incur incidental trampling. Amount and condition of grasshopper sparrow nesting habitat could indirectly be affected by over-grazing; however excessive grazing would not occur under 3 due to adherence to Forest Plan standards and guidelines. Livestock grazing can help to maintain some areas of bare ground thereby maintaining foraging habitat for grasshopper sparrow. Indirect effects include the potential to remove 50% of annual herbaceous growth, which may reduce some insect prey availability within riparian areas and upland meadows. The understory structure can influence the abundance and availability of many species of insects including Coleoptera, Lepidoptera and Orthoptera. Reduced understory vegetation could affect the abundance of insect prey species available for foraging. Livestock grazing can reduce the abundance of these insects by removing vegetative cover necessary for shelter, breeding, and feeding. Often these species will switch from one source of insect prey to another as these sources become available. However, this should not create a detectable decrease in prey because Phase II standards will be met, limiting vegetation utilization and providing residual levels (standards/guidelines 2502-2506) for insect prey. Since there would be no direct or indirect effects to woodpeckers under any alternative (with adherence to standard 2505, the allowable utilization standard), there would be no cumulative effects.		*All Alternatives*: No Impact to woodpeckers. *Alternative 1*: Beneficial Impact to grasshopper sparrow. *Alternatives 2 and 3*: May adversely impact individual grasshopper sparrows, but is not likely to result in a loss of viability in the planning area, nor cause a trend toward Federal listing.

Species	Alternative 1-No Action No Grazing	Alternative 2– Current Management	Alternative 3– Proposed Action with Adaptive Management	Summary and Determination for all Alternatives
SOLC				
Riparian species *(Atlantis fritillary, tawny crescent butterfly, meadow jumping mouse)*	No mortality due to livestock trampling. Habitat improvement due to removal of grazing in riparian areas	Possible mortality of butterfly larvae and meadow jumping mice through livestock trampling and use. Riparian cover and the quality and extent of water sources, particularly in the summer months, could decrease with continued livestock grazing. Proposed French Creek improvements under alternative 3 would improve habitat for these species more than alternative 2.		Assuming Forest Plan standards and guidelines would be followed under any alternative, this species would persist across the project area (Phase II Amendment EIS).
Snails (*callused vertigo, mystery vertigo, frigid ambersnail and striate disc)*	The possibility of mortality due to livestock trampling is eliminated and snail habitat would not be negatively impacted due to livestock.	Mortality to snails possible from trampling. Cattle grazing may reduce riparian vegetation and adversely affect snail habitat conditions. Alternative 3 should enhance riparian snail habitat with new riparian exclosures.		Assuming Forest Plan standards and guidelines would be followed under any alternative, this species would persist across the project area (Phase II Amendment EIS).
Predator bird species *(sharp-shinned hawk, Cooper's hawk, broad-winged hawk, and northern saw-whet owl)*	The overall available habitat for predatory species would not change substantially; however, some foraging habitat would be enhanced.	Livestock grazing would remove annual herbaceous growth, which may reduce prey availability within riparian areas and meadows; however, with adherence to allowable use standards this removal should not be excessive. Alternative 3 would provide more riparian habitat for prey due to planned new exclosure areas.		Assuming Forest Plan standards and guidelines would be followed under any alternative, this species would persist across the project area (Phase II Amendment EIS).
Insectivore species *(pygmy nuthatch, northern long-eared myotis, small-footed myotis, long-eared myotis, and long-legged myotis)*	There are no direct effects expected under this alternative. There may be effects to these species due to a change in insect (prey) habitat and water sources.	Pine trees, hibernacula, day roosts, maternity roosts or snags would not likely be affected by the presence of cattle grazing. See black-backed woodpecker above for effects.	Same effects as Alternative 2. Under Alternative 3, any new permanent or temporary water developments placed in new locations to improve livestock distribution should improve riparian conditions and provide additional bat foraging habitat and watering sites.	Assuming Forest Plan standards and guidelines would be followed under any alternative, this species would persist across the project area (Phase II Amendment EIS).

Species	Alternative 1-No Action No Grazing	Alternative 2– Current Management	Alternative 3– Proposed Action with Adaptive Management	Summary and Determination for all Alternatives
Northern flying squirrel	The overall available foraging habitat for this squirrel may improve when pastures are not grazed on these allotments.	Direct effects include mortality from barbed wire fences and drowning in stock tanks. Potential effects to foraging habitat.		Assuming Forest Plan standards and guidelines would be followed under any alternative, this species would persist across the project area (Phase II Amendment EIS).
MIS				
White-tailed deer	Beneficial effects to riparian/hardwood habitats used by deer, possible long-term adverse effects to forage quality. Removal of fences and gates may benefit deer.	Loss of forage and fawning cover to livestock. Displacement due to livestock and associated activities.	Same effects as Alternative 2; however, some riparian areas would improve due to exclosure fencing and movement/installation of stock tanks and dugouts.Forage quality in the uplands may improve over the long-term with acceptable levels of livsetock grazing.	White-tailed deer are likely to persist on the Forest under all alternatives.
Golden-crowned kinglet	No effects expected to spruce habitat.	No direct effects are expected to golden-crowned kinglet habitat. However, enhanced riparian conditions under alternative 3 would improve habitat.		Golden-crowned kinglets are likely to persist on the Forest under all alternatives.
Grasshopper sparrow	No effects expected. Possible beneficial effects with more grasses available.	Loss of nesting cover and possible direct mortality due to livestock trampling on all allotments except Water Draw.	Same effects as Alternative 2 on all Allotments, including Water Draw since it would be grazed under Alternative 3.	Assuming Forest Plan utilization standards are met, all alternatives would allow the Forest-wide grasshopper sparrow population to remain stable.
Black-backed woodpecker	Alternative1 would have no direct or indirect effects and would thus have no impact to black-backed woodpeckers.	Removal of 50% of annual herbaceous growth may reduce some insect prey availability within riparian areas and upland meadows.	Same effects as alternative 2. However, alternative 3 includes fencing new areas and expanding existing fences. This action may enhance habitats and increase insect prey, available for woodpeckers, in these areas.	Assuming Forest Plan standards are met, all alternatives would allow the Forest-wide black-backed woodpecker populations to remain stable. Black-backed woodpeckers are likely to persist on the Forest .

Species	Alternative 1-No Action No Grazing	Alternative 2– Current Management	Alternative 3– Proposed Action with Adaptive Management	Summary and Determination for all Alternatives
Brown creeper	Habitat for this species would not change if livestock grazing is no longer allowed on these allotments.	No direct or indirect effects are expected		Assuming Forest Plan standards are met, this project would allow the Forest-wide brown creeper population to remain stable.
Ruffed grouse	Alternative 1 provides the best habitat for the ruffed grouse due to enhancement of aspen regeneration both short and long term.	Direct mortality in nests possible from trampling. Adverse effects to food source and cover for ruffed grouse.	Same effects as Alternative 2; however, under Alternative 3, new exclosure fences would be built, primarily around riparian areas (this is often where hardwoods are found).	The long-term habitat trend for ruffed grouse is one of decline. Due to the habitat decline it is likely there has been an associated population decline.
Song sparrow	No mortality due to livestock trampling. Alternative1 provides the most benefit to the song sparrow. It would allow for more riparian shrub growth and create better riparian conditions overall.	Possible mortality of chicks due to trampling. Adverse effects to riparian species that utilize understory to mid-story vegetation for cover, feeding or building nests.	Same effects as Alternative 2. The French Creek fence and other proposed riparian fences should provide enhanced habitat for the song sparrow and other species dependent on riparian areas. Alternative 3 would provide more enhanced riparian conditions than Alternative 2.	Assuming Forest Plan standards are met, any of the alternatives would allow the Forest-wide song sparrow population to remain stable. The song sparrow is likely to persist on the Forest.
Migratory Birds				
Predator bird species *(golden eagle and prairie falcon)*	Overall available habitat for predatory species would not change substantially; however, some foraging habitat would be enhanced.	Livestock grazing would remove annual herbaceous growth, which may reduce prey availability in grasslands however, with adherence to allowable use standards this removal should not be excessive.		Assuming Forest Plan standards are met, all alternatives would allow the Forest-wide golden eagle and prairie falcon populations to remain stable.
Upland sandpiper	No direct effects expected under this alternative. Indirectly, taller grasses may increase over the long-term providing improved nesting habitat but preferred forage for sandpipers may decrease over the long-term in the absence of some level of livestock grazing .	Mortality possible due to nest trampling. Reduction of cover and insect prey in grasslands.	Same effects as Alternative 2. Alternative 3 proposes moving 50 cow/calf pairs to the Water Draw Allotment from the French Creek Allotment. This may create some preferred foraging habitat, but increase trampling.	Assuming Forest Plan standards are met, all alternatives would allow the Forest-wide upland sandpiper population to remain stable.

Species	Alternative 1-No Action No Grazing	Alternative 2– Current Management	Alternative 3– Proposed Action with Adaptive Management	Summary and Determination for all Alternatives
Red-headed woodpecker	Alternative1 would have no direct or indirect effects and would thus have no impact to red-headed woodpeckers.	Removal of 50% of annual herbaceous growth may reduce some insect prey availability within riparian areas and upland meadows.	Same effects as Alternative 2. However, Alternative 3 includes fencing new areas and expanding existing fences. This action may enhance habitats and increase insect prey, available for woodpeckers, in these areas.	Assuming Forest Plan standards are met, all alternatives would allow the Forest-wide red-headed woodpecker population to remain stable.
Pinyon jay	No effects are expected to this bird species under the no grazing alternative.	Grazing is not expected to impact the pinyon jay or its variable habitat.		Assuming Forest Plan standards are met, all alternatives would allow the Forest-wide pinyon jay population to remain stable.
PIF				
Swainson's hawk	Overall available habitat for predatory species would not change substantially; however, some foraging habitat would be enhanced.	Adverse effects to willows, nesting habitat. Livestock grazing would remove annual herbaceous growth, which may reduce prey availability in grasslands.		Assuming Forest Plan standards are met, all alternatives would allow the Forest-wide Swainson's hawk population to remain stable.
Demand Species				
Rocky Mountain elk and mule deer	Beneficial effects to riparian/hardwood habitats used by elk/deer, possible long-term adverse effects to forage quality. Removal of fences /gates would benefit deer/elk.	Loss of forage and fawning /calving cover to livestock. Displacement due to livestock and associated activities.	Same effects as Alternative 2; however, some riparian areas would improve due to exclosure fencing and movement/installation of stock tanks and dugouts. Fencing can effect deer and elk movement but the benefit to riparian habitat improvement would outweigh the small amount of fencing proposed; fence impacts would be minimized with implementation of project design features. Upland forage quality could improve over the long-term with grazing at appropriate levels.	Assuming Forest Plan standards are met, all alternatives would allow the Forest-wide elk and mule deer populations to remain stable.

Implementation of alternative 3 would improve habitat for riparian-dependent species; this improvement would be greater than under alternative 2. Implementation of alternative 3 would result in a determination of no impact to 13 sensitive species. Implementation of alternative 3 may impact six sensitive species, but would not result in a trend toward Federal listing or loss of viability. All 17 SOLC and 7 MIS populations would persist and habitat would improve due to riparian area protections and management changes. All 5 migratory bird populations and 1 PIF species would remain stable and habitat would improve due to riparian area protections and management changes. Elk and deer populations would remain stable and habitat would improve due to riparian area protections, improvement in forage quality and management changes.

Under alternative 3 (proposed action), more riparian/resource areas would be protected from livestock use. The French Creek pasture within the French Creek Allotment would benefit greatly from this alternative. Portions of the creek would be excluded from livestock use permanently and the remainder would be monitored for use after a period of rest. Therefore, those species using riparian areas (such as northern leopard frog, song sparrow, land snails, Black Hills redbelly snake) would benefit from management under alternative 3 when compared to alternative 2. While some species can be negatively affected by additional fencing (e.g. elk and deer), the benefit to riparian habitat improvement would outweigh the small amount of fencing proposed; fence impacts would be minimized with implementation of project design features. Alternative 3 would be able to move towards Forest riparian habitat objectives and meet Forest standards and guidelines more quickly than alternative 2. Riparian/aquatic species would see the most benefits under alternative 1 (no grazing). Between alternatives 2 and 3, riparian species would see the most benefit under alternative 3. Alternative 3 better meets the purpose and need for this project when compared to alternative 2.

The differences in upland habitat between alternatives 2 and 3 would be less noticeable. The Water Draw Allotment has been livestock-free for several years. Under alternative 3, 50 cow/calf pairs would be permitted in this allotment. They would be removed from the French Creek Allotment. This would benefit habitats in the French Creek Allotment. The six riparian areas on the Water Draw Allotment would be protected from livestock use under Alternative 3. The uplands in the Water Draw Allotment may benefit from grazing under Alternative 3; thatch is currently dense and this would improve with grazing as would the rejuvenation of grasses and forbs with ungulate grazing. Under alternative 1 (in all allotments other than Water Draw, which is currently not grazed), more browse plants and fawning/calving cover would be available for wild ungulates when compared to Alternatives 2 and 3. Under Alternatives 2 and 3, browse species and fawning/calving cover would continue to be available for ungulates. Some decline in browse and cover could occur when livestock are re-introduced to the Water Draw Allotment under Alternative 3. Birds, needing shrubs and ground cover for nesting, could see benefits under Alternative 1 in five of the allotments. Under Alternative 2, the Water Draw Allotment would continue to not be grazed and therefore upland bird habitat would remain suitable. Populations, however, would remain stable under Alternative 3.

Table 15 summarizes the effects to all wildlife species/groups of species analyzed. Determinations are based on meeting Forest standards and guidelines. Refer to the

Wildlife Report and Wildlife Biological Assessment and Evaluation for detailed evaluations (Clark 2010a and 2010b).

Fisheries

Methodology

Fish species occurrence in the analysis area was based upon the best available data including Ford (1988), Isaak et al. (2003), the South Dakota Department of Game, Fish and Parks (SDGFP) Stream Fisheries Database (2009), and Belica and Nibbelink (2006). A site visit was conducted in May 2008 on the French Creek Allotment to compare existing conditions to desired conditions, with an emphasis on aquatic/riparian areas. This section is compiled from information contained in the Fisheries Report prepared for this project (Hirtzel 2010).

Livestock grazing primarily affects fisheries through the modification of aquatic and riparian habitat. In order to compare alternatives, the following measurable indicators have been developed:

- changes in fish habitat quality and stream connectivity

There are no federally threatened, endangered, or proposed fish species known to occur or likely to be affected by management activities on the Black Hills National Forest nor any designated critical habitat (USDI Fish and Wildlife Service 2010).

The finescale dace, lake chub, and mountain sucker are Region 2 sensitive species that are known to occur on the Black Hills National Forest. The mountain sucker is also designated as a management indicator species (MIS). Stream surveys conducted by the SDGFP in 1994 and 2004 did not collect mountain suckers in the analysis area. Therefore, range management activities in this analysis area would have no impact on the mountain sucker given its absence in the analysis area. This project would have no effect on the Forest-wide population or habitat trend for the mountain sucker (objective 238d).

Neither the finescale dace (*Phoxinus neogaeus*) nor the lake chub occur in the analysis area (Isaak et al. 2003). Subsequently, there would be no impact to either the finescale dace or the lake chub.

This effects analysis assumes that funding is available to implement the proposed action, that implementation and effectiveness monitoring occurs, and any subsequent adaptive management actions that may be needed are taken in a timely manner so that the desired condition is achieved in a reasonable timeframe. The cumulative effects area is bounded in time as the next 10 to 15 years and is bounded in space as the upper French Creek and Ruby Creek Watersheds downstream to West Dam on French Creek.

Affected Environment

Suitable and occupied fish habitat is limited to French Creek and Ruby Creek in the French Creek Allotment. Minimal fisheries surveys have been completed in the analysis area due to the limited amount of suitable fish habitat. Native fish species documented (SDGFP 2009) in the analysis area include creek chub, fathead minnow, and white sucker (table 16). French Creek from the headwaters to the town of Custer and Ruby Creek are

assigned the designated use of coldwater marginal fish life propagation. French Creek is not attaining this use because of low dissolved oxygen levels due to drought-related causes and natural sources (SD DENR 2010). The state will be completing a full assessment of French Creek in summer 2010 which should provide updated information on this situation. See the soil and water sections of this document for more information on watershed conditions.

Recreational fishing opportunities in the Black Hills are sustained by non-native gamefish species, primarily brook, brown or rainbow trout. None of these species have been reported or stocked in French Creek or Ruby Creek.

Table 16. Fish and suitable habitat in the analysis area (SDGFP 2009)

Allotment/Water Body	Fish Species Present
French Creek Allotment	
French Creek	Creek chub, fathead minnow, white sucker
North Fork French Creek	Creek chub, fathead minnow
South Fork French Creek	No fish
Ruby Creek	Creek chub

Environmental Consequences

There would be no direct, indirect, or cumulative effects to fisheries under any of the alternatives on the Bull Flats, Lithograph, Lower Beaver, Tepee, and Water Draw Allotments due to the lack of suitable occupied fish habitat.

Alternative 1 – No Action

Direct and Indirect Effects

There would be no direct effects (fish injury or mortality) with the removal of livestock from the French Creek Allotment. This alternative would have the beneficial indirect effect of providing for the quickest and most permanent attainment of the desired condition, specific to riparian vegetation and aquatic conditions along French and Ruby creeks. This would improve spawning, rearing, and feeding habitat for native, non-game fish species. Stream connectivity would not be affected because no new instream barriers would be constructed nor would any existing instream structures be removed. Additional information on the effects to aquatic and riparian habitat conditions, which constitute the indirect effects to fisheries, is disclosed in the hydrology, botany, and wildlife analyses.

Cumulative Effects

The removal of livestock would have a positive incremental impact in reducing sediment input and improving bank stability on French Creek that would be additive to stream habitat improvement expected from the Forest-wide travel management decision that restricted motorized off-road travel and reduced the number of stream crossings on French Creek that are open to the public. Any realized improvements to aquatic and riparian habitat conditions along French Creek would probably not be of a magnitude to support a recreational coldwater fishery, nor offset some of the stream channel and floodplain disturbance from historic mining activity. The coldwater marginal fish use assigned to French Creek may continue to be impaired due to natural sources and drought-related impacts. Native, nongame fish species would benefit when stream flow

conditions are adequate, which would be influenced primarily by rainfall amounts. Instream barriers on French Creek, such as West Dam downstream of the French Creek Allotment boundary, would continue to preclude the upstream movement of fish into this improved aquatic habitat. This alternative best meets Forest Plan (objective 219, standard 1201 and guideline 3212) and Regional Watershed Conservation Practices Handbook direction related to fisheries.

Alternative 2 – Current Management

Direct/Indirect Effects

The direct effects to fisheries from livestock grazing relate to the potential for livestock to trample fish eggs and larvae during the fish spawning, incubation, and rearing season. This impact is expected to be negligible given the relatively short egg incubation and emergence time of native fish species, the lack of non-native trout in French Creek and Ruby Creek, and the fact that livestock are not impacting all suitable stream habitat during the spawning, incubation or rearing season.

Indirect effects to fisheries result from the aquatic and riparian habitat modification caused by livestock grazing (USDA Forest Service 2005b). Streambank alteration caused by livestock results in wider stream channels, increased sediment input, and reduced streambank cover. Increased sediment input reduces pool depth, degrades spawning habitat suitability, and reduces food availability for fish that are native to Black Hills streams. Pool depth is a critical element in the overwintering survival of fish on the Black Hills. Wider stream channels and reduced streambank cover may increase the water temperature and reduce protective cover for fish. Additional information on the effects to aquatic and riparian habitat conditions, which constitute the indirect effects to fisheries, is disclosed in the hydrology, botany, and wildlife analyses.

Cumulative Effects

Alternative 2 would continue to have a negative incremental impact on aquatic and riparian habitat conditions along French Creek. The coldwater marginal fish use assigned to French Creek is likely to remain impaired due to natural sources and drought-related impacts. Stream conditions are not likely to improve to a degree that would sustain a recreational coldwater fishery, nor offset the stream and floodplain degradation due to historic mining activities on French Creek. Improved aquatic and riparian habitat conditions predicted to occur with implementation of the recent Forest-wide travel management decision may be partially negated by continued livestock grazing under this alternative. Stream connectivity would remain unchanged because no instream barriers are proposed for removal or to be constructed. If the existing condition persists, this alternative would not meet the intent of Forest Plan guideline 3212 or the Regional Watershed Conservation Practices Handbook percent stable streambank design criteria on French Creek.

Alternative 3 – Proposed Action

Direct/Indirect Effects

Direct effects are likely to be similar to those occurring under current management practices. The proposed creation of a four-pasture deferred-rotation-grazing system (the existing Pope Springs Unit would be split into a north and a south pasture) with a 50 head

reduction in permitted numbers on the French Creek Allotment could reduce this direct effect. With the exception of the complete exclusion of livestock access to French and Ruby creeks during the fish spawning season, this potential effect is greater than under the no-grazing alternative, but probably still negligible.

A number of actions are proposed in the French Creek Allotment to address aquatic and riparian habitat concerns (see the "Alternatives" descriptions in chapter 2). Upon the successful implementation of these actions, the negative indirect effects to fisheries are reduced compared to alternative 2, but are still greater than alternative 1 (no grazing). Additional information on the effects to aquatic and riparian habitat conditions, which constitute the indirect effects to fisheries, is disclosed in the hydrology, botany, and wildlife analyses.

Appendix E displays effects to fisheries from implementing adaptive management options (table 4) that could be used during the implementation of alternative 3.

Cumulative Effects

Alternative 3 is predicted to have a positive incremental impact on improving aquatic and riparian habitat conditions along French Creek, but to a lesser degree than alternative 1. This positive incremental impact is probably not enough to attain the coldwater marginal fish use that is impaired due to low dissolved oxygen levels caused by natural sources and drought-related impacts. This positive impact would be additive to the positive impact resulting from the Forest-wide travel management decision which reduced motor vehicle use adjacent to French Creek, but is not enough to offset the stream and floodplain degradation on French Creek due to historic mining activities. Stream conditions are not likely to be improved to a degree that would sustain a recreational coldwater fishery. Stream connectivity would remain unchanged because no instream barriers are proposed for removal or to be constructed. Implementation of the proposed action and any subsequent adaptive management actions would be consistent with the Forest Plan (objective 219, standard 1201 and guideline 3212) and the Regional Watershed Conservation Practices Handbook percent stable streambank design criteria.

Summary

There would be no direct adverse effects to fish under alternative 1. Alternatives 2 and 3 may directly affect fisheries if livestock trample fish eggs and larvae during the spawning, incubation, or rearing season. This impact is likely to be negligible.

Alternative 1 has positive indirect effects because the desired aquatic and riparian habitat conditions along French Creek and Ruby Creek would be attained in the least amount of time and be maintained with the greatest certainty. Under alternative 2, localized stream sites where the desired condition is not currently being met are likely to persist. Alternative 3 and the implementation of adaptive management actions is anticipated to achieve the desired condition, but not with the expediency or certainty expected under alternative 1.

Alternative 1 has the greatest positive incremental impact on achieving the desired aquatic and riparian habitat condition, followed by alternative 3. This impact would be additive to other positive impacts resulting from the Forest-wide travel management decision that reduces the routes and areas open to motorized vehicle use adjacent to

French Creek. This additive incremental impact is not likely to improve stream habitat conditions to the degree that the existing coldwater marginal fish use would be attained let alone upgraded to a coldwater permanent fish use, nor would stream conditions improve to the degree that a recreational coldwater fishery would be sustainable. Alternative 2 lacks the positive incremental benefits expected in alternatives 1 and 3. None of the alternatives have a cumulative effect on stream connectivity because no existing instream barriers that block fish are currently proposed for removal and no new instream structures are proposed. Executive Orders 12962 and 13474 on recreational fisheries have minimal applicability because of the marginal stream habitat in the analysis area.

Cultural Resources

Methodology

Cultural resources include archaeological, historical, ethnographic and tribal resources; these are considered irreplaceable and nonrenewable resources. Forest Service policy (FSM 2361.3) requires that projects with the potential to affect cultural resources be surveyed to comply with 36 CFR_800 (protection of historic properties); the National Historic Preservation Act (NHPA) of 1966, as amended; the Archeological Resources Protection Act (ARPA) of 1979; the National Environmental Policy Act (NEPA) of 1969; the Native American Graves Protection and Repatriation Act (NAGPRA) of 1990; and the American Indian Religious Freedom Act (AIRFA) of 1978. To comply with these laws, any cultural resources known to be 50 years or older are recorded according to State Historic Preservation Office standards, evaluated for eligibility to the National Register of Historic Places (NRHP), and assessed for potential effects from the proposed action alternatives.

A review of past survey results and any recorded sites within the project area was conducted prior to any fieldwork. Locations to survey within these grazing allotments were based on established cultural resource inventory protocols. The South Dakota State Historic Preservation Officer (SHPO) reviewed the survey strategy and concurred with the research methods on April 25, 2008 (SHPO Project #080318007F). Criteria outlined within this survey strategy require the consideration of cultural resources that fall within areas where the high susceptibility for livestock impact overlaps areas of high potential for cultural sites.

Surveys were conducted in May and June 2008 on a total of 4,843 acres within the Bull Flats, French Creek, and Water Draw Allotments (King et al. 2008), and within the Lithograph, Lower Beaver, and Teepee Allotments in July and August 2009 (King et al. 2009).

Livestock grazing can have both direct (e.g., trampling) and indirect impacts (e.g., reduced herbaceous cover which creates more site visibility and increases the risk of vandalism) to cultural resource sites. Effects to cultural resources are determined by the effects on their eligibility for listing on the National Register of Historic Places (NRHP). Sites that have not been evaluated for eligibility are treated as potentially-eligible properties and given the same protection as NRHP listed/eligible properties. For the purposes of this analysis, all confirmed cultural resource sites that have not been formally

evaluated are treated the same as NRHP-eligible sites. The following measurement indicators were used to evaluate the effects of livestock grazing within the project area:

- Location of sites and proximity to livestock concentration areas, and
- Determination of potential effects to the sites' eligibility for listing on the NRHP.

There are a total of 75 sites within the area of potential effect: 32 new sites were recorded based on these surveys, 19 of which were subsequently evaluated for listing on the NRHP. Forty-three previously known sites were also monitored for grazing impacts, of which 12 were also evaluated for listing on the NRHP.

Affected Environment

The Black Hills are part of the larger Northwestern Plains cultural area (Rom et al. 1996). Human occupation of this area has been divided into six broad cultural periods (Frison 1991) starting in the Paleo-Indian (11,500 B.P. to 7,000 B.P) through the Late-Prehistoric 1,500 B.P. to 500 B.P). Cultural sites have been located that represent all of the above prehistoric phases of occupation of the Black Hills (Rom et al. 1996). Identifiable tribal groups living within the Black Hills area during the Protohistoric period include the Kiowa, Crow, Arapaho, Cheyenne, and Sioux.

Certain Native American tribes consider the Black Hills to be sacred land. Their belief system links specific locations in and around the Black Hills to star constellations (Rom et al. 1996). These spiritually significant locations include but are not limited to: Devil's Tower, Old Baldy Mountain, Buffalo Gap, Reynolds Prairie, the Spearfish limestone "race track" that surrounds the Black Hills, and Harney Peak (Goodman 1992).

The historic context of the Black Hills overlaps the Protohistoric period, but is defined by Euro-American exploration and settlements in the area. Sporadic use of the Black Hills by Euro-Americans began in the early 1800s and consisted mainly of fur trappers and traders. The western half of South Dakota, including the Black Hills, portions of southern North Dakota, and nearly the entire area of the Powder River Basin in Wyoming and Montana was recognized as unceded Indian Territory by the 1868 treaty between the United States and the Sioux and Arapaho. More intense Euro-American occupation of the Black Hills began shortly after the discovery of gold in 1874. It was this discovery that brought a full scale and swift influx of Euro-American prospectors and miners to the Black Hills (Rom et al. 1996).

Historic settlement in the Black Hills by Euro-Americans is generally auxiliary to this history of the mining industry. Homestead patents are common from the late 1800s through the 1920s. Industries such as ranching and logging became common in the early 1900s (Rom et al. 1996). As these industries changed and homesteads failed, sites once bustling with human activity became abandoned. Today, the landscape is dotted with the remains of these early homesteads, the ranching infrastructure, as well as logging camps, usually presenting themselves as foundations, depressions can dumps, and historic artifact scatters.

A total of 75 historic properties have been identified within the area of potential effect; 3 on the Bull Flats Allotment; 8 on French Creek; 25 on Lithograph; 18 on Lower Beaver; 11 on Tepee; and 10 on Water Draw.

Environmental Consequences

Alternative 1 – No Action

Direct, Indirect, and Cumulative Effects

If there is no Federal action, then there is no undertaking, as defined in 36_CFR_800.16 (y), for section 106 of the National Historic Preservation Act (16 U.S.C 470f). Under this alternative livestock would no longer be grazed within the project area. Existing permits would be phased out. This by itself does not constitute an undertaking under section 106. However, at the point that existing improvements such as fences, gates, and pipelines are proposed for removal, this would constitute a new undertaking and further consultation would then be required with the SHPO and tribal governments to ensure site-specific effects are minimized or avoided.

Alternative 2 – Current Management and Alternative 3 – Proposed Action

Direct/ Indirect Effects

Because livestock grazing would continue under both alternatives 2 and 3, both alternatives have the potential for the same type and extent of adverse impacts to cultural resources. These include such effects as trampling and direct damage to sites if cattle congregate on a site, increasing bare ground around sites, and rubbing against historic cabins and damaging wood features. Several project design features have been developed to minimize the potential for direct, adverse impacts to known cultural sites within the allotments for either alternative (see chapter 2). These design features include ensuring livestock concentration areas avoid culturally sensitive areas and any newly discovered sites are considered. Indirect effects are also possible and include increased exposure of sites due to removal of vegetation, which can lead to looting, vandalism, and increased unauthorized off-highway vehicle activity. These effects would be negligible to minor, due to limited public access in the area. Proposed actions and monitoring are also a component of alternatives 2 and 3 (see table 5 and B-1). For purposes of section 106 consultation, implementation of either alternative 2 or 3 would result in **no adverse effect** to cultural resources. The South Dakota SHPO concurred with this finding on February 2, 2010. The cultural resources report provides more detail on this determination.

Implementation of adaptive management options (table 4) is an important component of alternative 3. Any of these options could be used during the implementation of alternative 3. Any new structural improvements or changes (such as new fences or tanks) would require additional site-specific section 106 review and consultation. Other actions that would not result in new ground disturbance (such as changed permitted numbers or seasons of use) would not result in direct, indirect or cumulative effects.

Cumulative Effects

Cumulative effects to cultural resources relate to the level of potential ground-disturbing activities within the project area. Actions listed in table 9 were reviewed for applicability to cultural resources. Forest management projects such as livestock grazing, and associated existing range projects, as well as timber harvest, recreation, road construction, pine encroachment treatments and prescribed burning, may have cumulative

effects to heritage resources by increasing soil erosion from surface disturbances, bringing additional people in contact with heritage resources by increasing visitor use and traffic, and affecting the fabric of historic structures. These impacts are difficult to quantify, but can be avoided or minimized through the implementation of appropriate site-specific management options through consultation with the SHPO and the Advisory Council on Historic Preservation.

Natural weathering and deterioration, erosion, fires, and other types of ongoing processes may contribute to cumulative effects to heritage resources. The proposed action, which would result in continuation of sanctioned management activities, could reduce adverse cumulative effects. This is because inventory and evaluation would be required under this proposal. The inventory and evaluation could lead to more heritage resources being located and a reduction of adverse cumulative effects caused by natural processes after heritage resources are brought under appropriate management. Recording and archiving basic information about archaeological sites in the proposed project areas serve to lower potential cumulative effects to cultural resources.

This project could contribute to cumulative effects of other projects in the form of disrupting site features, moving or breaking surface artifacts, trampling, and erosion. While these effects do not normally occur within a single grazing season they can result from continued, long-term grazing and become cumulative over time. These effects would be monitored as part of the proposed action based on current monitoring guidelines, and the site-specific monitoring stipulations recommended by the State and Tribal Historic Preservation Offices. With implementation of the proposed action, the contribution of effects from this project is expected to be very minor. These effects may be monitored at sites determined eligible for the NRHP. If the monitoring reveals adverse effects to historic properties, State and Tribal Historic Preservation Offices will be consulted.

By following a predictive model for determining the coincidence of cattle and human high probability areas, not all areas of possible effect were surveyed for cultural resources. Unidentified eligible and ineligible sites may exist in these un-surveyed areas. The un-surveyed portions of the allotment are less likely to be grazed, or are grazed much less intensively, thereby reducing the potential to affect cultural resources. If grazing patterns change, or if ground disturbance becomes necessary for maintenance of range improvements, additional cultural resource assessment is required to determine if additional survey is needed prior to implementation.

Cumulative effects could also occur to heritage resources as a result of non-sanctioned activities, such as vandalism or illegal excavation. Efforts to control and monitor these activities under the proposed action would result in a low level of cumulative effects.

Archaeological resources are non-renewable. Due to both natural and human processes, the loss of archaeological resources has happened in the past and would happen in the future. Over time fewer archaeological resources would be available to learn about past human life-ways, to study changes in human behavior through time, and to interpret the past to the public. However, cumulative effects to heritage resources as a result of sanctioned current management activities should be minimized because of the protection

and management measures that would be implemented through compliance with the National Historic Preservation Act.

Summary

Implementation of alternative 1 is not considered an undertaking for purposes of section 106 of the NHPA. If alternative 1 is selected for implementation, site-specific section 106 evaluations would need to occur to determine the potential for effects to cultural resources as a result of removal of range improvements.

Implementation of alternatives 2 and 3 would result in a **no adverse effect** determination under section 106 of the NHPA and the SHPO concurred with this finding on February 2, 2010. Project design features, proposed actions, and monitoring would apply to both alternatives that would minimize the potential for adverse effects.

Livestock Grazing and Economics

Methodology

Livestock grazing provides jobs and revenue to the local economy. Permitted AMs and how allotments are managed influences the economic viability of ranching operations. The economic analysis was assessed for the entire project area. The Quick-Silver economic program (USDA Forest Service 2008b) was used to compare the present net value (PNV) of the alternatives to both the Forest Service and the range permittees per allotment. Benefit:cost ratio and net annual equivalent were calculated for both the permittee and the Forest Service separately because certain grazing practices are more costly to one or the other. PNV is a way of comparing all monetarily valued costs and benefits and is calculated by subtracting the discounted sum of total costs from the discounted sum of total benefits.

PNVs are calculated over a 10-year period because this is a typical time frame for an allotment management plan.

For alternative 1, the analysis considered all costs associated with removing livestock grazing on the Forest. For purposes of analysis, costs to the Forest Service included the removal of all livestock fences, two-thirds of the water developments and half of the associated pipelines, and maintenance of the range improvements left intact for wildlife purposes.

For alternatives 2 and 3, the analysis considered all costs and benefits associated with grazing on the Forest, and calculated these over a 10-year period. Costs and benefits to the Forest Service included materials and other associated costs of range improvements provided by the Forest Service and grazing fees collected. Permit administration and monitoring costs were not analyzed, but should be taken into account when comparing alternatives. Costs and benefits to permittees include construction of range improvements, maintenance of range improvements, grazing fees, and grazing forage value. Annual expenses of grazing livestock such as salting, incidental livestock mortality, and veterinary costs were not accounted for in the economic analysis due to the variability of the factors involved and because they are not a result or condition of grazing on NFS lands.

Under alternative 3, only the initial adaptive management changes were included in the economic analysis. In most cases there is a range of adaptive management options that could be chosen and there is no way of knowing which options might be chosen in the future.

The value of the weight gained by livestock while grazing on NFS lands was not included for alternatives 2 or 3 because it is dependent on many factors that vary between allotments and permittees, including the breed of livestock, management strategies while on private lands, market conditions at the time of sale and other factors.

This section is compiled from information contained in the Range Report (Bindel 2010a) and the Economics Report (Reedy 2010) prepared for this project.

Changes in permitted numbers, range improvements, implementation of improvements can all affect the administration of livestock permits, operation costs, jobs and revenue, and the success in meeting project objectives. Differences in permitted numbers are limited to the French Creek and Water Draw Allotments, as shown in chapter 2 and summarized in tables 3 and 7. Existing number of range improvements for each allotment are summarized in chapter 2 and shown on allotment maps in appendix A. Proposed new range improvements under alternative 3 are discussed in detail for each allotment in chapter 3 and summarized in table 5. Permitted numbers and range improvements are considered in the economic analysis.

In order to compare alternatives, the following measurable indicators have been developed:

- Change in social and economic factors (costs and benefits) associated with grazing on the Forest (measured through PNV, using the factors described above).
- Changes in permit administration for the French Creek Allotment and changes in conflicts with private land owners.

Affected Environment

Social and Economic Factors. The first step in the analysis of economic effects was to identify the counties and communities with economic dependencies associated with livestock grazing on the Black Hills National Forest, and particularly those in the project area. For the purpose of this analysis, only those communities located most closely to the Black Hills National Forest were included. The counties considered most vulnerable to decisions within the project area are Custer and Pennington counties, SD, and Weston County, WY. Five of the allotments are located entirely within Custer County, while one allotment is located in Custer, Pennington, and Weston counties. The communities of Custer, SD (population 1,860) and Newcastle, WY (population 3,065), were considered those most likely to be affected based on their proximity to the project area.

Every county's economy is fueled by one or more sectors that provide jobs and income throughout the area. Jobs and income are dependent upon the size and vitality of these economic sectors. The health of the economy is dependent not only on strong economic sectors, but upon a diversified range of sectors. If a county's economy is heavily dependent on only one industrial segment, it may be vulnerable to declines in prosperity if business conditions for that industry turn downward. Economies that are diversified are

more resilient and far less vulnerable to downturns resulting from adverse conditions in any one sector.

In 2007, agriculture (farming and ranching) accounted for about 6.6 percent of jobs in Custer County, 1.1 percent in Pennington County, and approximately 5.5 percent of jobs in Weston County (U.S. Bureau of Economic Analysis). Of agricultural products sold in 2007, livestock made up 96 percent of sales in Custer County, 67 percent of sales in Pennington County, and 97 percent of sales in Weston County (USDA-NASS).

Demographics. Based on population estimates for 2008, Custer County has a population of 7,811 with a population increase of 7.4 percent since 2000; Pennington County has a population of 98,533 with a growth rate of 11.2 percent; and Weston County has a population of 7,022, a 5.7 percent increase since 2000. Comparatively, the State of South Dakota as a whole has increased by 6.5 percent from 2000 to 2008 and the State of Wyoming has increased by 7.9 percent (U.S. Census Bureau).

Ethnicity is predominantly Caucasian in Custer County (93.9 percent), Pennington County (86.7 percent) and Weston County (96.6 percent). In 2000 the median age in Custer, SD, was 41.7 years and the median age in Newcastle, WY, was 40.1 years (U.S. Census Bureau).

Geography. Custer County encompasses 1,558 square miles of land area. According to data from the census year 2000, there are approximately five people per square mile in Custer County. Pennington County comprises 2,776 square miles with a population density of 32 people per square mile compared to an average population density of approximately 10 people per square mile for the State of South Dakota as a whole. Weston County comprises 2,398 square miles with a population density of approximately three people per square mile compared to an average population density of about five people per square mile for the State of Wyoming as a whole (U.S. Census Bureau).

Employment and Income. Custer, Pennington, and Weston Counties have fairly diverse economies with service, mining, ranching, retail, construction, government, professional, and education-related jobs contributing to the economic base. Agriculture is a smaller portion of the economy than it once was; but adds to the diversity of the county and the surrounding communities. Income from ranching is highly variable. Ranching operations in the area often operate at a loss or close to the margin and the profitability can be significantly affected by a variation of market conditions. If access to Federal lands for grazing is altered significantly, this change could affect ranching profits and overall business viability.

Social Environment. In addition to the economic factors, ranching contributes to the social fabric of both Custer and Newcastle, and it is an important part of the people's heritage in Custer, Pennington, and Weston counties. Ranching has a long history in the local communities dating back to the late 1800s. Many of the local ranching families are direct descendants of the area's earliest settlers while others have moved to the area more recently. The allotments within the Hell Canyon Range 2010 Project area support 15 permittees and their families. The use of the National Forests has been an integral part of the management of these ranches for many years and contributes to the viability of their agricultural operations.

Grazing Fees. The Public Rangelands Improvement Act of 1978 declared that "vast segments of the public rangelands are producing less than their potential for livestock, wildlife, habitat, recreation, forage, and water and soil conservation benefits…" The act further declared that "…to prevent economic disruption and harm to the western livestock industry, it is in the public interest to charge a fee for livestock grazing permits and leases on the public lands which is based on a formula reflecting annual changes in the costs of production…" Guidance for implementation of grazing fees is found in 36 CFR 222, subpart C. These regulations state that: "… the calculated grazing fee for 1988 and subsequent grazing fee years represent the economic value of the use of the land to the user and is the product of multiplying the base fair market value of $1.23 by the result of the annual Forage Value Index, added to the sum of the Beef Cattle Price Index minus the Prices Paid Index and divided by 100: provided that the annual increase or decrease in such fee for any given year shall be limited to not more than or minus 25 percent of the previous year's fee, and provided further that the fee shall not be less than $1.35 per head per month."

While the act established that grazing on public land was in the public interest, it did not require that the grazing programs administered by land management agencies, such as the Forest Service, achieve a profit from grazing.

French Creek Allotment Permit Administration. The French Creek Allotment is located approximately 1 mile west of Custer, SD, and includes a total of 10,128 acres of land, all of which is NFS land. While not part of the allotment, there are many private land parcels interspersed throughout the area. A rest rotation system started on the French Creek Allotment in 1960 and continued through 2007. In 2007, it was changed to a deferred rotation grazing system with a use period of June 1–September 30. The amount and distribution of private land parcels throughout the French Creek Allotment makes management difficult in this area. The last AMP was approved in 1991.

Environmental Consequences

Alternative 1

Direct/Indirect Effects

Social and Economic Factors. As shown in table 17, alternative 1 would result in a loss in revenue to all affected permittees and a short-term (estimated over a 10-year period) financial loss of nearly $673,000 to the Forest Service due to costs associated with removal of all livestock fences, two-thirds of the water developments, and half of the associated pipelines, and maintenance of the range improvements left intact for wildlife purposes.

Table 17. Comparison of economic cost (PNV) by alternative for each allotment

Allotment	Alternative 1	Alternative 2	Alternative 3
Bull Flats			
Permittee Cost	NA	($11,480)	($11,480)
USFS Cost	($113,560)	$910	$910
French Creek			
Permittee Cost	NA	$71,940	$1,780
USFS Cost	($52,070)	$2,000	($72,250)
Lithograph			
Permittee Cost	NA	$129,430	$127,640
USFS Cost	($106,570)	($3,720)	($7,280)
Lower Beaver			
Permittee Cost	NA	$173,140	$171,480
USFS Cost	($171,040)	$3,620	$520
Tepee			
Permittee Cost	NA	$182,220	$173,320
USFS Cost	($144,300)	($8,480)	($23,670)
Water Draw			
Permittee Cost	NA	NA	($27,430)
USFS Cost	($85,270)	($48,070)	($46,690)
All Allotments–Total Permittee Cost	**NA**	**$545,250**	**$435,320**
All Allotments–Total USFS Cost	**($672,810)**	**($53,740)**	**($150,370)**

In the long term (greater than 10 years), total removal of livestock grazing would eventually eliminate all costs and benefits to the Forest Service for administration and monitoring of the livestock grazing program. Since the costs of grazing administration are not completely offset by the grazing fees collected, this alternative would benefit the Forest Service by reducing a negative cash flow. However, the Forest Service is not required to maintain a positive cash flow from the grazing program as discussed above.

Alternative 1 would eliminate all benefits to permittees and would require the permittees (15 families) to either find other locations for grazing or lose this source of income. The loss of these ranching operations could cause landowners to sell their private land to developers; this would affect the social fabric of these communities.

French Creek Allotment Permit Administration. Because all livestock would be removed from this allotment, the current permit administration and management challenges related to numerous scattered private land parcels would be eliminated. This alternative goes the furthest in addressing this project objective.

Alternatives 2 and 3

Direct/Indirect Effects

Social and Economic Factors. As shown in table 17, alternative 2 would result in revenue to the permittees for all allotments except Bull Flats and Water Draw. The forage value received from Bull Flats does not outweigh the cost of grazing fees and maintenance of range improvements and Water Draw would not be grazed under Alternative 2. When comparing alternatives 2 and 3, permittee revenue is quite similar for the Bull Flats, Lithograph, Lower Beaver, and Tepee Allotments. There are differences for French Creek and Water Draw, because alternative 3 includes multiple range improvements for both of these allotments, and the cost of these would be greater than the forage value on these allotments, over the short term (10 years).

The values shown in Table 17 for total cost for all permittees combined are positive, which means that, in terms of PNV, the benefits the permittees receive (grazing forage value) outweigh the costs of implementing either alternative.

Under alternative 2, the Forest Service would incur costs on the Lithograph, Tepee, and Water Draw Allotments by implementing range improvements that would address heritage resource concerns but would realize revenue for Bull Flats, French Creek, and Lower Beaver Allotment because no new actions would occur in these allotments that would detract from the grazing fees collected. However, under alternative 3, the Forest Service would incur higher costs, primarily due to increases on the French Creek, Lithograph, and Tepee Allotments. This is due to the greater number of proposed actions occurring in these three allotments.

Because of the increase in the number of range improvements, adaptive management options, and additional monitoring, implementation of alternative 3 would result in a higher cost to the Forest Service and generation of lower revenue to permittees (for all allotments combined) than alternative 2.

Alternatives 2 and 3 would both provide some economic value to the local communities.

French Creek Allotment Permit Administration. Because livestock grazing would continue on the French Creek Allotment under alternatives 2 and 3, management challenges related to numerous scattered private land parcels would continue. However, alternative 3 would improve grazing efficiency through creation of a one permit operation. There would be greater flexibility in implementing adaptive management decisions in the allotment with one permittee rather than three.

An increase in efficiency relating to management of the allotment by one permit would also be reflected in relationships with adjacent private property owners. The intermingled ownership creates additional complexities in management of livestock. Private property owners often do not understand rules and regulation associated with livestock on Federal lands adjacent to private land. One permittee with one herd of livestock would open communications between permittee, private landowner, and the Forest Service.

Cumulative Effects

There are many outside influences that affect the economic viability of ranching operations including livestock market conditions, weather patterns, governmental regulation, occurrence of diseases, and international trade policies.

Within the local counties, the overall volume of livestock-related jobs in the local economy is quite small; hence, the economy-wide impacts between the alternatives are quite small. However, the direct and indirect effects may be considerable for individual persons, families, or businesses within the analysis area. Within the rural communities of the surrounding area, particularly in very small communities, the loss of a single job may be very important to that community, even though it may be barely noticeable within the larger economy.

The American Farmland Trust (2006) found that from 1992 to 1997, more than 11 million acres of rural land in the United States were converted to developed use—more than half of that conversion was from agricultural land. In that same period, an average of more than 1 million agricultural acres was developed each year. The rate is increasing: up

51 percent from the rate reported in the previous decade. If these local ranching operations become economically unviable, it is likely that the ranches would be sold, broken up, and developed for residential properties or converted to other uses. Gradually the ranching component of the social setting could be decreased or lost.

Summary

The comparison between alternatives gives a valid portrayal of the relative costs to the permittees. This method also gives a valid comparison of the total cost to the Forest Service for grazing these allotments under both alternatives.

Alternatives 2 and 3 would provide some economic value to the local communities. The effects of the alternatives on the social setting are directly tied to the economic effects. Alternative 1 could affect the viability of those operations and move them toward economic demise. The loss of these ranching operations could force landowners to sell to developers and affect the social fabric of the communities. Alternatives 2 and 3 would have greater benefits to local ranchers and are more likely to maintain cattle ranching in the local communities.

Alternatives 2 and 3 would help with the attainment of Forest Plan goal 8 and Forest Plan objectives 803 and 804. Alternative 1 would not help attain these goals and objectives.

Climate Change

Methodology

The methods used to assess how success of the alternatives could be affected by climate change and the predicted impacts of the alternatives on climate change came primarily from guidance in the Climate Change Considerations in Project Level NEPA Analysis (USDA Forest Service 2009b), information provided by the Climate Change Resource Center found at (http://www.fs.fed.us/ccrc/topics/landscape-analysis.shtml) and a white paper prepared by the Sawtooth National Forest specific to livestock grazing (Brown et al. 2008).

Livestock grazing can result in release of greenhouse gases through enteric fermentation and manure. Livestock grazing can also contribute to alteration of rangelands and habitat quality through grazing practices and contribute to large pulses of greenhouse gas emissions through a decrease in the potential for high-intensity wildfire through consumption of fine fuels. The effect of climate change on the proposed project includes changes in rainfall and temperature patterns over time that can influence the forage capacity in the project area over the long term.

Affected Environment

Elevation ranges from 2,440 to 9,320 feet and in some areas the terrain is rugged and steep. The project area has a semi-arid climate with low humidity throughout the year. Temperatures range from 100^{o} F during the summer months to well below 0^{o} F in winter. Average annual precipitation is approximately 19 inches (Driscoll et al. 2002). The largest precipitation amounts typically occur during May and June, and the smallest amounts typically occur during November through February (Driscoll et al. 2002).

Localized intense thunder cells associated with the monsoons can produce much greater rain than surrounding areas within one storm event (Fact Sheet Team 2001).

The temperature of the Earth's atmosphere is regulated by a balance between amount of radiation received from the sun that is reflected by the earth's surface and clouds, and the amount of radiation absorbed by the earth and atmosphere. Greenhouse gases, which include carbon dioxide, methane, nitrous oxide and other gases, keep the Earth's surface warmer than it would be otherwise because they absorb infrared radiation from the Earth and, in turn, radiate this energy back down to the surface. This insulating effect, known as the greenhouse effect, moderates atmospheric temperatures and keeps the Earth warm enough to support life (GAO 2006). While these gases occur naturally in the atmosphere, there has been a rapid increase in concentrations of greenhouse gases in the Earth's atmosphere from human causes since the start of industrialization, which has caused concerns over potential changes in the global climate. For over the past 200 years, the burning of fossil fuels, such as coal and oil, and deforestation has caused the concentrations of heat-trapping greenhouse gases to increase significantly in our atmosphere. These gases prevent heat from escaping to space, somewhat like the glass panels of a greenhouse (EPA 2009).

The Intergovernmental Panel on Climate Change (IPCC), a leading source for international climate expertise, noted in April 2007 that "observational evidence from all continents and most oceans shows that many natural systems are being affected by regional climate changes, particularly temperature increases." The IPCC further noted that climate change has, in some areas, led to rising sea levels, declining snow cover, melting glacial and Arctic ice, coral bleaching, and changes in the timing and amount of precipitation, among other things (IPCC 2007).

The primary greenhouse gas emitted by human activities in the United States in 2006 was carbon dioxide (CO_2), representing approximately 85 percent of total greenhouse gas emissions. The largest source of CO_2, and of overall greenhouse gas emissions, was fossil fuel combustion. Methane (CH_4) emissions, which have declined from 1990 levels, resulted primarily from enteric fermentation associated with domestic livestock, decomposition of wastes in landfills, and natural gas systems (Brown et al. 2008).

Methane is more than 20 times as effective as carbon dioxide at trapping heat in the atmosphere. Over the last 250 years, the concentration of methane in the atmosphere increased by 148 percent (IPCC 2007 [in Brown et al. 2008]). Anthropogenic sources of methane include landfills, natural gas and petroleum systems, agricultural activities, coal mining, wastewater treatment, stationary and mobile combustion, and certain industrial processes. Methane emissions from enteric fermentation and manure management represented about 23 percent and 7 percent of total methane emissions from anthropogenic activities, respectively, in 2006. An adult cow emits between 55 to 110 kilograms of methane annually. There are approximately 100 million cattle in the United States, which emit about 5.5 million metric tons of methane per year (http://www.epa.gov/oeaagct/anprgbmp.html). Calculations to determine the methane output from livestock grazing permitted on the Black Hills National Forest as a whole has not been conducted but a rough calculation was prepared for projected methane production in the project area (Bindel 2010b). The range of methane emitted by permitted livestock grazing contributes about 0.0006 percent to about 0.0012 percent to the national

methane output. This is similar to an estimate prepared on the Sawtooth National Forest where the range of methane calculated for permitted livestock grazing in 2007 for the whole Forest contributed about 0.01 percent to 0.02 percent to the national methane output (Brown et al. 2008).

Forests play a major role in the carbon cycle. The carbon stored in live biomass, dead plant material, and soil represents the balance between CO_2 absorbed from the atmosphere and its release through respiration, decomposition, and burning. Over longer time periods, indeed as long as forests exist, they would continue to absorb carbon (USDA Forest Service 2009b).

Ongoing climate change research is summarized in reports by the United Nations Intergovernmental Panel on Climate Change (IPCC) (www.ipcc.ch), U.S. Climate Change Science Program's Science Synthesis and Assessment Products, and the U.S. Global Change Research Program. These reports concluded that climate is already changing; that the change would accelerate, and that human greenhouse gas emissions, primarily carbon dioxide emissions, are the main source of accelerated climate change (USDA Forest Service 2009b). Regional Great Plains predictions found on the 2009 United States Global Climate Change website states that (1) increases in temperature, evaporation, and drought frequency are possible out to year 2099 and that there may be a decline in water resources if it continues unabated; and (2) agriculture, ranching, and natural lands, already under pressure due to an increasingly limited water supply, would also be stressed by rising temperatures.

Environmental Consequences

Alternative 1 – No Action

Direct, Indirect, and Cumulative Effects

Literature on climate change indicates that restoration of degraded habitats and maintaining resilient habitats is an effective tool for land managers to deal with climate change, as reinforced by Brennan 2008 and CCSP 2009. From a global perspective, stresses caused by climate change could be exacerbated by existing stresses on ecosystems from such sources as pollution, human settlement, land-use change, and invasion by nonnative species. Together, climate change and ecosystem stresses may cause substantial damage to, or the complete loss of, some ecosystems and the extinction of species. Furthermore, scientists project that changes in temperature and precipitation may result in more extreme weather events, such as more frequent and severe droughts, storms, and floods (GAO Report 2007). Therefore, reducing stressors and enhancing ecosystem resiliency are tools managers could use at a regional or local scale to address changing environmental conditions.

Removal of livestock grazing from the project area would not result in direct greenhouse gas emissions or direct changes in climate or overall vegetation patterns. Carbon would remain sequestered in the forested portions of the project area. Methane would not be produced by livestock on those portions of the project area on Forest Service land. It is also likely that all or most of the livestock would be moved off-Forest and out of the district, reducing methane production even more. This reduction in methane production (on six allotments out of approximately 135 allotments on the Forest), would not be

measurable. As discussed above, estimated calculations of methane emitted by permitted livestock grazing in the project area contributes much less than 1 percent of the methane production to the national annual output; a removal of livestock from these six allotments in the project area would then not appreciably change (positively or negatively) this predicted output.

As discussed in other resource sections of this chapter, removal of livestock grazing could result in short-term, and in some cases, long-term, benefits to natural resources including rangeland condition and riparian area health in the project area. However, totally removing livestock would actually reduce management flexibility and would decrease variability and the mosaic of vegetation conditions across the landscape. While Alternative 1 would result in some benefits to natural resources in the short-term, other sections of this chapter discuss that removing livestock is not necessarily the best way to maintain diverse, productive, healthy, vigorous plant communities in the long-term; Improved riparian conditions, for example, is part of the purpose and need for action. Since the national forests were created in part for "securing favorable conditions of water flows," managing vegetation to restore and enhance ecological processes and functions would also provide more favorable conditions for adapting to a changing climate.

Continual severe livestock grazing could be considered to be a stressor to the ecological site where those impacts are occurring; removal of this stressor may in the short-term provide habitat improvement. However, because rangeland conditions in the project area are generally good, trends in condition are stable or upward, and continued severe livestock grazing is not occurring, there is no indication that a total removal of livestock would be necessary to achieve habitat restoration, increased resiliency, or enhanced management flexibility.

Alternatives 2 and 3

Direct/Indirect and Cumulative Effects

Both alternative 2 and 3 would authorize livestock grazing in the project area which would result in the production of the greenhouse gas, methane, by permitted livestock. However, as discussed above, this production is extremely small when compared to that of the nation, or in global context. This project-level contribution to greenhouse gas emissions would not be significant enough to measure.

To increase ecosystem resilience, a number of approaches have been put forth for use in adaptive management (Julius et al. 2008 cited in CCSP 2009). These include, among other things, avoiding landscape fragmentation and restoring connectivity and reducing stressors (Scott and Lemieux 2005 and Groffman et al. 2006 cited in CCSP 2009). Use of adaptive management is an extremely useful tool to deal with changing climatic conditions and environmental variability (CCSP 2009). Increasing resiliency and reducing stressors are challenges that are difficult to plan for. Providing management flexibility through the use of adaptive management techniques and tools, as described for Alternative 3, would contribute.

Alternative 3 is in compliance with Forest Plan direction and thus would provide resource conditions that are resilient to changing climatic conditions. Alternative 3 includes site-specific proposed actions to address concern areas, enhanced monitoring and the implementation of adaptive management. For these reasons, Alternative 3 would result in

resource conditions more resilient to long-term changes and would provide more management flexibility to respond to these changes in both the short- and long-term, when compared to Alternative 2.

Assembling a toolbox of short-term and long-term strategies for building resistance and resilience in ecosystems may be key to addressing climate change. Alternative 3, by incorporating adaptive management, does this by providing the management flexibility to implement needed changes quickly on the ground.

Summary

At this time there are no regulations to limit greenhouse gas emissions. The current state of science does not allow for site-specific analysis of greenhouse gas emissions at local or regional levels. Likewise, global climate change models are not yet able to determine specific impacts of greenhouse gases on local climate patterns. Methane production would differ between the alternatives and, for alternatives 2 and 3, would contribute to greenhouse gas emissions, but this would not be measurable at larger scales.

By complying with Forest Plan direction, each alternative would maintain resilient habitats which may function better under changing climatic conditions, but Alternative 3 provides the greatest opportunity for achieving this due to maintenance of diverse, productive, healthy, vigorous plant communities in the long-term. Alternative 3 also provides for enhanced management flexibility through the application of adaptive management.

Glossary

Adaptive Management ~ A type of natural resource management in which decisions are made as part of an ongoing process. Adaptive management involves testing, monitoring, evaluating, and incorporating new knowledge into management approaches based on scientific findings and the needs of society. Results are used to modify management policy.

Adaptive Management (as defined in this EA) ~ Adaptive management is defined as a process where land managers implement management practices that are designed to meet Forest Plan standards and guidelines, and would likely achieve the desired conditions in a timely manner. If monitoring shows that desired conditions, as described by Forest Plan direction, are not being met, then an alternate set of management actions, the effects of which are analyzed in this EA, would be implemented to achieve the desired results.

Adjustment ~ Change in animal numbers, seasons of use, kinds or classes of animals, or management practices as warranted by specific conditions.

Administrative Use ~ Use authorized by Forest Service officials to complete management functions and activities.

Administrative (Jurisdictional) Wetland ~ These sites are considered to be wetlands for administrative purposes. However, having been delineated based on remote sensing technology, these sites may not meet all criteria (hydrophytic vegetation, hydric soils, and wetland hydrology) to be considered jurisdictional wetlands.

Affected Environment ~ The biological and physical environment that may be changed by proposed actions and the relationship of people to that environment.

Allocation ~ The assignment of a land area to a particular use or uses to achieve management goals and objectives.

Allotment ~ A designated area of land available for livestock grazing upon which a specified number and kind of livestock may be grazed under a range allotment management plan. It is the basic land unit used to facilitate management of the range resource on National Forest System lands, including national grasslands.

Allotment Management Plan (AMP) ~ The document containing the action program needed to manage the range resource for livestock utilization, and possibly wildlife utilization, while considering the soil, watershed, wildlife, recreation, timber, and other resources in a range allotment.

Allowable Use ~ (1) The degree of utilization considered desirable and attainable on various parts of a ranch or allotment considering the present nature and condition of the resource, management objectives, and levels of management; (2) the amount of forage planned to be used to accelerate range improvement.

Alternative ~ A combination of management prescriptions applied in specific amounts and locations to achieve a desired management emphasis as expressed in goals and objectives. One of several policies, plans, or projects proposed for decision-making. An alternative need not substitute for another in all respects.

Animal Unit Month (AUM) ~ The amount of feed or forage required by an animal unit for 1 month.

Animal Month (AM) ~ A month's tenure upon the rangeland by one animal; must specify kind and class of animal. *Note*: This term is not synonymous with animal unit month (AUM).

Animal Unit ~ Considered to be a mature 1,000-pound cow, either dry or with a calf less than 6 months old, based on an average daily forage consumption of 26 pounds dry matter per day.

Annual (plant) ~ A plant that completes its life cycle and dies in 1 year or less.

Aquatic Ecosystem ~ An ecosystem (biological and physical components and their interactions) in which water is the principal medium. Examples include wetlands, streams, reservoirs, and areas with plants or animals suited to either permanently or seasonally inundated soils.

Archeological Resource ~ Any physical remains of past human life or activities.

Available Forage ~ That portion of the forage production that is accessible for use by a specified kind or class of grazing animal.

Available Lands ~ Those portions of the national forest or national grassland not administratively excluded from timber harvest or livestock grazing.

Base Property ~ Those lands in a ranching enterprise that are owned and required to hold a term grazing permit.

Benchmarks ~ Benchmarks are reference points that are sensitive to management changes. These are the small areas where long-term trend studies are installed and maintained so that the manager can assess the resource impacts from management.

Best Management Practices (BMPs) ~ Land management methods, measures, or practices intended to minimize or reduce water pollution as well as practices that result in healthy ecosystems. Usually, BMPs are applied as a system of practices rather than a single practice. BMPs are selected based on site-specific conditions that reflect natural background conditions and political, social, economic, and technical feasibility.

Biennial (plant) ~ A plant that lives for 2 years, usually flowering and fruiting only in the second year and then dying.

Big Game ~ Certain wildlife that may be hunted for sport under State laws and regulations, including elk, mule and white-tail deer, turkey, and bighorn sheep.

Biological Diversity ~ The full variety of life in an area, including the ecosystems, plant and animal communities, species and genes, and the processes through which individual organisms interact with one another and their environments. Emphasis is on the diversity of native or endemic species.

Botanical Area ~ A unit of land that contains plant specimens, plant groups, or plant communities that are significant because of their form, color, occurrence, habitat, location, life history, arrangement, ecology, rarity, or other features.

Browse ~ Twigs, leaves, and young shoots of trees and shrubs upon which animals feed: in particular, those shrubs that are utilized by some livestock and big game animals for food.

Brush Barriers ~ Piles of logging slash, brush, stumps or other natural woody material that has been placed on the ground around sensitive sites (e.g., archeological sites) to exclude livestock.

Candidate Species ~ Species for which the USDI Fish and Wildlife Service has on file sufficient information on biological vulnerability and threat(s) to support issuance of a proposed rule to list the species for protection under the Endangered Species Act.

Capable Rangeland ~ The potential of an area of land to produce resources, supply goods and services, and allow resource uses under an assumed set of management practices and at given levels of management intensity. Capability depends on current conditions and site conditions such as climate, slope, landform, soils, and geology, as well as the application of management practices such as silviculture or protection from fire, insects, and disease.

Carrying Capacity ~ The maximum possible stocking rate that is consistent with maintaining or improving vegetation or related resources. It may vary from year to year in the same area due to fluctuating forage production. Also called *grazing capacity*.

Carrying Capacity (wildlife and livestock grazing) ~ The maximum number of animals that can be supported in a given environment without deteriorating that environment.

CFR ~ Code of Federal Regulations.

Class of Animal ~ Description of age and/or sex-group for a particular kind of animal. Example: cow, calf, yearling, ewe, doe, fawn, etc.

Cold-water Fishery ~ Steam and lake waters that support predominately cold-water species of game or food fishes, which have maximum, sustained water-temperature tolerances of about 70°F in the summer.

Connected Disturbed Areas ~ CDAs are areas that contribute sediment to streams or wetlands causing degradation of physical function, degraded water quality and increased peak flows that may alter physical channel processes.

Conservation ~ The aggregate of practices and customs to perpetuate sustained yield of renewable resources and prevent waste of nonrenewable resources.

Conservation Practices ~ Required land use practices on the national grasslands that are imposed upon the persons or organizations holding grazing permits (including grazing agreements) in order to protect, improve, develop, and administer the land and thus assist in furthering the program of land conservation and good land utilization.

Consumptive Uses ~ Uses of a resource that reduce the supply. Examples include irrigation, domestic and industrial water use, grazing, and timber harvest.

Continuous Grazing ~ The grazing of a specific unit by livestock throughout a year.

Cool-Season Plant ~ A plant that generally makes the major portion of its growth during the late fall, winter, and early spring. Cool-season species generally exhibit the C3 photosynthetic pathway.

Cost ~ The negative or adverse effects or expenditures resulting from an action. Costs may be monetary, social, physical, or environmental in nature.

Cost Efficiency ~ The usefulness of specified inputs (costs) to produce specified outputs (benefits). In measuring cost efficiency, some outputs, including environmental, economic, or social impacts, are not assigned monetary values but are achieved at specific levels in the least-cost manner. Cost efficiency is usually measured using present net value, although use of benefit-cost ratios and rates of return may be appropriate.

Council on Environmental Quality (CEQ) ~ An advisory council to the President established by the National Environmental Policy Act of 1969.

Cover Type ~ The vegetative species that dominates a site. Cover types are named for one plant species or non-vegetative condition presently (not potentially) dominant, using canopy or foliage cover as the measure of dominance. In several cases, sites with more than one dominant species have been lumped together into one cover type. Co-dominance is not necessarily implied.

Cover/Forage Ratio ~ The ratio of tree cover (usually conifer types) to foraging areas, such as natural openings.

Cross Fence ~ A fence that divides an allotment or pasture into smaller units.

Cultural Resources ~ The physical remains and conceptual content or context of an area. Physical remains may include artifacts, structures, landscape modifications, rock art, trails, or roads. Conceptual content/context includes the setting for legendary, historic, or prehistoric events, such as a sacred area for American Indians.

Cumulative Impact ~ The impact on the environment that results from the incremental effect of the action when added to other past, present, and reasonably foreseeable future actions regardless of the source (Federal or non-Federal agencies, individuals). Cumulative effects can result from individually minor but collectively significant actions taking place over time.

Decision Documents ~ Documents that provide the criteria and information used in the formulation and evaluation of alternatives and the preferred alternative.

Decreaser (Plant) ~ Plant species of the original or climax vegetation that will decrease in relative amount with continued disturbance (heavy defoliation, fire, drought) to the norm. Some agencies use this only in relation to response to overgrazing.

Deferment ~ Delay of livestock grazing on an area for an adequate time to allow plant reproduction, establishment of new plants, or restoration of vigor of existing plants.

Deferred Rotation ~ To discontinue grazing on various parts of a range in succeeding years, allowing each part of the range to rest successively during the growing season to permit seed production, establishment of seedlings, or restoration of plant vigor. Each rested part of the range is grazed during the year. At least two, but usually three or more, separate grazing units are required.

Desired Condition ~ A portrayal of the land or resource conditions that are expected to result if goals and objectives are fully achieved.

Desired Plant Community ~ A plant community that produces the kind, proportion, and amount of vegetation necessary for meeting or exceeding the land use plan/activity plan objectives established for an ecological site. The desired plant community must be consistent with the site's capability to produce the desired vegetation through management, land treatment, or a combination of the two.

Desired Plant Species ~ Species that contribute positively to the management objectives.

Deteriorated Range ~ Range where vegetation and soils have significantly departed from the natural potential. Corrective management measures, such as seeding, would change the designation from deteriorated range to some other term.

Developed Recreation ~ This type of recreation is dependent on facilities provided to enhance recreational opportunities in concentrated use areas. Examples include campgrounds and picnic areas. Facilities in these areas might include roads, parking lots, picnic tables, toilets, drinking water and buildings.

Developed Recreation Sites ~ Relatively small, distinctly defined areas where facilities are provided for concentrated public use, such as campgrounds, picnic areas, and swimming beaches.

Direct Effects ~ Environmental effects caused by an action and that occur at the same time and place.

Dispersal ~ Leaving an area of birth, origin, or activity for another area.

Dispersed Recreation ~ This type of recreational use requires few, if any, improvements and may occur over a wide area. This type of recreation involves activities related to roads, trails and undeveloped waterways, and beaches. The activities do not necessarily take place on or adjacent to a road, trail, or waterway, only in conjunction with them. Activities are often day-use oriented and include hunting, fishing, boating, off-road vehicle use, hiking, and others.

Domestic ~ Refers to those animals and plants that are under the control of humans throughout their life cycle. Animals whose breeding is controlled by humans.

Drift Fence ~ An open-ended fence used to retard or alter the natural movement of livestock. Generally used in connection with natural barriers.

Drought ~ Any year or sequence of years when annual precipitation amounts are less than 75 percent below average.

Dry Meadow ~ A meadow dominated by grasses and characterized by soils that become moderately dry by mid-summer.

Economic Efficiency ~ The usefulness of inputs (costs) to produce outputs (benefits) and effects when all costs and benefits that can be identified and valued are included in the computations. Economic efficiency is usually measured using present net value, though use of benefit-cost ratios and rates-of-return may sometimes be appropriate.

Ecosystem ~ (1) A community of living plants and animals interacting with each other and with their physical environment. A geographic area where it is meaningful to address the interrelationships with human social systems, sources of energy, and the ecological processes that shape change over time. (2) A community of organisms and its environment functioning as an ecological unit in nature.

Ecosystem Health ~ A condition where the parts and functions of an ecosystem are sustained over time and where the system's capacity for self-repair is maintained, such that goals for uses, values, and services of the ecosystem are met.

Ecosystem Management ~ Scientifically based land and resource management that integrates ecological capabilities with social values and economic relationships to produce, restore, or sustain ecosystem integrity and desired conditions, uses, products, values, and services over the long term.

Effects ~ Physical, biological, social, and economic results (expected or experienced) resulting from achievement of outputs. Effects can be direct, indirect, and cumulative.

Effects (Cultural Resources) ~ Impacts to the characteristics that qualify a heritage resource for the National Register of Historic Places. These can include alterations in location, setting, use design, materials, feeling, and association. Adverse effects include:

- Physical destruction or damage.
- Isolation from or alteration of setting.
- Introduction of visual, audible, or atmospheric elements.
- Physical deterioration from neglect or from any action.
- Transfer, lease, or sale.

Eligible (Cultural Resources) ~ Indicates that a specific heritage resource qualifies for or is already listed in the National Register of Historic Places.

Endemic ~ Plants or animals that occur naturally in an area and whose distribution is relatively limited to a particular locality.

Environment ~ All the conditions, circumstances, and influences surrounding and affecting the development of an organism or group of organisms.

Environmental Analysis ~ An analysis of alternative actions and their predictable short- and long-term environmental effects, which include physical, biological, economic, social, and environmental design factors and their interactions.

Ephemeral – Generally, a grass-lined valley bottom with no defined channel that flows only in response to storms.

Erosion ~ The wearing away of the land surface by running water, wind, ice, gravity, or other geological activities.

Executive Order ~ An order or regulation issued by the President or some administrative authority under presidential direction.

Exotic ~ Not native to the place where it is found. Often in reference to a specific race or variety of an organism that has been transplanted to a new region.

Exotic Species ~ An organism that exists in a free state in an area in which it is not native. Also refers to animals from outside the country in which they are held captive or in free-ranging populations.

Extinction ~ Disappearance of a taxon of organisms from existence in all regions.

Extirpated ~ The elimination of a species from a particular area.

Fair Market Value ~ The amount or value for which, in all probability, a property would be sold by a knowledgeable owner willing but not obligated to sell to a knowledgeable purchaser who desires but is not obligated to buy.

Fen ~ Peat-forming wetlands that receive nutrients from sources other than precipitation: usually from upslope sources through drainage from surrounding mineral soils and from groundwater movement.

Floodplain ~ The area adjacent to a stream/river channel effective in carrying flow, within which carrying capacity must be preserved and where the flood hazard is generally highest; that is, where flood depths and velocities are the greatest (FSH 2520).

Forage ~ Vegetation used for food by wildlife and livestock, particularly ungulate wildlife and domestic livestock.

Forage Production ~ The weight of forage that is produced within a designated period of time on a given area. The weight may be expressed as green, air dry, or oven dry. The term may also be modified as to time of production such as annual, current year, or seasonal forage production.

Forage Reserve ~ Standing forage specifically maintained for future or emergency use.

Forbs ~ Any herbaceous plant other than those in the grass, sedge, and rush families. For example, any non grass-like plant that has little or no woody material.

Forest Plan (Forest Land and Resource Management Plan) ~ A document that guides natural resource management and establishes standards and guidelines for a national forest or national grassland. Required by the National Forest Management Act.

Forested Range ~ Forestland that produces, at least periodically, sufficient understory vegetation suitable for forage and that can be grazed without significantly impairing wood production and other forest values.

FSH ~ Forest Service Handbook.

FSM ~ Forest Service Manual.

Fuels ~ The organic materials that will support the start and spread of a fire: duff, litter, grass, weeds, forbs, brush, trees, and dead woody materials.

Geographic Information System (GIS) ~ A spatial type of information management system that provides for the entry, storage, manipulation, retrieval, and display of spatially oriented data.

Graminoid ~ Grass or grass-like plant, such as *Poa*, *Carex*, or *Juncus* species.

Grass ~ A member of the grass family, Poaceae.

Grassland ~ Any land on which the dominant plants are grasses or on which grasses originally dominated.

Grazing ~ The act of animals consuming plants on range or pasture.

Grazing Capacity ~ The maximum number of livestock under management that a given range area is capable of supporting within guidelines found in the allotment management plan.

Grazing Distribution ~ Dispersion of livestock or wild herbivores grazing within a given area.

Grazing Fee ~ A charge, usually on a monthly basis, for grazing use by a given kind of animal.

Grazing Land ~ An area of rangeland, public or private, that is used by animals for grazing.

Grazing Permit ~ Official, written permission to graze a specified number, kind, and class of livestock for a specific period on a defined range allotment.

Grazing Season ~ (1) A period of grazing to obtain optimum use of the forage resource; (2) on public lands, an established period for which grazing permits are issued.

Grazing System ~ A specialization of grazing management that defines systematically recurring periods of grazing and deferment for two or more pastures or management units. Some examples are: deferred grazing, rotation grazing, deferred-rotation grazing, and short-duration grazing.

Grazing Trespass ~ The grazing of livestock on a range area without proper authority and resulting from a willful or negligent act.

Grazing Unit ~ An area of rangeland, public or private, that is grazed as an allotment or pasture.

Grazing, Short-duration ~ A grazing system in which animals are concentrated on less than one-half of the total land area and the lengths of deferment exceed the lengths of grazing.

Ground Cover ~ The percentage of material, other than bare ground, covering the land surface. It may include live and standing dead vegetation, litter, cobble, gravel, stones, and bedrock. Ground cover plus bare ground would total 100 percent.

Groundwater ~ Water within the Earth that supplies wells and springs. Specifically, water in the zone of saturation where all openings in soils and rocks are filled. The upper surface level forms the water table.

Growing Season ~ In temperate climates, that portion of the year when temperature and moisture permit plant growth.

Guideline ~ Advisable actions that should be followed to achieve grassland or Forest goals and objectives. Deviations from guidelines must be analyzed during project-level analysis and be documented in a project decision document but do not require management plan amendments.

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

Habitat Suitability ~ A measure of current habitat quality relative to the local biological potential of an area to provide habitat for a species. Habitat suitability is usually expressed as low, moderate or high or is quantitatively presented as an index value scaled from 0 (unsuitable) to 1.0 (optimum habitat).

Herb ~ A plant with one or more stems that dies back to the ground each year.

Herbicide ~ A chemical substance used for killing plants.

Herbivore ~ An animal that subsists principally or entirely on plants or plant material.

Herd ~ An assemblage of animals usually of the same species.

Historic Property ~ Any prehistoric or historic district, site, building, structure, or object included in or eligible for inclusion in the National Register. This term includes artifacts, records, and remains related to and located within such properties.

Home Range ~ The geographic area within which an animal restricts its activities.

Human Environment ~ Includes the natural and physical environment and the relationship of people within that environment.

Hydrologic Cycle ~ The ecological cycle that moves water from the air, by precipitation, to the earth and back to the atmosphere. A variety of processes are involved, including evaporation, runoff, infiltration, percolation, storage, and transpiration.

ID Team (interdisciplinary team) ~ A group of people with different specialized training assembled to solve a problem or perform a task. The team is assembled out of recognition that no one discipline is sufficiently broad to adequately solve the problem. Through interaction, participants bring different points of view and a broader range of expertise to bear on the problem.

Inaccessible Range ~ Rangeland that is not grazed by livestock because of barriers, distance to water or steep slopes.

Increaser (Plant) ~ Plant species of the original vegetation that increase in relative amount, at least for a time, under continued disturbance (heavy defoliation, fire, drought) to the norm.

Indigenous Species ~ Animals or plants that originated in the area in which they are found; for example, animals or plants that were not introduced after frontier settlement of the Northern Great Plains and that naturally occur on the Northern Great Plains.

Indirect Effects ~ Environmental effects caused by an action, but resulting later in time or farther away in place, yet which are still reasonably foreseeable.

In-holdings ~ Lands within the proclaimed boundaries of a national forest or national grassland that are owned by some other agency, organization, or individual.

Instream Flows ~ The minimum water volume (cubic feet per second) in each stream necessary to meet seasonal stream flow requirements for maintaining aquatic ecosystems, visual quality, recreational opportunities, and other uses.

Intensive Grazing Management ~ Grazing management that attempts to increase production or utilization per unit area or production per animal through a relative increase in stocking rates, forage utilization, labor, resources, or capital. Intensive grazing management is not synonymous with rotation grazing. Grazing management can be intensified by using any one or more of a number of grazing methods that use relatively more labor or capital resources.

Intermittent Stream ~ (1) A stream that flows only 50 to 90 percent of the year when it receives water from some surface source, such as melting snow; (2) a stream that does not flow continuously, as when water losses from evaporation or seepage exceed the available stream flow.

Introduced Species ~ A species not a part of the original fauna or flora of the area in question.

Invader (Plant) ~ Plant species that were absent in undisturbed portions of the original vegetation of a specific range site and will invade or increase following disturbance or continued heavy grazing.

Invasive Plant ~ A species that displays rapid growth and spread, free from natural controls and enhanced by abundant seed production and germination.

Key Area ~ (1) An area selected to monitor the effects of management activities on ecosystem health. Examples may include, but are not limited to, uplands, riparian areas, and valley bottoms; (2) that portion of a pasture or grazing unit which is selected as a monitoring point because of its location, use, or grazing value.

Land Exchange ~ The conveyance of non-Federal land or interests to the United States in exchange for National Forest System land, including national grasslands, or interests in such land.

Land Unit ~ A mapped land type polygon or a mapped soil unit.

Listed Species ~ Any species of fish, wildlife, or plant officially designated as endangered or threatened by the Secretary of the Interior or Commerce.

Litter ~ A surface layer of loose organic debris consisting of freshly fallen or slightly decomposed organic materials.

Livestock ~ Domestic animals.

Livestock Use Permit ~ Used to document specific animal numbers, class, and seasons of use under a specified management plan for a given period (10 years).

Logging ~ Harvest of trees of given size from a forest.

Management Area ~ Area of the grassland that are managed for a particular emphasis. These areas have common management direction and may be non contiguous on the national forest or national grassland.

Management Indicator Species ~ A plant or animal species selected because their status is believed to (1) be indicative of the status of a larger functional group of species, (2) be reflective of the status of a key habitat type, or (3) act as an early warning of an anticipated stressor to ecological integrity. The key characteristic of a MIS species is that

its status and trend provide insights to the integrity of the larger ecological system to which it belongs.

Management Indicators (Fish and Wildlife) ~ Plant or animal species or habitat components selected in a planning process used to monitor the effects of planned management activities on populations of wildlife and fish, including those that are socially or economically important.

Marginal Land ~ Land of questionable physical or economic capabilities for sustaining a specific use.

Market Value ~ The unit price of an output normally exchanged in a market after at least one stage of production, expressed in terms of what people are willing to pay as evidenced by market transactions.

Meadow ~ (1) An area of perennial herbaceous vegetation, usually grass or glasslike, used primarily for hay production; (2) openings in forests and grasslands of exceptional productivity in arid regions, usually resulting from high water content of the soil (streamside situations, areas having a perched water table).

Migration ~ The movement of genotypes (as individuals) into or out of a population.

Mitigate ~ To lessen the severity.

Mitigation ~ Includes avoiding an impact by not taking certain actions; minimizing impacts by limiting the degree or magnitude of the action and its implementation; rectifying the impact by repairing, rehabilitating, or restoring the affected environment; reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action; and compensating for the impact by replacing or providing substitute resources or environments.

Mitigation (Cultural Resources) ~ Actions taken to reduce or eliminate adverse effects caused to cultural resources. Avoidance is not considered a mitigation measure.

Monitoring and Evaluation ~ The sample collection and analysis of information regarding LRMP management practices to determine how well objectives have been met, as well as the effects of those management practices on the land and environment.

Multiple Use ~ According to the Multiple Use Sustained Yield Act of 1960, multiple use is the management of all the various renewable surface resources of the National Forest System, including national grasslands, so that they are utilized in the combination that will best meet the needs of the American people. Such management makes 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. Some lands will be used for less than all of the resources. Harmonious and coordinated management of the various resources is employed, each with the other, without impairment of the productivity of the land. Consideration is given to the relative values of the various resources and not necessarily the combination of uses that gives the greatest dollar return or the greatest unit output.

National Environmental Policy Act of 1969 (NEPA) ~ An act declaring a national policy to encourage productive harmony between people and their environment, to promote efforts that will prevent or eliminate damage to the environment and the

biosphere and stimulate the health and welfare of people and to enrich the understanding of the ecological systems and natural resources important to the nation and to establish a Council on Environmental Quality.

National Forest Management Act (NFMA) ~ A 1976 law that amended the Forest and Rangeland Renewable Resources Planning Act and requires the preparation of Regional and Forest Plans and regulations to guide Forest Plan development.

National Forest System (NFS) Lands ~ Federal lands designated by Executive order or statute as national forests, national grasslands, or purchase units, or other lands under the administration of the U.S. Forest Service.

National Register of Historic Places (NRHP) ~ A list of heritage resources that have local, state, or national significance maintained by the Secretary of the Interior.

Native ~ A plant or animal indigenous to a particular locality.

Native Seed ~ Seeds of plants considered indigenous to the Northern Great Plains.

Natural ~ Occurring in conformity with the ordinary course of nature. An area having undergone no, or at least minimal, disturbance by anthropogenic forces.

Natural Barrier ~ A natural feature that will restrict livestock movements, such as a dense stand of trees or downfall, or a feature that will stop the spread of fire, such as a talus slope, water course, or areas otherwise devoid of fuel.

NEPA Process ~ Means all measures necessary for compliance with the requirements of section 2 and Title I of NEPA.

Niche ~ The ecological role of a species in a community.

No Adverse Effect (Cultural Resources) ~ Any effect on a heritage resource that would not be considered harmful to those characteristics that qualify the property for inclusion in the National Register of Historic Places.

No Effect (Cultural Resources) ~ No effect to those characteristics that qualify the property for inclusion in the National Register of Historic Places.

Non-point Source Pollution ~ Pollution whose source is not specific in location. The sources of the pollutant discharge are dispersed, not well-defined or constant. Examples include sediments from logging activities and runoff from agricultural chemicals.

Noxious Weeds ~ Those plant species designated as weeds by Federal or State laws. Noxious weeds generally possess one or more of the following characteristics: aggressive and difficult to manage, poisonous, toxic, parasitic, a carrier or host for serious insects or diseases, and generally non-native.

Off-Highway Vehicle (OHV) or Off-Road Vehicle (ORV) ~ Any motorized vehicle designed for or capable of cross-country travel on or immediately over land, water, snow, ice, marsh, swampland, or other natural terrain.

Overgrazing ~ Continued heavy grazing that exceeds the recovery capacity of the community and creates a deteriorated range.

Overstocking ~ Placing a number of animals on a given area that will result in overuse if continued to the end of the planned grazing period.

Pasture ~ A land area consisting of grass or other growing plants used as food by grazing animals. Also an area used for grazing, often enclosed and separated from other areas by fences, hedges, ditches, or walls.

Perennial (plant) ~ A plant that lives for 2 or more years.

Perennial Streams ~ Streams that flow continuously throughout most years.

Permitted Grazing ~ Use of a National Forest System range allotment under the terms of a grazing permit.

Permittee (Grazing) ~ One who holds a permit to graze livestock on State, Federal, or certain privately owned lands.

Plant Communities ~ Assemblages of plant species living in an area. A plant community is an organized unit to the extent that it has characteristics in addition to the individuals and populations and functions as a unit.

Potential Natural Community (PNC) ~ A taxonomic unit of vegetation classification. The biotic community that would be established under present environmental conditions if all successional sequences were completed without additional human-caused disturbances. Natural disturbances, such as drought, flood, wildfire, grazing by native fauna, and insect and disease infestations, are inherent in the development of potential natural communities, which may include naturalized, non-native species.

Prehistoric Site ~ Archeology sites associated with American Indians and usually occurring before contact with Europeans.

Present Net Value (PNV) ~ The difference between the discounted value (benefits) of all outputs to which monetary values or established market prices are assigned and the total discounted costs of managing the planning area.

Primary Grazing Areas ~ Areas that animals prefer to use and over which they will graze when management is limited. The area on which overuse will occur before secondary range is used when animals are allowed to shift for themselves.

Productivity ~ The total quantity of organic material produced within a given period by organisms or the energy that this represents, such as gram-calories per square centimeter per year. The innate capacity of an environment to produce plant and animal life. The capacity of a soil to produce a certain kind of crop under a defined set of management conditions.

Proper Functioning Condition (PFC) ~ Riparian/wetland areas achieve proper functioning condition when adequate vegetation, landform, or large woody debris is present to dissipate stream energy associated with high water flows. This reduces erosion; improves water quality; filters sediment; captures bed load; aids floodplain development; improves floodwater retention and groundwater recharge; develops root masses that stabilize stream banks against cutting action; develops diverse ponding and channel characteristics to provide habitat and water depth, duration, and temperature necessary for fish production, waterfowl breeding, and other uses; and supports greater biodiversity. The functioning condition of riparian/wetland areas is a result of the interaction among geology, soil, water, and vegetation.

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

Public Involvement ~ A Forest Service process designed to broaden the information base upon which agency decisions are made. It includes the following steps:

- Informing the public of Forest Service activities, plans, and decisions.
- Encouraging public understanding about the participation in the planning processes that lead to final decision-making.

Range ~ Any land supporting vegetation suitable for grazing including rangeland, grazeable woodland, and shrubland.

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

Range Analysis ~ Systematic acquisition and evaluation of rangeland resources data needed for allotment management planning and overall land management.

Range Condition ~ (1) A rangeland is considered to be in satisfactory condition when the desired condition is being met or short-term vegetative objectives are being achieved to move the rangeland toward the desired condition or trend. Unsatisfactory condition is when the desired condition is not being met and short-term vegetative objectives are not being achieved to move the rangeland toward the desired condition or trend. (2) Historically, range condition usually has been defined in one of two ways: (a) a generic term relating to present status of a unit of range in terms of specific values or potentials. Specific values or potentials must be stated, or (b) the present state of vegetation of a range site in relation to the climax (natural potential) plant community for that site. It is an expression of the relative degree to which the kinds, proportions and amounts of plants in a plant community resemble that of the climax plant for the site.

Range Development, Nonstructural ~ Any practice designed to improve range condition or facilitate more efficient utilization of the range.

Range Development, Structural ~ Any structure or excavation to facilitate management of range or livestock.

Range Management ~ A distinct discipline founded on ecological principles and dealing with the use of rangelands and range resources for a variety of purposes. These purposes include use as watersheds, wildlife habitat, grazing by livestock, recreation, and aesthetics, as well as associated uses. Two kinds of range management can be described:

Extensive range management carries the goal to control livestock numbers within the present capacity of the range, but little or no attempt is made to achieve uniform distribution of livestock. Range management investments are minimal and only to the extent needed to maintain stewardship of the range in the presence of grazing. Past resource damage is corrected and resources are protected from natural catastrophes.

Intensive range management carries the goal to maintain full plant vigor and to achieve full livestock utilization of available forage. This goal is achieved through implementation of improved grazing systems and construction and installation of range improvements. Cultural practices, such as seeding and fertilizing, to improve forage quality and quantity may be used.

Range Readiness ~ Indicators used to determine rangeland readiness are soils and vegetation conditions. Rangelands are generally ready for grazing when soils have become firm after winter and spring precipitation, and when plants have reached the defined stage of growth at which grazing many begin under the specific management plan without long-lasting damage

Rangeland ~ Lands on which the native vegetation is predominately grasses, grass-like plants, forbs, or shrubs suitable for grazing or browsing usage. Includes lands revegetated naturally or artificially to provide a forage cover that is managed like native vegetation.

Rangeland Health ~ The degree to which the integrity of the soil, the vegetation, the water, and air as well as the ecological processes of the rangeland ecosystem is balanced and sustained. Integrity is defined as: Maintenance of the structure and functional attributes characteristic of a particular locale, including normal variability.

Rare Communities ~ A ranking system used by The Nature Conservancy to assess relative endangerment. Community types are ranked on a global, national, and state scale of 1 to 5. A rank of G1 (Global 1) indicates that a community type is critically imperiled globally to rarity, endemism, and/or threats. A rank of G5 indicates little to no risk of global elimination. Similar definitions apply to national and state rankings.

Residual Cover ~ Standing or lodged herbaceous vegetation left after livestock grazing and killing frost.

Responsible Official ~ The Forest Service employee who has the delegated authority to make a specific decision.

Rest ~ To leave an area of rangeland ungrazed by livestock or unharvested by mechanical methods for at least one year (12 consecutive months).

Rest Rotation (Livestock Grazing) ~ An intensive system of management where grazing is deferred on various parts of the range during succeeding years, allowing the deferred part complete rest for one year. At least two, but usually three or more, separate grazing units are required.

Restoration ~ Holistic actions taken to modify an ecosystem to achieve desired, healthy, and functioning conditions and processes. Generally refers to the process of enabling the system to resume its resiliency to disturbances.

Revegetation ~ The reestablishment and development of plant cover. This may take place naturally through the reproductive processes of the existing flora or artificially through reforestation or reseeding.

Rhizome ~ A horizontal underground stem, usually sending out roots and above-ground shoots from the nodes.

Riparian ~ The bands and adjacent areas of water bodies, water courses, seeps, and springs whose waters provide soil moisture in excess of what is locally available. This results in a moister habitat than that found on the contiguous flood plains and uplands. Refers to land bordering a stream, lake, or tidewater, and generally implies a particular type of habitat physiognomy often characterized by an over story of trees or other large woody plants with a complex under story of other woody and/or herbaceous species.

Riparian Area ~ Areas of the aquatic and riparian ecosystems with distinctive resource values and characteristics that are geographically delineated (FSM 2526). Ecological units with distinctive vegetation, landform, soil, and water regimes consisting of the aquatic ecosystem and wet-to-moist areas located between aquatic ecosystems and adjacent terrestrial ecosystems. Includes floodplains and wetlands. Riparian ecosystems are distinguished by soil characteristics and distinctive existing or potential vegetation communities that are adapted to soils with consistently high levels of moisture.

Riparian Communities ~ Repeating, classified, defined and recognizable assemblages of plant or animal communities associated with riparian areas.

Riparian Ecosystem ~ A transition between the aquatic ecosystem and the adjacent upland terrestrial ecosystem. It is identified by soil characteristics and by distinctive vegetative communities that require free or unbounded water.

Rotation ~ The planned number of years between the formation or regeneration of a crop or stand and its final cutting at a specified stage of maturity.

Rotation Grazing ~ A grazing scheme where animals are moved from one grazing unit (paddock) in the same group of grazing units to another without regard to specific graze/rest periods or levels or plant defoliation.

Runoff ~ The total stream discharge of water, including both surface and subsurface flow, usually expressed in acre-feet of water yield.

Scoping Process ~ An early and open process for determining the scope of issues to be addressed and for identifying the significant issues related to the proposed action. Identifying the significant environmental issues deserving of study and de-emphasizing insignificant issues, narrows the scope of the environmental impact statement accordingly.

Season-long Grazing (Livestock Grazing) ~ Allowing livestock to graze a single pasture throughout one growing season.

Sediment ~ Material suspended in water or deposited in streams and lakes.

Sediment Load ~ The solid material transported by a stream and expressed as the dry weight of all sediment that passes a given point in a given period of time.

Sediment Yield ~ Amount of sediment leaving an analysis area and entering a channel.

Self-sustaining Fish Population ~ A reproducing fish population that does not require supplemental hatchery stocking.

Sensitive Species ~ Those plant and animal species identified by Regional Foresters for which population viability is a concern, as evidenced by the following:

- Significant current or predicted downward trends in population numbers or density.
- Significant current or predicted downward trends in habitat capability that would reduce a species' existing distribution.

Significant Archeological Sites ~ Sites eligible for inclusion in the National Register of Historic Places as determined by the Forest Service in consultation with the State Historic Preservation Officer.

Site Productivity ~ Production capability of specific areas of land.

Soil Compaction ~ A physical change in soil properties that results in a decrease in porosity and an increase in soil bulk density and strength.

Soil Erosion ~ The detachment and movement of soil from the land surface by water or wind. Soil erosion and sediment are not the same.

Soil Productivity ~ The inherent capacity of a soil to support the growth of specified plants, plant communities, or a sequence of plant communities. Soil productivity may be expressed in terms of volume or weight/unit area/year, percent plant cover, or other measures of biomass accumulation.

Soil Profile ~ A vertical section of the soil from the surface down through all of its layers into the parent material.

Soil Survey ~ A general term for the systematic examination of soils in the field and in laboratories; their description and classification; the mapping of soil types; the interpretation of soils according to their adaptability for various crops, grasses, and trees; their response to treatment for plant production or for other purposes; and their productivity under different management systems.

Species ~ A group of potentially interbreeding populations that is reproductively isolated from other such groups.

Species of Local Concern ~ Species that do not meet the criteria for sensitive species status but may have declining trends in the Black Hills or those that are important components of diversity in the Black Hills.

Species Composition ~ The proportions of various plant species in relation to the total on a given area. It may be expressed in terms of cover, density, weight, etc.

Species Diversity ~ A measurement that relates the density of individuals of a species in a habitat to the number of different species present in the habitat. The number of different species in a given habitat.

Species Viability ~ A species consisting of self-sustaining and interacting populations that are well distributed through the species' range. Self-sustaining populations are those that are sufficiently abundant and have sufficient diversity to display the array of life history strategies and forms to provide for their long-term persistence and adaptability over time.

Static ~ Staying the same.

Stewardship ~ Caring for land and associated resources and passing healthy ecosystems to future generations.

Stocking Rate (Livestock Management) ~ The actual number of animals, expressed in either animal units or animal unit months, on a specific area for a specific time.

Stream Bank Alteration ~ Stream bank alteration consists of physical alteration of the bank by trampling that exposes bare soil.

Stream Bank Stability ~ Stream bank stability refers to long-term bank structure, expressed as a percentage of the stream bank in one of six stability classes (Cowley and Burton 2005b). It is intended for long-term trend monitoring and is read on 3 to 5 year intervals. This method includes damage from natural processes, such as floods, and human caused impacts, such as mining or recreation vehicle crossings, as well as from livestock.

Stream Health ~ The condition of a stream versus reference conditions for the stream type and geology, using metrics such as channel geometry, large woody debris, substrate, bank stability, flow regime, water chemistry, and aquatic biota.

Stream Health Class. A category of stream health. Three classes are recognized in the Rocky Mountain Region: robust, at-risk and diminished. These classes are recommended to be used for assessing long-term stream health and impacts from management activities (USDA Forest Service Handbook 2509.25 – Watershed Conservation Practices, R2 Amendment 2006).

- *Robust*. Stream exhibits high geomorphic, hydrologic and/or biotic integrity relative to its natural potential condition (as represented by a suitable reference condition). For a quantitative analysis, high integrity is indicated by conditions that are 74 – 100% of a reference condition (after Plafkin et. al., 1989; EPA, 1999; CDPHE, 2002). Physical, chemical and/or biologic conditions suggest that State assigned water quality (beneficial, designated or classified) uses are supported.
- *At-Risk.* Stream exhibits moderate geomorphic, hydrologic and/or biotic integrity relative to its natural potential condition (as represented by a suitable reference condition). For a quantitative analysis, moderate integrity is indicated by conditions that are 59 – 73 % of a reference condition (after Plafkin et. al, 1989; EPA, 1999; CDPHE, 2002). Physical, chemical and/or biologic conditions suggest that State assigned water quality (beneficial, designated or classified) uses are at risk and may be threatened.
- *Diminished*. Stream exhibits low geomorphic, hydrologic and/or biotic integrity relative to its natural potential condition (as represented by a suitable reference condition). For a quantitative analysis, low integrity is indicated by conditions that are less than 58% of a reference condition (after Plafkin et. al., 1989; EPA, 1999; CDPHE, 2002). Physical, chemical and/or biologic conditions suggest that State assigned water quality (beneficial, designated or classified) uses may not be supported.

Stream Order ~ A classification of the relative position of streams in a channel network. Each non-branching channel segment is designated as a first-order stream. The channel segment below the confluence of the two first-order tributaries. The channel segment below the confluence of two second-order streams is designated a third-order stream, etc.

Stream Type ~ A class of stream reach having a discrete combination of valley geomorphology and climate, flow regime, stream size, and channel morphology, which differs from other stream types in its ability to support biota and respond to management.

Suitable Lands ~ Lands that are appropriate for the application of certain resource management practices as determined by an analysis of the economic and environmental consequences and the alternative uses foregone.

Suitable Rangeland ~ The appropriateness of applying certain resource management practices to a particular area of land, as determined by an analysis of the economic and environmental consequences and the alternative uses forgone. A unit of land may be suitable for a variety of individual or combined management practices.

Suspended Sediment ~ The very fine soil particles that remain suspended in water for a considerable period of time without contact with the bottom of the channel.

Tiering ~ Refers to the elimination of repetitive discussions of the same issue by referencing the general discussion in an environmental impact statement of broader scope. For example, a project environmental assessment could be tiered to the Forest Plan EIS.

TMDL ~ Total maximum daily load.

Topography ~ The configuration of a land surface including its relief, elevation, and the position of its natural and human-made features.

Traditional Use Areas ~ An area that is significant to a living community because of its association with cultural practices or beliefs that are rooted in the community's history and are important in maintaining the continuing cultural identity of the community.

Trampling ~ Treading underfoot. The damage to plants or soil brought about by movements or congestion of animals.

Travel Management ~ Travel management is the movement of people and products to and through national forests and national grasslands. It connects many different varieties of user and multiple uses on National Forest System lands.

Trespass ~ The act of going on another's land or property unlawfully.

Undesirable Species ~ (1) Species that conflict with or do not contribute to the management objectives, (2) species that are not readily eaten by animals.

Ungulate ~ A hoofed animal, including ruminants (cattle, but also horses, tapirs, elephants, rhinoceroses, and swine).

Unpalatable Species (Range Management) ~ Plant species that are not readily eaten by an ungulate animal.

Utilization Levels (Livestock Grazing) ~ The portion of the current year's forage production by weight consumed or trampled by livestock. Utilization levels are usually expressed as a percentage.

Vegetative Management ~ Any activities undertaken to modify the existing condition of the vegetation.

Viable Population ~ A group of individuals of a particular species that produces enough offspring for long-term persistence and adaptation of the species or population in a given place. For planning purposes, 36 CFR 219.19 defines a viable population as one that has the estimated numbers and distribution of reproductive individuals to ensure that a continued viable population is well-distributed in the planning area. A planning area is further defined by 36 CFR 219.3 as the "area of the National Forest System covered by a regional guide or forest plan." Direction estimated numbers and distribution of reproductive individuals to ensure the continued existence of the species throughout its existing range (or range required to meet recovery for listed species) within the planning area.

Warm-Season Plant ~ A plant that makes most or all its growth during the spring, summer, or fall and is usually dormant in winter. A plant that usually exhibits the C4 photosynthetic pathway.

Water Development ~ A facility constructed or placed to hold water for livestock use.

Water Influence Zone ~ The water influence zone (WIZ) includes the geomorphic floodplain, riparian ecosystem, and inner gorge. Its minimum horizontal width (from top of each bank) is the greater of 100 feet or the mean height of mature dominant late-seral vegetation. It includes adjacent unstable and highly-erodible soils. The WIZ protects interacting aquatic, riparian, and upland functions by maintaining natural processes and resilience of soil, water, and vegetation systems.

Water Rights ~ Rights given by State and Federal governments for the diversion and use of water.

Water Table ~ The upper surface of the ground water or that level below which the soil is saturated with water.

Waters of the United States ~ Waters used for navigation and all other waters such as lakes, streams (including intermittent streams), mudflats, sand flats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds, and their tributaries.

Watershed ~ The area of land, bounded by a divide, that drains water, sediment, and dissolved materials to a common outlet at some point along a stream channel (Dunne and Leopold 1978), or to a lake, reservoir, or other body of water. Also called drainage basin or catchment.

Watershed Condition. The state of a watershed based on physical and biological characteristics and processes affecting hydrologic and soil functions (USDA Forest Service Manual 2500,Chapter 2520 - Water.

- *Class I Condition*. Watersheds exhibit high geomorphic, hydrologic, and biotic integrity relative to their natural potential condition. The drainage network is generally stable. Physical, chemical, and biologic conditions suggest that soil,

aquatic, and riparian systems are predominantly functional in terms of supporting beneficial uses.

- *Class II Condition*. Watersheds exhibit moderate geomorphic, hydrologic, and biotic integrity relative to their natural potential condition. Portions of the watershed may exhibit an unstable drainage network. Physical, chemical, and biologic conditions suggest that soil, aquatic, and riparian systems are at risk in being able to support beneficial uses.
- *Class III Condition*. Watersheds exhibit low geomorphic, hydrologic, and biotic integrity relative to their natural potential condition. A majority of the drainage network may be unstable. Physical, chemical, and biologic conditions suggest that soil, riparian, and aquatic systems do not support beneficial uses.

Weed ~ Any plant growing where unwanted and having a negative value.

Wet Meadow ~ A meadow where the surface remains wet or moist throughout the growing season, usually characterized by sedges and rushes.

Wetland Communities ~ Plant communities that occur on sites with soils typically saturated with or covered with water most of the growing season.

Wetlands ~ Those areas that are inundated by surface water or groundwater with a frequency sufficient to support, and under normal circumstances do or would support, a prevalence of vegetative or aquatic life that requires saturated or seasonally saturated soil conditions for growth and reproduction. Wetlands generally include swamps, marshes, bogs, and similar areas such as sloughs, potholes, wet meadows, river overflows, mudflats, and natural ponds.

Wildfire ~ Any wild land fire not designated and managed as a prescribed fire within an approved prescription. An appropriate suppression action will be applied to all wildfires.

Wildlife ~ Collectively the no domesticated vertebrate animals, except fishes. The natural community of animals.

Winter Range ~ Rangeland that is grazed during the winter months.

Xeric ~ Having very little moisture; tolerating or adapted to dry conditions.

CHAPTER 4 – CONSULTATION AND COORDINATION

Consultation and Coordination

Federal, State, and County Officials and Agencies

Custer County Commissioners
Custer County Highway Department
Fall River County Commissioners
Pennington County Commissioners
South Dakota Division of Forestry
South Dakota Department of Forestry
South Dakota Department of Natural Resources
South Dakota Game, Fish and Parks
South Dakota Department of Transportation
USDI Fish and Wildlife Service
USDI Bureau of Land Management
USDI National Park Service, Jewel Cave National Monument

Tribes

Cheyenne River Sioux Tribe
Cheyenne Arapaho Tribes of Oklahoma
Crow Creek Sioux Tribe
Eastern Shoshone Tribe
Fladreau Santee Sioux Tribe
Grey Eagle Society
Kiowa Ethnographic Endeaver for Preservation
Lower Brule Sioux Tribe
Manda, Kidatsa, and Arikara Nation
Northern Arapaho Tribe
Oglala Sioux Tribe
Rosebud Sioux Tribe
Santee Sioux Nation
Sicangu Lakota Treaty Council Office
Sisseton-Wahpeton Sioux Tribe
Spirit Lake Sioux Tribe
Standing Rock Sioux Tribe
Yankton Sioux Tribe

Others

Approximately 40 additional contacts, including elected officials, environmental groups, and other interested parties were made during the scoping period for this project to solicit issues and concerns with the proposed action.

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Meghan Reedy	Range Conservationist	Socioeconomics
John Rongstad	Geographic Information Systems	Maps
Steve Hirtzel	Fisheries Biologist	Fisheries
Cynthia Englebert	Former Botanist	Botany
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Tracy Clark	Wildlife Biologist	Wildlife
Les Gonyer	Hydrologist	Soils and Water
Lynn Kolund	District Ranger	Purpose and Need, Alternatives, Design Criteria, Monitoring
Craig Beckner	Forest Rangelands Program Manager	Purpose and Need, Alternatives, Design Criteria, Rangeland Vegetation, Climate Change
USDA Forest Service, TEAMS Enterprise Unit		
Maple Taylor	Writer-Editor	Document Editing

CHAPTER 5 – REFERENCES

Analysis Documents Used For this Assessment

This EA is based upon analysis prepared in the following reports for the Hell Canyon Range 2010 Project (these reports are available in the project record).

- Soil and Water Report (Gonyer 2010)
- Rangeland Vegetation Report and methane production calculation (Bindel 2010a and 2010b)
- Wildlife Report and Biological Assessment and Evaluation (Clark 2010a and Clark 2010b)
- Botany Report and Biological Assessment and Evaluation (Englebert 2010 and Scott 2010)
- Fisheries Report (Hirtzel 2010)
- Cultural Resource Report (Engelhart 2010)
- Socioeconomics Report (Reedy 2010)

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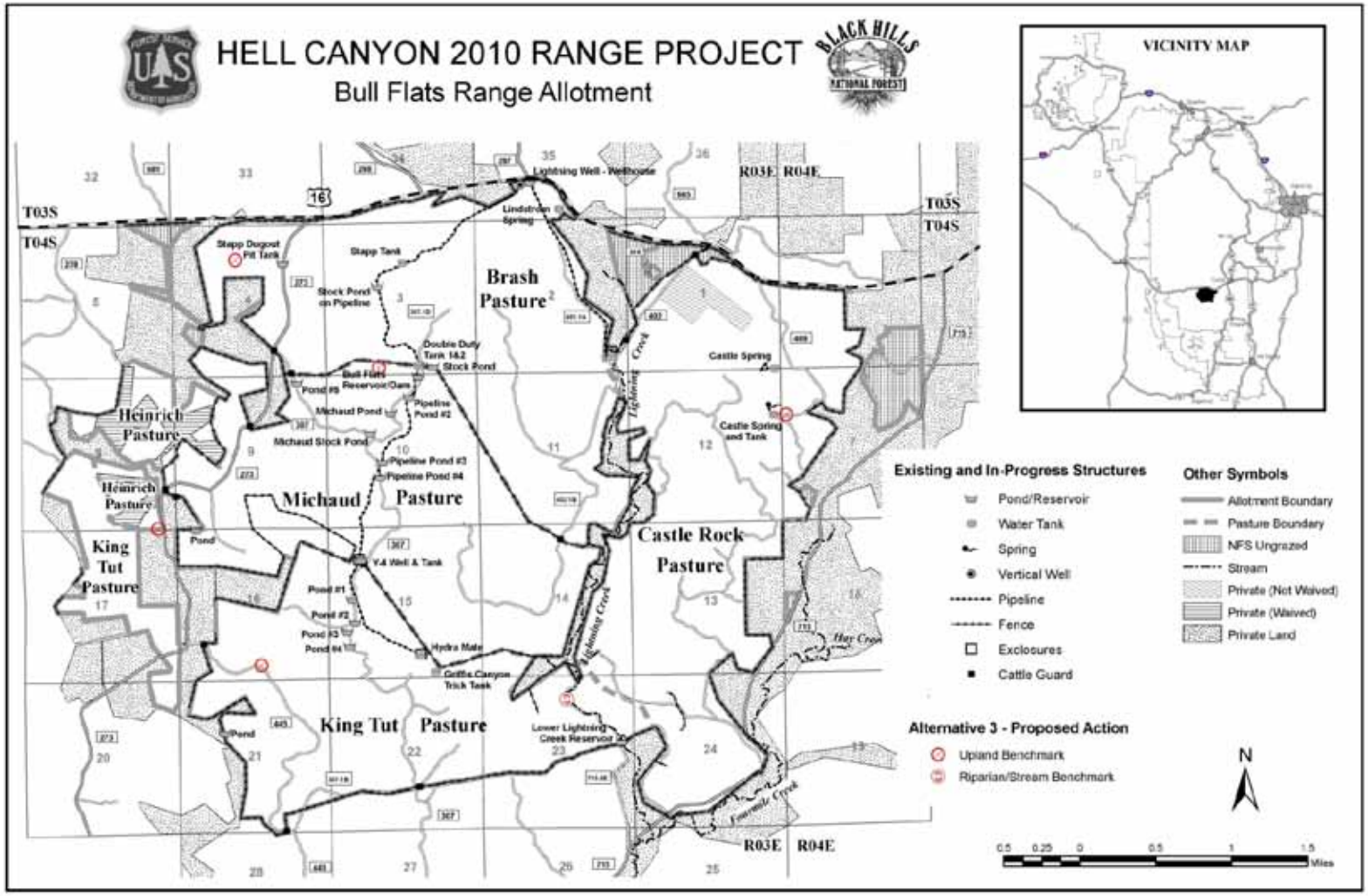
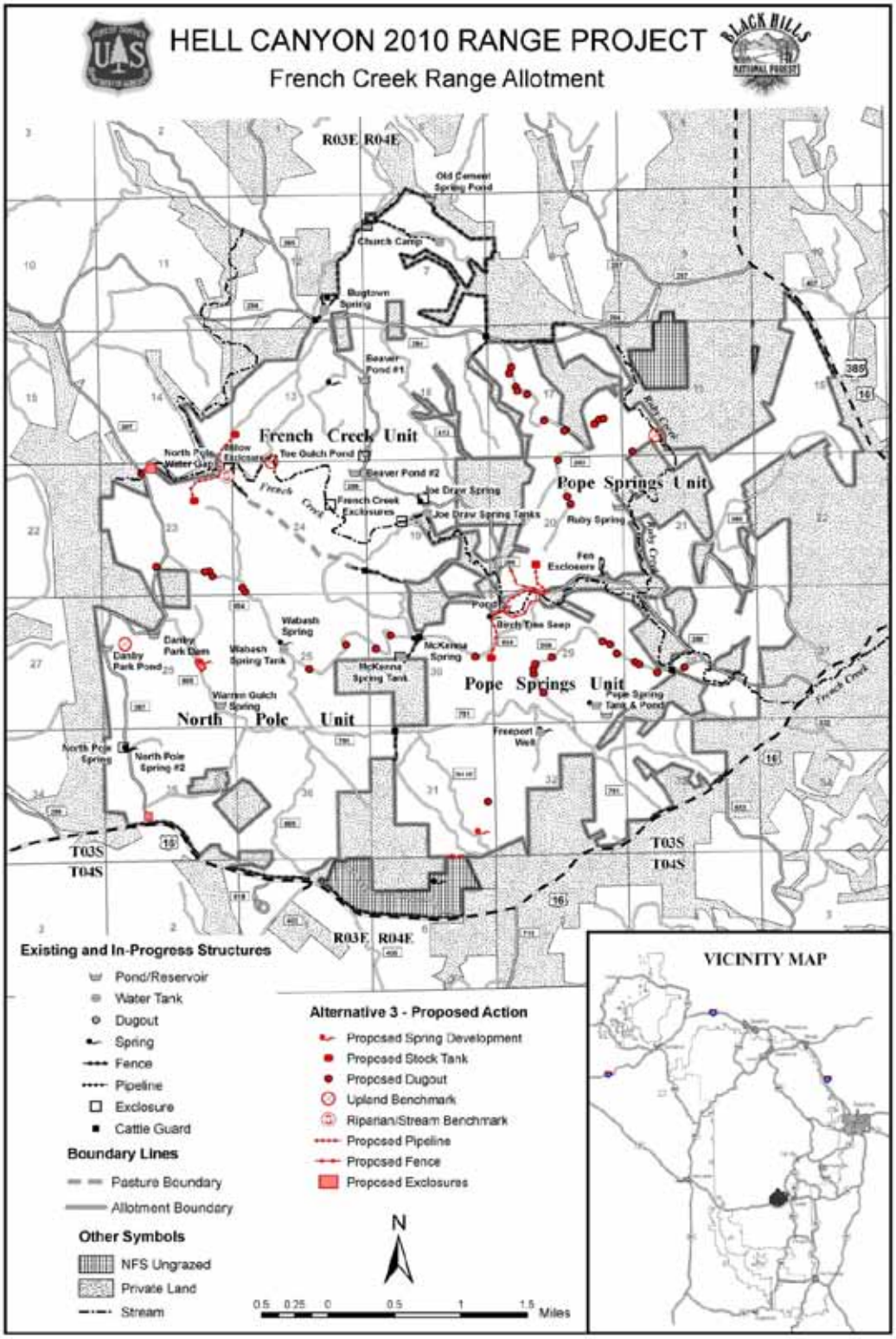
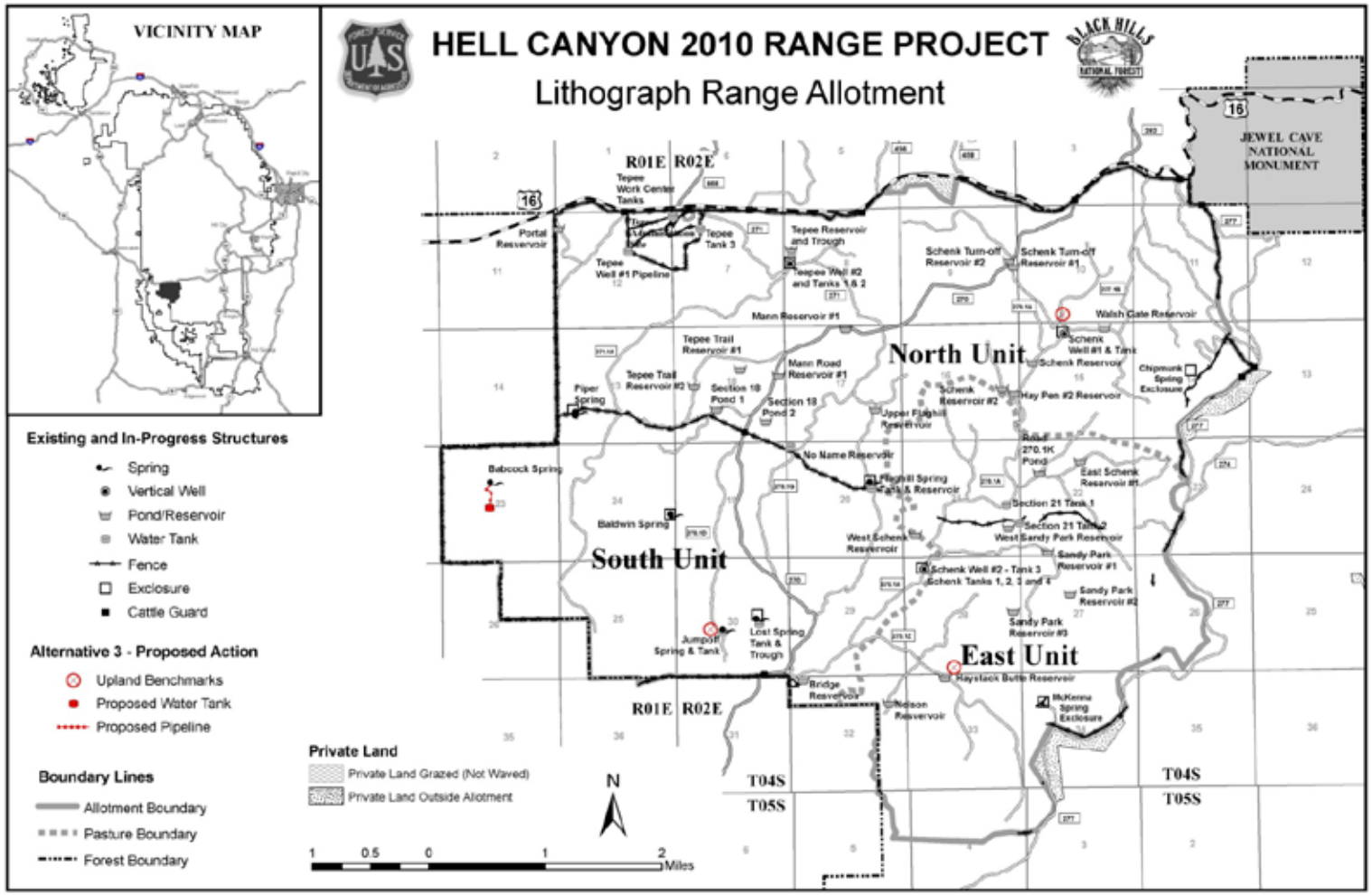
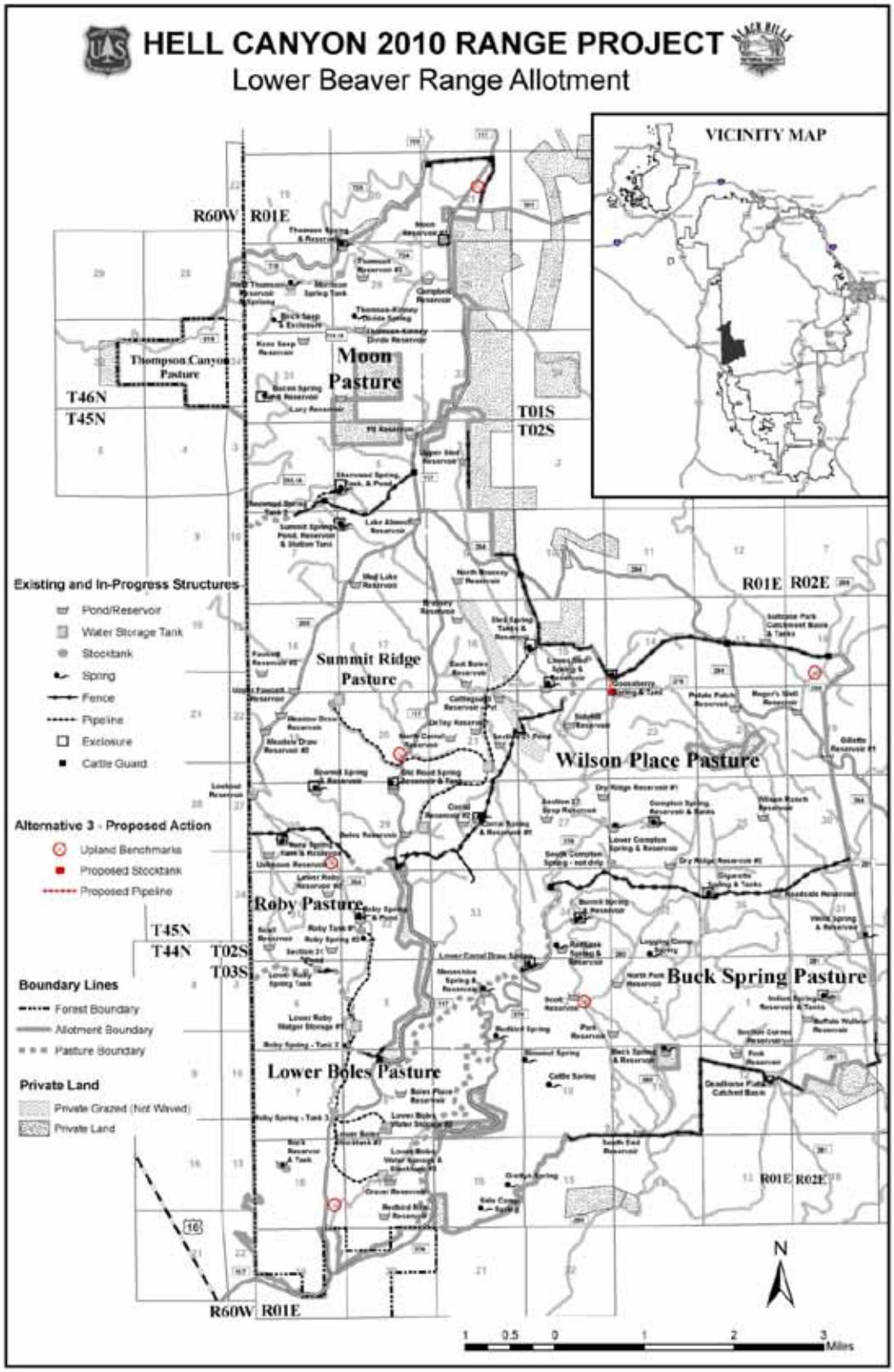
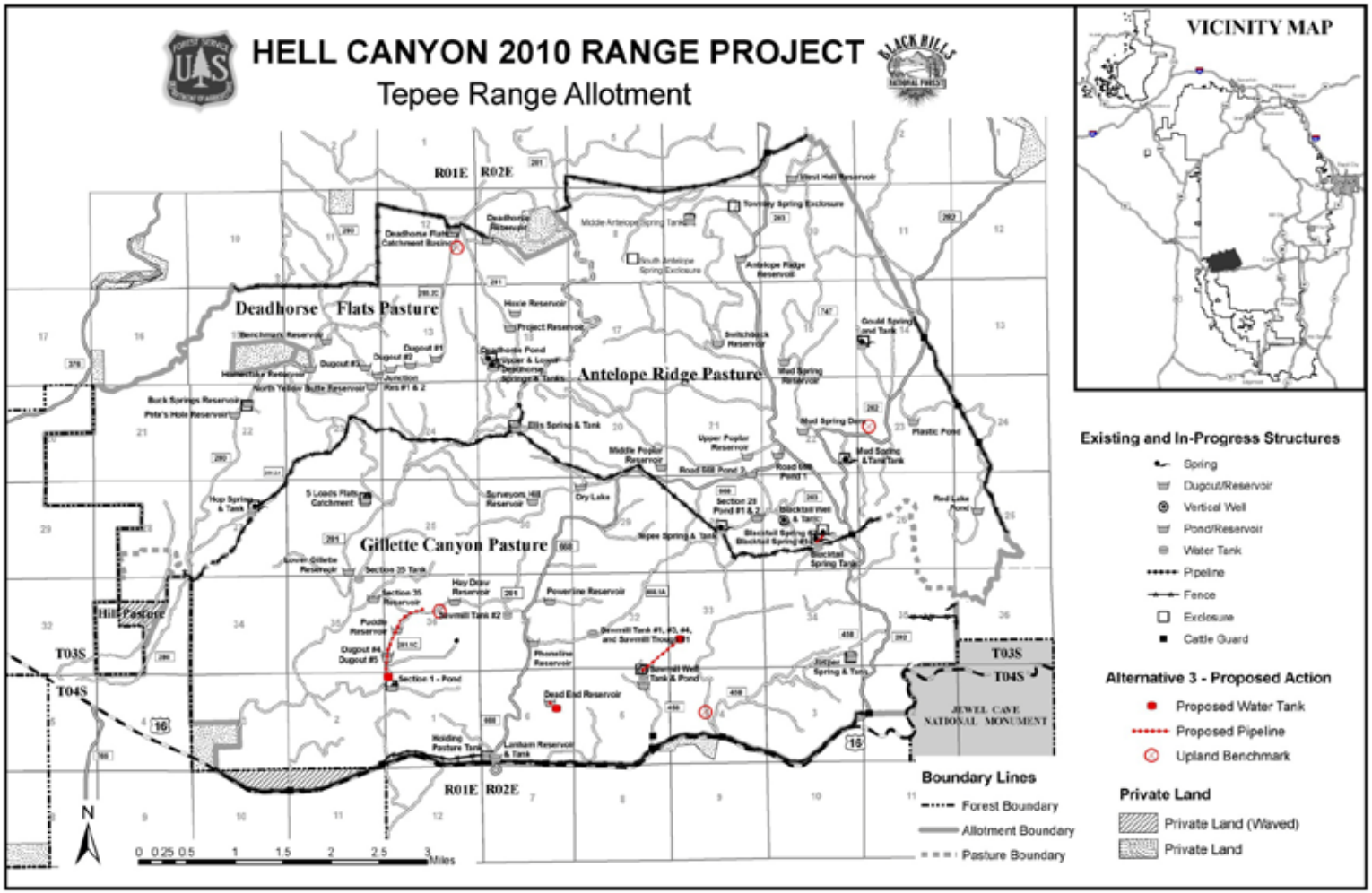


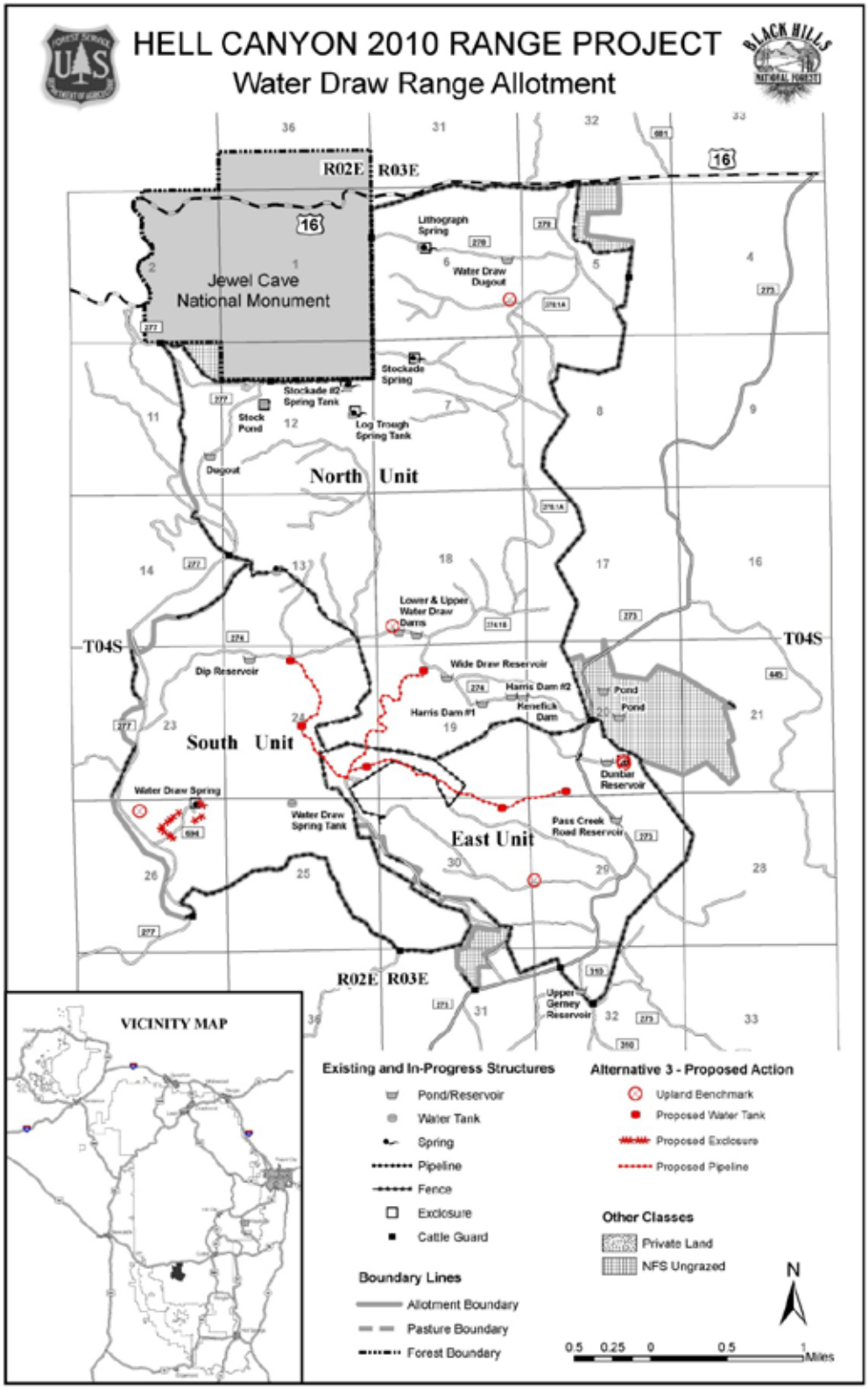
APPENDIX A: ALLOTMENT MAPS


HELL CANYON 2010 RANGE PROJECT
French Creek Range Allotment
R03E R04E
R03E R04E
T03S
T04S
T03S
T04S
French Creek Unit
Pope Springs Unit
Pope Springs Unit
North Pole Unit
Old Cement Spring Pond
Church Camp
Bugtown Spring
Beaver Pond #1
Beaver Pond #2
Toe Gulch Pond
Joe Draw Spring
Joe Draw Spring Tanks
French Creek Exclosures
Ruby Spring
Fen Exclosure
Birch Tree Seep
McKenna Spring
McKenna Spring Tank
Wabash Spring
Wabash Spring Tank
Danby Park Dam
Danby Park Pond
Warren Gulch Spring
Pope Spring Tank & Pond
Freeport Pipeline
North Pole Spring
North Pole Spring #2
Ruby Creek
French Creek
Existing and In-Progress Structures
Pond/Reservoir
Water Tank
Dugout
Spring
Fence
Pipeline
Exclosure
Cattle Guard
Boundary Lines
Pasture Boundary
Allotment Boundary
Other Symbols
NFS Ungrazed
Private Land
Stream
Alternative 3 - Proposed Action
Proposed Spring Development
Proposed Stock Tank
Proposed Dugout
Upland Benchmark
Riparian/Stream Benchmark
Proposed Pipeline
Proposed Fence
Proposed Exclosures
N
0.5 0.25 0 0.5 1 1.5 Miles
VICINITY MAP


VICINITY MAP
HELL CANYON 2010 RANGE PROJECT
Lithograph Range Allotment
BLACK HILLS NATIONAL FOREST
JEWEL CAVE NATIONAL MONUMENT
North Unit
South Unit
East Unit
R01E R02E
R01E R02E
T04S
T05S
T04S
T05S
Existing and In-Progress Structures
Spring
Vertical Well
Pond/Reservoir
Water Tank
Fence
Exclosure
Cattle Guard
Alternative 3 - Proposed Action
Upland Benchmarks
Proposed Water Tank
Proposed Pipeline
Boundary Lines
Allotment Boundary
Pasture Boundary
Forest Boundary
Private Land
Private Land Grazed (Not Waved)
Private Land Outside Allotment
N
1 0.5 0 1 2
Miles


HELL CANYON 2010 RANGE PROJECT
Lower Beaver Range Allotment
VICINITY MAP
R60W R01E
R01E R02E
T46N
T45N
T01S
T02S
T44N
T03S
Thompson Canyon Pasture
Moon Pasture
Summit Ridge Pasture
Wilson Place Pasture
Roby Pasture
Buck Spring Pasture
Lower Boles Pasture
Existing and In-Progress Structures
Pond/Reservoir
Water Storage Tank
Stocktank
Spring
Fence
Pipeline
Exclosure
Cattle Guard
Alternative 3 - Proposed Action
Upland Benchmarks
Proposed Stocktank
Proposed Pipeline
Boundary Lines
Forest Boundary
Allotment Boundary
Pasture Boundary
Private Land
Private Grazed (Not Waved)
Private Land
N
1 0.5 0 1 2 3 Miles


HELL CANYON 2010 RANGE PROJECT
Tepee Range Allotment
VICINITY MAP
Deadhorse Flats Pasture
Antelope Ridge Pasture
Gillette Canyon Pasture
Hill Pasture
R01E R02E
T03S
T04S
JEWEL CAVE NATIONAL MONUMENT
Existing and In-Progress Structures
Spring
Dugout/Reservoir
Vertical Well
Pond/Reservoir
Water Tank
Pipeline
Fence
Exclosure
Cattle Guard
Alternative 3 - Proposed Action
Proposed Water Tank
Proposed Pipeline
Upland Benchmark
Boundary Lines
Forest Boundary
Allotment Boundary
Pasture Boundary
Private Land
Private Land (Waved)
Private Land
N
0 0.25 0.5 1 1.5 2 2.5 3 Miles


HELL CANYON 2010 RANGE PROJECT
Water Draw Range Allotment
R02E R03E
Jewel Cave
National Monument
Lithograph Spring
Water Draw Dugout
Stockade Spring
Stockade #2 Spring Tank
Stock Pond
Log Trough Spring Tank
Dugout
North Unit
Lower & Upper Water Draw Dams
T04S
Dip Reservoir
Wide Draw Reservoir
Harris Dam #2
Harris Dam #1
Kenefick Dam
Pond
Pond
South Unit
Dunbar Reservoir
Water Draw Spring
Water Draw Spring Tank
Pass Creek Road Reservoir
East Unit
R02E R03E
Upper Gerney Reservoir
VICINITY MAP
Existing and In-Progress Structures
Pond/Reservoir
Water Tank
Spring
Pipeline
Fence
Exclosure
Cattle Guard
Boundary Lines
Allotment Boundary
Pasture Boundary
Forest Boundary
Alternative 3 - Proposed Action
Upland Benchmark
Proposed Water Tank
Proposed Exclosure
Proposed Pipeline
Other Classes
Private Land
NFS Ungrazed
N
0.5 0.25 0 0.5 1 Miles

APPENDIX B: ALLOTMENT MONITORING PLANS

Table B-1. Hell Canyon Range 2010 Project individual allotment monitoring plans

Monitoring Site	Desired Conditions	Method (described in EA on pages 39-41)	Frequency[3]	Responsibility	Trigger Point for Change	Action Taken if Trigger Point Reached
Bull Flats Allotment						
Key upland grazing area[1]	Less than 50 percent utilization	Ocular utilization	Every year; periodically throughout grazing season	Permittee and/or USFS range staff	50 percent utilization	Remove livestock from area
Key riparian grazing area[2]	4–6 inch stubble height on *Carex* and *Juncus* species along the greenline (WCP 3h)	Stubble height	Every year; periodically throughout grazing season	Permittee and/or USFS range staff	4–6 inch stubble height	Remove livestock from area
Benchmark: Brash Unit: C6	Maintain ecological processes; increase western wheatgrass, sedges, and other native perennials; bare ground less than 5%	Cover frequency index	5–10 Years	USFS range staff	Similarity coefficient less than 65%, **or** greater than 5% bare ground	Adjust annual operating instructions and/or implement an adaptive management option
Benchmark: Castle Rock Unit: CF1	Maintain ecological processes; decrease smooth brome and Kentucky bluegrass and increase other perennial grasses and sedges; bare ground less than 5%	Cover frequency index	5–10 years	USFS range staff	Similarity coefficient less than 65%, **or** greater than 5% bare ground	Adjust annual operating instructions and/or implement an adaptive management option
Castle Rock Unit: North Lightning Creek riparian site	Maintain ecological processes; reduce hummocking; maintain perennial native vegetation; bare ground less than 5%	Photographs/ photopoints	5–10 years	USFS range staff	Decreasing riparian condition measured through increase in hummocking, **or** decrease in perennial native vegetation	Adjust annual operating instructions and/or implement an adaptive management option
Castle Rock Unit: Ponds below Castle Spring	Maintain high-quality amphibian breeding site that contains perennial native vegetation	Photographs/ photopoints	3–5 years	USFS wildlife staff	Decreasing riparian condition measured through declining trend in perennial native vegetation	Implement an adaptive management option such as move cows from area or fence ponds
Benchmark: Heinrich Unit: CF1	Maintain ecological processes; similarity coefficient greater than 65%; bare ground less than 5%	Cover frequency index	5–10 Years	USFS range staff	Similarity coefficient less than 65%, **or** greater than 5% bare ground	Adjust annual operating instructions and/or implement an adaptive management option
Benchmark:	Maintain ecological	Cover	5–10 Years	USFS range	Similarity coefficient less than	Adjust Annual Operating

Monitoring Site	Desired Conditions	Method (described in EA on pages 39-41)	Frequency[3]	Responsibility	Trigger Point for Change	Action Taken if Trigger Point Reached
Michaud Unit: C2	processes; decrease Kentucky bluegrass, increase other perennial grasses and shrubs; bare ground less than 5%	Frequency index		staff	65%, **or** greater than 5% bare ground	Instructions and/or implement an adaptive management option
Benchmark: King Tut Unit: C7	Maintain ecological processes; decrease Kentucky bluegrass, increase other perennial grasses and shrubs; bare ground less than 5%	Cover frequency index	5–10 Years	USFS range staff	Similarity coefficient less than 65%, **or** greater than 5% bare ground	Adjust annual operating instructions and/or implement an adaptive management option
Benchmark: King Tut Unit: South Lightning Creek MIM	Maintain ecological processes; increase riparian shrubs and hydric vegetation; bare ground less than 5%	Multiple indicator method (MIM)	5–10 Years	USFS interdisciplinary team	Declining trend or less than 74% streambank stability, **or** declining trend or more than 26% bank alteration, **or** greater than 40% use of current year's willows leaders, **or** declining trend in percentage of plots containing hydric plants, **or** declining trend in the percentage of plots containing riparian shrubs, **or** trend toward decadent dominant riparian shrubs with lack of recruitment	adjust annual operating instructions and/or implement an adaptive management option
3 Sensitive Archeological Sites (565, 566, 567)		Heritage site monitoring		USFS heritage resources staff		
French Creek Allotment						
Key upland grazing area[1]	Less than 50 percent utilization	Ocular utilization	Every year; periodically throughout grazing season	Permittee and/or USFS range staff	50 percent utilization	Remove livestock from area
Key riparian grazing area[2]	4–6 inch stubble height on *Carex* and *Juncus* species along the greenline (WCP 3h)	Stubble height	Every year; periodically throughout grazing season	Permittee and/or USFS range staff	4–6 inch stubble height	Remove livestock from area
Benchmark: French Creek Unit: Upland site C1	Maintain ecological processes; decrease Kentucky bluegrass and undesirable forbs; increase other perennial grasses and sedges; bare ground less	Cover frequency index	5–10 Years	USFS range staff	Similarity coefficient less than 65%, **or** greater than 5% bare ground	Adjust annual operating instructions and/or implement an adaptive management option

Monitoring Site	Desired Conditions	Method (described in EA on pages 39-41)	Frequency[3]	Responsibility	Trigger Point for Change	Action Taken if Trigger Point Reached
	than 5%					
Benchmark: French Creek Unit: French Creek MIM #1	Less than 26% bank alteration; greater than 74% stable banks; increase riparian shrubs and hydric vegetation	Multiple indicator method (MIM)	5–10 years	USFS interdisciplinary team	Declining trend or less than 74% streambank stability, **or** declining trend or more than 26% bank alteration, **or** greater than 40% use of current year's willows leaders, **or** declining trend in percentage of plots containing hydric plants, **or** declining trend in the percentage of plots containing riparian shrubs, **or** trend toward decadent dominant riparian shrubs with lack of recruitment	Implement an adaptive management option
French Creek MIM #2	Less than 26% bank alteration; greater than 74% stable banks; increase riparian shrubs and hydric vegetation	Multiple indicator method (MIM)	5–10 years	USFS interdisciplinary team	Declining trend or less than 74% streambank stability, **or** declining trend or more than 26% bank alteration, **or** greater than 40% use of current year's willows leaders, **or** declining trend in percentage of plots containing hydric plants, **or** declining trend in the percentage of plots containing riparian shrubs, **or** trend toward decadent dominant riparian shrubs with lack of recruitment	Implement an adaptive management option
French Creek Unit: Key riparian grazing area along French Creek	4–6 inch stubble height on *Carex* and *Juncus* species along the greenline (WCP 3h); less than 26% streambank alteration	Stubble height, streambank alteration	Every year; periodically throughout grazing season	Permittee and/or USFS range staff	4–6 inch stubble height	Remove livestock from area
Benchmark: North Pole Unit: Upland site C2	Maintain ecological processes; decrease Kentucky bluegrass and undesirable forbs, increase other perennial grasses and sedges; bare ground less than 5%	Cover frequency index	5–10 Years	USFS range staff	Similarity coefficient less than 65%, **or** greater than 5% bare ground	Adjust annual operating instructions and/or implement an adaptive management option
Benchmark: Pope Springs Unit: C1	Maintain ecological processes; decrease Kentucky bluegrass and undesirable forbs, increase other perennial grasses and sedges; bare ground less	Cover frequency index	5–10 Years	USFS range staff	Similarity coefficient less than 65%, **or** greater than 5% bare ground	Adjust annual operating instructions and/or implement an adaptive management option

Monitoring Site	Desired Conditions	Method (described in EA on pages 39-41)	Frequency[3]	Responsibility	Trigger Point for Change	Action Taken if Trigger Point Reached
	than 5%					
Pope Springs Unit: Crow Creek Pond	Native riparian vegetation and stable banks on pond	Photographs/ photopoints	3–5 Years	USFS wildlife staff	Decreasing riparian condition measured through declining trend in native riparian vegetation	Consult with adjacent land owner and implement an adaptive management option such as fencing
Pope Springs Unit: Ruby Spring Amphibian Breeding Site	Maintain ecological processes; increase riparian shrubs and hydric vegetation; bare ground less than 5%	Photographs/ photopoints	3–5 Years	USFS wildlife staff	Decreasing riparian condition measured through declining trend in native riparian vegetation	Adjust annual operating instructions and/or implement an adaptive management option such as fencing
1 Sensitive Archeological Site (1211)		Heritage site monitoring		USFS heritage resources staff		
Lithograph Allotment						
Key upland grazing area[1]	Less than 50 percent utilization	Ocular utilization	Every year; periodically throughout grazing season	Permittee and/or USFS range staff	50 percent utilization	Remove livestock from area
Key riparian grazing area[2]	4–6 inch stubble height on *Carex* and *Juncus* species along the greenline (WCP 3h)	Stubble height	Every year; periodically throughout grazing season	Permittee and/or USFS range staff	4–6 inch stubble height	Remove livestock from area
Benchmark: North Unit: CF1	Maintain ecological processes; decrease blue grama and subshrubs and increase other perennial grasses and forbs; bare ground less than 5%	Cover frequency index	5–10 Years	USFS range staff	Similarity coefficient less than 65%, or greater than 5% bare ground	Adjust annual operating instructions and/or implement an adaptive management option
Benchmark: South Unit: CF1	Maintain ecological processes; decrease blue grama and subshrubs and increase other perennial grasses and forbs; bare ground less than 5%	Cover frequency index	5–10 Years	USFS range staff	Similarity coefficient less than 65%, **or** greater than 5% bare ground	Adjust annual operating instructions and/or implement an adaptive management option
Benchmark: East Unit: C3	Maintain ecological processes; decrease blue grama and subshrubs and increase other perennial grasses and forbs; bare ground less than 5%	Cover frequency index	5–10 Years	USFS range staff	Similarity coefficient less than 65%, **or** greater than 5% bare ground	Adjust annual operating instructions and/or implement an adaptive management option
Lower Beaver Allotment						
Key upland grazing area[1]	Less than 50 percent utilization	Ocular utilization	Every year; periodically	Permittee and/or USFS range	50 percent utilization	Remove livestock from area

Monitoring Site	Desired Conditions	Method (described in EA on pages 39-41)	Frequency[3]	Responsibility	Trigger Point for Change	Action Taken if Trigger Point Reached
			throughout grazing season	staff		
Key riparian grazing area[2]	4–6 inch stubble height on *Carex* and *Juncus* species along the greenline (WCP 3h)	Stubble height	Every year; periodically throughout grazing season	Permittee and/or USFS range staff	4–6 inch stubble height	Remove livestock from area
Benchmark: Buck Springs Unit: C5	Maintain ecological processes; decrease sedges and subshrubs and increase other perennial grasses, forbs and shrubs; bare ground less than 5%	Cover frequency index	5–10 Years	USFS range staff	Similarity coefficient less than 65%, **or** greater than 5% bare ground	Adjust annual operating instructions and/or implement an adaptive management option
Benchmark: Lower Boles Unit: C6	Maintain ecological processes; decrease blue grama and subshrubs and increase other perennial grasses, forbs and sedges; bare ground less than 5%	Cover frequency index	5–10 Years	USFS range staff	Similarity coefficient less than 65%, **or** greater than 5% bare ground	adjust annual operating instructions and/or implement an adaptive management option
Benchmark: Moon Unit: C8	Maintain ecological processes; decrease Kentucky bluegrass and timothy and increase other perennial grasses and sedges; bare ground less than 5%	Cover frequency index	5–10 Years	USFS range staff	Similarity coefficient less than 65%, **or** greater than 5% bare ground	Adjust annual operating instructions and/or implement an adaptive management option
Benchmark: Roby Unit: C7	Maintain ecological processes; decrease crested wheatgrass and increase other perennial grasses, forbs and sedges; bare ground less than 5%	Cover frequency index	5–10 Years	USFS range staff	Similarity coefficient less than 65%, **or** greater than 5% bare ground	Adjust annual operating instructions and/or implement an adaptive management option
Benchmark: Summit Ridge Unit: C3	Maintain ecological processes; decrease sedges and subshrubs and increase other perennial grasses, forbs and shrubs; bare ground less than 5%	Cover frequency index	5–10 Years	USFS range staff	Similarity coefficient less than 65%, **or** greater than 5% bare ground	Adjust annual operating instructions and/or implement an adaptive management option
Benchmark: Wilson Place Unit: CF1	Maintain ecological processes; decrease Kentucky bluegrass and subshrubs and increase other perennial grasses and forbs; bare ground less than 5%	Cover frequency index	5–10 Years	USFS range staff	Similarity coefficient less than 65%, **or** greater than 5% bare ground	Adjust annual operating instructions and/or implement an adaptive management option

Monitoring Site	Desired Conditions	Method (described in EA on pages 39-41)	Frequency[3]	Responsibility	Trigger Point for Change	Action Taken if Trigger Point Reached
Tepee Allotment						
Key upland grazing area[1]	Less than 50 percent utilization	Ocular utilization	Every year; periodically throughout grazing season as funding and personnel are available	Permittee and/or USFS range staff	50 percent utilization	Remove livestock from area
Key riparian grazing area[2]	4–6 inch stubble height on *Carex* and *Juncus* species along the greenline (WCP 3h)	Stubble height	Every year; periodically throughout grazing season	Permittee and/or USFS range staff	4–6 inch stubble height	Remove livestock from area
Benchmark: Gillette Canyon Unit: CF4	Maintain ecological processes; decrease Western wheatgrass, blue grama and subshrubs and increase other perennial grasses forbs and sedges; bare ground less than 5%	Cover frequency index	5-10 Years	USFS range staff	Similarity coefficient less than 65%, **or** greater than 5% bare ground	Adjust annual operating instructions and/or implement an adaptive management option
Benchmark: Gillette Canyon Unit: CF1	Maintain ecological processes; decrease blue grama and subshrubs and increase other perennial grasses forbs and shrubs; bare ground less than 5%	Cover frequency index	5–10 Years	USFS range staff	Similarity coefficient less than 65%, **or** greater than 5% bare ground	adjust annual operating instructions and/or implement an adaptive management option
Benchmark: Deadhorse Flats Unit: CF3	Maintain ecological processes; decrease blue grama and subshrubs and increase other perennial grasses forbs and shrubs; bare ground less than 5%	Cover frequency index	5–10 Years	USFS range staff	Similarity coefficient less than 65%, **or** greater than 5% bare ground	Adjust annual operating instructions and/or implement an adaptive management option
Benchmark: Antelope Ridge Unit: CF2 (old C5)	Maintain ecological processes; decrease Kentucky bluegrass and subshrubs and increase other perennial grasses and forbs; bare ground less than 5%	Cover frequency index	5–10 Years	USFS range staff	Similarity coefficient less than 65%, **or** greater than 5% bare ground	Adjust annual operating instructions and/or implement an adaptive management option
Antelope Ridge Unit: Poplar Spring	Maintain ecological processes; increase riparian shrubs and hydric vegetation; bare ground less than 5%	Photographs/ photopoints	3–5 years	USFS range and/or watershed staff	Decreasing riparian condition measured through decline in riparian shrubs and hydric vegetation	Implement an adaptive management option such as fencing water the source from livestock and wildlife
Antelope Ridge Unit:	Maintain ecological processes; increase riparian	Photographs/ photopoints	3–5 years	USFS range and/or	Decreasing riparian condition measured through decline in	Implement an adaptive management option such as

Monitoring Site	Desired Conditions	Method (described in EA on pages 39-41)	Frequency[3]	Responsibility	Trigger Point for Change	Action Taken if Trigger Point Reached
Townley Spring	shrubs and hydric vegetation; bare ground less than 5%			watershed staff	riparian shrubs and hydric vegetation	fencing the water source
1 Sensitive Archeological Site (811)		Heritage site monitoring		USFS heritage resources staff		
Water Draw Allotment						
Key upland grazing area[1]	Less than 50 percent utilization	Ocular utilization	Every year; periodically throughout grazing season	Permittee and/or USFS range staff	50 percent utilization	Remove livestock from area
Key riparian grazing area[2]	4–6 inch stubble height on *Carex* and *Juncus* species along the greenline (WCP 3h)	Stubble height	Every year; periodically throughout grazing season	Permittee and/or USFS range staff	4–6 inch stubble height	Remove livestock from area
Benchmark: North Unit: CF1	Maintain ecological processes; decrease needleandthread and increase other perennial grasses, sedges, shrubs and forbs; bare ground less than 5%	Cover frequency index	5–10 Years	USFS range staff	Similarity coefficient less than 65%, **or** greater than 5% bare ground	Adjust annual operating instructions and/or implement an adaptive management option
Benchmark: North Unit: C2	Maintain ecological processes; decrease blue grama and subshrubs and increase other perennial grasses forbs, shrubs and sedges; bare ground less than 5%	Cover frequency index	5–10 Years	USFS range staff	Similarity coefficient less than 65%, **or** greater than 5% bare ground	Adjust annual operating instructions and/or implement an adaptive management option
North Unit: Un-named Spring below Log Trough Spring	Maintain ecological processes; increase riparian shrubs and hydric vegetation; bare ground less than 5%	Photographs/ photopoints	3–5 years	USFS range and/or watershed staff	Decreasing riparian condition measured through decline in riparian shrubs and hydric vegetation	Implement an adaptive management option such as fencing the water source
Benchmark: East Unit: Inside Dunbar Exclosure PC1	Maintain ecological processes; decrease Kentucky bluegrass and increase other perennial grasses, sedges, shrubs and forbs; bare ground less than 5%	Cover frequency index	5–10 Years	USFS range staff	Reference plot	
Benchmark: East Unit: Outside Dunbar Exclosure PC2	Maintain ecological processes; decrease Kentucky bluegrass and increase other perennial	Cover frequency index	5–10 Years	USFS range staff	Similarity coefficient less than 65%, **or** greater than 5% bare ground	Adjust annual operating instructions and/or implement an adaptive management option

Monitoring Site	Desired Conditions	Method (described in EA on pages 39-41)	Frequency[3]	Responsibility	Trigger Point for Change	Action Taken if Trigger Point Reached
	grasses, sedges, shrubs and forbs; bare ground less than 5%					
Benchmark: East Unit: C3	Maintain ecological processes; decrease subshrubs and increase other perennial grasses, sedges, shrubs and forbs; bare ground less than 5%	Cover frequency index	5–10 Years	USFS range staff	Similarity coefficient less than 65%, **or** greater than 5% bare ground	Adjust annual operating instructions and/or implement an adaptive management option
Benchmark: South Unit: C1	Maintain ecological processes; decrease blue grama and increase other perennial grasses, sedges, shrubs and forbs; bare ground less than 5%	Cover frequency index	5–10 Years	USFS range staff	Similarity coefficient less than 65%, **or** greater than 5% bare ground	Adjust annual operating instructions and/or implement an adaptive management option
2 Sensitive Archeological Sites (520 and 1098)		Heritage site monitoring		USFS heritage resources staff		

[1] and [2]: The location of key upland and key riparian areas change periodically based on season of use, pastures used and other factors.

[3]: The goal for monitoring frequency is as described in this table for each site. However, monitoring is based on available staff and funding. Priority would be given to monitoring riparian areas on the French Creek Allotment.

APPENDIX C: SCOPING COMMENT CATEGORIZATION

Table C-1. Hell Canyon Range 2010 Project public scoping summary

Comment	Com-menter	Focus Area	Concern Category	Disposition
Ensure adequate funds are available to replace substandard cattleguards	1	Funding	(3) Procedural Concern *(but relates to key issue Costs and Range Improvements)*	The process for cattle guard replacement and installation is an administrative concern regarding USFS and Custer County working relationships. This comment will be forwarded to the District Ranger.
Cattle guards will help alleviate conflicts between private landowners and livestock grazing on public land	1	Range Improvements	(3) Procedural Concern *(but relates to key issue Costs and Range Improvements)*	USFS agrees; with the increased development of private land intermingled throughout the National Forest, cattleguards can be effective to control livestock both on and off National Forest System lands.
I support grazing on the forest	1	Support	(6) Statement of Support	The proposed action includes continuation of livestock grazing.
The frigid ambersnail occurs within the project area. Keep apprised of the status of this species and develop proactive measures to conserve frigid ambersnail populations and habitat	2	Sensitive Species	(2) Non-Key Issue	The frigid ambersnail is considered a species of local concern and will be considered and evaluated as part of this project, documented through the EA and the wildlife specialist report. The USFS agrees that populations occur within the project area, as well as additional suitable habitat. Forest Plan direction for conservation of species of location concern will be followed for this project.
The northern leopard frog may occur within the project area. Keep apprised of the status of the species and develop proactive measures to conserve northern leopard frog populations and habitat	2, 10	Sensitive Species	(2) Non-Key Issue	The northern leopard frog is considered a Region 2 Sensitive Species and will be considered and evaluated as part of this project, documented through the EA, the wildlife specialist report, and the biological assessment. The USFS agrees that populations occur within the project area, as well as additional suitable habitat. Forest Plan direction for conservation of sensitive species will be followed for this project.
Protect and conserve springs, riverine and riparian areas, wetlands, and fens	2, 8, 10	Riparian Area Protection	(1) Key Issue	The USFS agrees with your concern regarding conservation of sensitive habitats such as riparian areas. The purpose and need for taking action includes improvement in riparian area conditions, and the proposed action includes measures for enhanced protection of these sensitive areas. Forest Plan direction for protection of riparian areas will be followed for this project through specific components of the proposed action and through site-specific project design features and adaptive management principals.
Livestock grazing on the Black Hills National Forest is a tremendous fire deterrent	3, 4	Fire and Fuels	(6) Statement of Support	The Forest Service agrees that proper management of livestock on public lands can sometimes have the indirect, beneficial effect of reducing high fuel loading and the risk of wildfire.
We agree with any improvement to address wetland and riparian	3	Riparian Area	(6) Statement of Support/	The USFS agrees with your concern regarding conservation of sensitive habitats such as riparian areas. The purpose and need for taking action

Comment	Com-menter	Focus Area	Concern Category	Disposition
area concerns and improve water distribution		Protection	(1) Key Issue	includes improvement in riparian area conditions and the proposed action includes measures for enhanced protection of these sensitive areas. Forest Plan direction for protection of riparian areas will be followed for this project through specific components of the proposed action and through site-specific project design features and adaptive management principals.
Livestock grazing improves wildlife habitat	4	Wildlife	(6) Statement of Support	The Forest Service agrees that proper management of livestock on public lands can sometimes have the indirect, beneficial effect of improving habitat conditions for some species of wildlife.
Develop additional water sources in the Pope Springs and North Pole Units of the French Creek Allotment	4	Range Improvements	(4) Alternative	The Forest Service agrees that additional water sources are needed in these units; this is part of the proposed action and the current management alternative, described in chapter 2 of the EA.
Use mineral placement/salt and water development to facilitate cattle distribution	4	Management Techniques	(4) Alternative	The Forest Service agrees that using salt/minerals and additional water can be effective ways to better distribute livestock. These actions are part of the adaptive management options that are part of the proposed action.
With proper management, the French Creek Allotment can carry the current permitted number of 182 cow/calf pairs *(letter states 82 as current number; perhaps a typographic error?)*	4	Stocking Levels/Capability/ Capacity	(4) Alternative	Alternatives considered for this project are described in detail at the end of chapter 2 of the environmental document; alternatives for French Creek are described in that section.
Literature and reference cited and included as attachments to scoping comments	5			ID team members as technical area specialists will review literature and references provided.
Ensure current permitted numbers are based on recently determined capable acres; use the Forest plan capability/suitability (Cap Suit) and bring it to each allotment	5	Stocking Levels/Capability/ Capacity	(3) Procedural Concern	Grazing has occurred for many years and grazing capacity estimates have been adjusted based on actual use observations. Capability/suitability is calculated using available soils GIS layer with some modifications based on roads or other developed structures that may impact total acres.
Fair range condition should not be considered satisfactory	5	Range Condition	(3) Procedural Concern	Rangeland management status will be used rather than rangeland condition. Management status reflects existing conditions in relation to desired condition as opposed to a climax plant community and reduces the tendency to affix generic terms to the present status of a unit of range. Management status is determined through similarity coefficient and is documented in the range specialist report.
Desired conditions should be quantifiable	5, 10	Data and Best Available Science	(3) Procedural Concern	Agreed. Methods for developing desired conditions are briefly described in chapter 1 of the EA and in detail in the range specialist report.
Use MIM and GIG for riparian monitoring; do not use proper functioning condition (PFC)	5, 8, 10	Data and Best Available Science	(3) Procedural Concern	Data collected, to be used in the analysis of this project, include Multiple Indicator Monitoring (MIM) for monitoring streams and riparian vegetation. Proper functioning condition (PFC) data, collected in the past, can be used as an evaluation tool. PFC is used as an assessment tool and it is not

Comment	Com-menter	Focus Area	Concern Category	Disposition
				designed to be a monitoring tool. MIM is the current protocol of choice for stream and riparian monitoring. The Caribou National Forest Grazing Implementation Guide (GIG) is a riparian process paper prepared by the Forest hydrologist on riparian monitoring parameters and management systems in 7/30/2000 and updated in 12/28/2005. This paper includes information regarding references associated with riparian areas and appears to be a precursor to the use of MIM. MIM is used on the Black Hills National Forest.
Follow agency direction for how to implement adaptive management with clear measurable objectives, timelines, methods, etc. Ensure monitoring plans are realistic and implementable within available funds	5, 8, 10, 11	Adaptive Management	(3) Procedural Concern	Agreed. The Forest Service will follow all agency direction on adaptive management. The EA will include an estimate of the costs of range improvements. The decision maker will consider available funds when determining what improvements will be authorized.
Refer to GTR-209 for riparian management decisions	5	Data and Best Available Science	(3) Procedural Concern	RMRS GTR 209 is a review of disease-related conflicts between domestic sheep and goats and bighorn sheep. This publication was prepared to provide a summary of the published scientific literature concerning the issue of disease transmission between bighorn sheep and domestic sheep and goats. Due to some inaccurate findings the agency has retracted RMRS-GTR-209.
Do not downplay impacts in your NEPA analysis	5	Analysis	(3) Procedural Concern	Chapter 3 of the EA will include a detailed evaluation of the environmental consequences of the alternatives
Use and gather data for use in describing current conditions and potential conditions	5	Data and Best Available Science	(3) Procedural Concern	Methodology for current and desired conditions is described in chapter 1 of the EA and included the compilation of monitoring data and other sources.
Base decisions on science and data	5, 8, 10	Data and Best Available Science	(3) Procedural Concern	All available data and the best available science were used in the development of the alternatives and the analysis summarized in the EA. The EA will be carefully reviewed by the decision maker before a decision is made on this project.
Ensure permits with livestock permittees include accountability	5	Administrative	(3) Procedural Concern	Permits are administered in accordance with Forest Service directives (FSH 2209.13 and FSM 2230).
Include past performance of the Forest Service, permittees and previous NEPA documents in the EA; show how current range conditions compare to conditions when current AMPs were first completed and if any habitats	5, 11	Analysis	(3) Procedural Concern	Existing resource conditions are reflective of past actions, previous management and a wide variety of other influences. Existing conditions (affected environment) are described in chapter 3 of the EA. The need for action was developed by comparing existing conditions to desired conditions.

Comment	Com-menter	Focus Area	Concern Category	Disposition
have improved or declined				
Follow Forest Plan direction for management areas. For instance, big game winter range emphasis management area should be managed differently than resource production areas	5, 10	Wildlife	(3) Procedural Concern/ Non-key Issue	Livestock management strategies including distribution and stocking rates will be designed to be compatible with big-game habitat objectives. A meeting is being arranged with South Dakota Game, Fish and Parks to discuss big-game habitat objectives.
Conduct sensitive species surveys to determine current conditions	5	Sensitive Species	(2) Non-Key Issue	Current sensitive species conditions are summarized in chapter 3 of the EA and described in detail in the Botany and Wildlife specialist reports.
What are current conditions for sensitive snail populations?	5	Sensitive Species	(2) Non-Key Issue	Sensitive snail population conditions will be summarized in chapter 3 of the EA based on detailed descriptions and analysis in the associated wildlife specialist report and biological assessment.
The EA should discuss the Fanny Boles RNA	5	Research Natural Area	(3) Procedural Concern	The EA discusses the Fanny Boles RNA in chapter 1 and in various resource sections of chapter 3.
The EA should discuss watershed condition classes	5	Soils and Water	(2) Non-Key Issue	The EA discusses watershed condition classes in chapter 3, based on a detailed evaluation of watershed condition in the Soils and Hydrology Specialist Report.
The EA should discuss existing fen, spring and wetland conditions	5	Riparian Area Protection	(1) Key Issue	Existing conditions are described in chapter 3 of the EA and include sensitive habitats such as springs, wetlands and fens.
The EA should clearly analyze all proposed range improvements, their site-specific impacts, how they relate to other past improvements and their effectiveness, show why more are needed and show costs and funding sources	5, 10	Range Improvements	(1) Key Issue	The EA includes a detailed list of proposed range improvements in chapter 2. Existing conditions, including existing range improvements on all allotments, are summarized in chapter 3 of the EA, and based on a detailed analysis in the Range Specialist Report. As described in chapter 1, additional range improvements are needed to move toward desired conditions.
The EA should include permitted and actual use for each allotment over the last 20 to 30 years so they can be related to current conditions	5, 10, 11	Data and Best Available Science	(3) Procedural Concern	The Forest Service agrees that permitted use and actual use are not always the same. Existing range conditions indicate actual use. When there is a difference between permitted and actual use, this is described in the Range Specialist Report and summarized in chapter 3 of the EA.
Ensure monitoring can be implemented; if not, do not use adaptive management	5, 10, 11	Adaptive Management	(3) Procedural Concern	The Forest Service agrees that any monitoring that is proposed needs to be funded and implemented. Monitoring is an integral component of the proposed action and any alternative to the proposed action. A monitoring plan is included as an appendix to the EA. When a decision is made on whether or not to implement the proposed action or one of the alternatives, a commitment to monitoring, and the details of the monitoring requirements, is made.
The decision should include	5	Adaptive	(3) Procedural Concern	Chapter 3 of the EA describes the details of all proposed actions

Comment	Com-menter	Focus Area	Concern Category	Disposition
actions needed now to address issues/concerns; don't put them off		Management		determined immediately necessary by the project ID team to address resource concerns and move toward desired conditions. However, in the spirit of adaptive management, some proposed methods for moving toward desired conditions and addressing a site-specific concern may include a less expensive option first with follow-up monitoring, before a more expensive option is proposed. Trigger points are part of the monitoring plan so that if a desired result is not achieved with the first option, for instance, the second option will be implemented if needed based on monitoring. How adaptive management will be implemented is described in the EA and the subsequent monitoring and implementation plan.
Ensure measures for movement of livestock, wildlife escape ramps, etc. ,are actually implemented; don't say this will happen if it won't	5	Administrative	(3) Procedural Concern	A monitoring and implementation plan will be developed as part of the allotment management plan for each allotment, based on the results of the environmental analysis and subsequent decision document. Project design features for wildlife escape ramps and other such items that are part of the environmental document and the decision document are incorporated into the AMP for implementation.
Please send a copy of the site-specific desired conditions developed for each benchmark and key site	5	Request	Request	The site-specific desired conditions developed for each benchmark and key area will be incorporated as part of the EA.
The plan should include evaluation of resource data and livestock grazing in larger context of natural resource stewardship	8	Data and Best Available Science	(3) Procedural Concern	All alternatives are evaluated in the context of achieving the purpose and need for action which focuses on improving natural resource conditions where needed.
Consider all public values for natural resources impacted by grazing over the next 10 years	8	Social	(3) Procedural Concern	Socioeconomics section of the environmental document describes costs and benefits of this project.
Consider livestock grazing in context with climate change and how this will likely affect vegetation and carrying capacity	8, 10, 11	Climate Change/ Environmental Variability	(2) Non-Key Issue	Climate change is discussed in chapter 3 of the EA.
Adaptive management options table is inadequate to address issues over 10 years and it includes options that have never been used (range riding)	8	Adaptive Management	(3) Procedural Concern	The adaptive management options table has been revised since the scoping period to ensure all actions included in it are reasonable and implementable.
Range riding should be considered to address livestock distribution issues instead of expensive pipelines	8, 10	Cost and Range Improvements/ Management Techniques	(1) Key Issue	Alternatives considered for this project are described in detail at the end of chapter 2 of the environmental document; range riding is described in that section; range riding is also a proposed action for the French Creek Allotment under alternative 3.
Please provide current forage capacity information in the EIS	8	Stocking Levels/Capability/	(3) Procedural Concern	Existing forage capacity is discussed in chapter 1 and 3 of the EA and in

Comment	Com-menter	Focus Area	Concern Category	Disposition
and tie livestock grazing to available forage capacity		Capacity		detail in the Range Specialist Report.
Recognize that changes in forage capacity have resulted from tree canopy changes over time. This should be included in setting stocking rates.	8	Stocking Levels/Capability/ Capacity	(3) Procedural Concern	Existing forage capacity is discussed in chapter 1 and 3 of the EA and in detail in the Range Specialist Report.
Consider use of the Robel Pole herbage-left-ungrazed protocol (calibrated for the Black Hills by Uresk) as the primary method for setting stocking rates	8, 10, 11	Data and Best Available Science	(3) Procedural Concern	There are several methods that may be used (including Robel Pole) for inventory and monitoring of rangelands. The more often-used methods can be found in the USDA Forest Service, Rocky Mountain Region Rangeland Analysis and Management Training Guide.
The plan should provide a framework for flexible future options, anticipating uncertain natural resource needs with climate change. Options should include grass banking	8, 10	Climate Change/ Environmental Variability	(2) Non-Key Issue	Alternatives considered for this project are described in detail at the end of chapter 2 of the environmental document; alternatives for grass banks, swing pastures, and other methods for addressing future environmental uncertainty is described in that section.
Wetland/riparian quality and water quality should not be sacrificed for livestock grazing	8	Riparian Area Protection	(1) Key Issue	Agreed. Forest Plan standards and guidelines will be followed which will improve riparian areas and maintain or improve water quality.
Consider closing an allotment if the cost and feasibility of implementing wetlands/riparian area protections is too high	8	Riparian Area Protection	(1) Key Issue	Alternatives considered for this project are described in detail at the end of chapter 2 of the environmental document; closing/vacating an allotment is described in that section.
Do not develop any more springs; there are so few undeveloped springs in the southern Black Hills that developing any new ones is inappropriate	8	Riparian Area Protection	(1) Key Issue	Alternatives considered for this project are described in detail at the end of chapter 2 of the environmental document; alternatives for no new spring developments is described in that section.
Restrict the fen in French Creek from livestock access; the only appropriate level of livestock use in fens is none; all fens located within any allotment should be protected	8	Riparian Area Protection	(1) Key Issue	This is part of the proposed action.
Consider a strategic, landscape scale approach to livestock management instead of separate allotment-by-allotment management; this does not allow for proactive changes if a major	8	Climate Change/ Environmental Variability	(2) Non-Key Issue	Alternatives considered for this project are described in detail at the end of chapter 2 of the environmental document; alternatives combining all allotments is discussed in that section.

Comment	Com-menter	Focus Area	Concern Category	Disposition
environmental problem arises				
The analysis should include a social analysis of other segments of the public (clean water, functioning ecosystems, recreation) and not just livestock permittees	8	Social/Economics	(1) Key Issue	An economic evaluation will be used as one part of the environmental document, considered in combination with other effects of the alternatives in meeting the purpose and need for action.
The French Creek Allotment, for instance, has a large human population on private land. At some point, effective livestock management will not be possible	8	Social	(4) Alternative	Minimizing conflicts with private landowners and enhancing effective administration is an objective for this project (see chapter 1 of the environmental document). Alternatives considered for this project are described in detail at the end of chapter 2 of the environmental document; alternatives for not grazing the French Creek Allotment are discussed in that section.
The plan must disclose, with applicable science, how livestock will be managed to meet the Forest Plan requirements for riparian and wetland protection and water quality (Forest Plan Objective 213); if individual projects do not contribute, the objective will never be met	8	Data and Best Available Science	(3) Procedural Concern/Non-Key Issue	All Forest Plan standards and guidelines were reviewed when developing the purpose and need for action. The intent of the proposed action and any alternatives is to ensure consistency with the Forest Plan. A summary of Forest Plan guidelines that pertain to this project are included in chapter 3 of the EA, appendices to the EA, and in detail in various resource specialist reports.
The plan should include quantitative riparian condition data with identified, acceptable, measurable, science-based triggers	8, 11	Riparian Area Protections	(1) Key Issue	Existing riparian conditions are summarized in chapter 3 of the EA and detailed in various resource specialist reports for this project. Data used and the monitoring plan is described in the EA. Using the MIMs protocol will establish baselines and provide quantitative results which will show riparian trends and which way they are moving.
The plan should examine all suitable willow habitat, manage for willow habitat and meet Forest Plan Objective 214; if individual projects do not contribute, the objective will never be met	8	Riparian Area Protections	(1) Key Issue	All Forest Plan standards and guidelines were reviewed when developing the purpose and need for action. The intent of the proposed action and any alternatives is to ensure consistency with the Forest Plan. A summary of Forest Plan guidelines that pertain to this project are included in chapter 3 of the EA, appendices to the EA, and in detail in various resource specialist reports. The proposed action includes riparian protection fences which will contribute to this objective as well.
The plan should address how to contribute to Forest Plan Objective 215; if individual projects do not contribute, the objective will never be met	8, 10	Riparian Area Protections	(1) Key Issue	All Forest Plan standards and guidelines were reviewed when developing the purpose and need for action. The intent of the proposed action and any alternatives is to ensure consistency with the Forest Plan. A summary of Forest Plan guidelines that pertain to this project are included in chapter 3 of the EA, appendices to the EA, and in detail in various resource specialist reports. This project has limited applicability to Forest Plan Objective 215 because there are few stream reaches in which the water table could be raised or

Comment	Com-menter	Focus Area	Concern Category	Disposition
				wet meadows restored. Some sections of French Creek may meet this criteria; how alternatives achieve Forest Plan objectives is the subject of individual specialist reports that are summarized in chapter 3 of the environmental document.
The plan should describe inventory results for Black Hills montane grassland communities and if it exists, describe management that will protect and enhance stands with a monitoring plan. this should contribute to Forest Plan Objective 205	8, 10	Sensitive Species and Habitats– Montane Grassland	(2) Non-Key Issue	A portion of the Black Hills Montane Grassland identified as "Middle Gillette Canyon" by Marriott (Marriott 2000) is located within the Lower Beaver Allotment. This site has been surveyed in depth and was assigned a ranking of C. This site was not considered by Marriott to be of sufficient quality to qualify as a conservation target. There is a long-term monitoring study (cover-frequency) installed in this site which will be re-read according to the monitoring plan.
We request that the botany and wildlife biological evaluations be included as an appendix to the DEIS so that we can review them	8, 10	Sensitive Species	(3) Procedural Concern/Request	There are no requirements to include the botany and wildlife biological evaluations and biological assessments as an appendix to the EA. An appendix of this size would substantially increase the cost of publication for this document. The BE and BA would be available upon request once they are complete.
The plan should discuss how livestock will be restricted to protect Region 2 sensitive plants and Species of Local Concern, or the monitoring plan that will be used with specific triggers and mitigations if plant populations are degraded	8	Sensitive Species	(2) Non-Key Issue	The EA discusses necessary protection measures for sensitive species in chapter 2 and chapter 3 of the EA.
Do not allow livestock grazing in the Fanny Boles RNA (Management Area 2.2) until a management plan for the RNA is completed. The plant communities described in the 2000 Black Hills Community Inventory, Volume 2 present in the Fanny Boles RNA (Management Area 2.2) did not evolve with domestic livestock grazing or bison grazing	8	Research Natural Area	(4) Alternative	Alternatives considered for this project are described in detail at the end of chapter 2 of the environmental document; an alternative that would restrict grazing in the Fanny Boles RNA is described in that section.
Add water developments to the French Creek Allotment; when water is not available livestock push upon adjacent private lands	9	Range Improvements	(4) Alternative	Alternatives considered for this project are described in detail at the end of chapter 2 of the environmental document; additional water developments is described in that section.
The DEIS should include detailed maps with proposed improvements, wetland/riparian	10	NEPA	Request	Much of this detail is included either in the environmental document, when deemed necessary for a full understanding on the alternatives and their

Comment	Com-menter	Focus Area	Concern Category	Disposition
locations, sensitive species habitats, MA direction, proposed roads, current and proposed monitoring locations				effects, or in the project record.
The DEIS should include explanations of how desired conditions are calculated and why 65 to 87% desired conditions are okay; why not 85 to 100%?	10	Desired Conditions	(3) Procedural	A description of how upland desired conditions and similarity coefficients are calculated is included in the Range Specialist Report. Desired species compositions are not necessarily climax conditions. If desired conditions are attained then the site can be re-evaluated and desired conditions adjusted. The desired conditions of vegetation and the physical resources on the acres having capability to support livestock grazing are conditions that are at least 65% similar to those that could occur naturally within various seral stages of development on a particular site. (A detailed discussion of similarity coefficients appear in the Forest Service R-2, "Rangeland Analysis and Management Training Guide" [1996]).
The DEIS should disclose effects of timing, intensity, duration and frequency of livestock grazing for adaptive management	10	Adaptive Management	(3) Procedural	The environmental document includes a detailed evaluation of the potential effects of livestock grazing on all relevant resources (see chapter 3).
Reduce stocking levels to improve range and riparian areas; adjusting grazing systems is not enough	10	Riparian Area Protections/Stocking Levels	(1) Key Issue	Alternatives considered for this project are described in detail at the end of chapter 2 of the environmental document; consideration of reduction in stocking levels is described in that section.
I recommend riparian health be an issue addressed in the DEIS; the southern hills has so few that protection is even more important	10	Riparian Area Protections	(1) Key Issue	Agreed. Riparian health has been identified as a key issue for this project.
Establish and disclose monitoring plan that will show how livestock as a tool will improve depleted areas	10	Monitoring	(3) Procedural	A detailed monitoring plan is included in an appendix to the environmental document.
Use an IDT approach to selecting proper placement of range improvements in order to avoid disturbance to sensitive species and habitats	10	Sensitive Species	(2) Non-Key Issue	An interdisciplinary team is part of this planning process to ensure potential effects to all resources are carefully considered and evaluated. Separate, detailed ID team evaluation of site-specific placement of improvements is also routine practice and includes cultural resource, wildlife, and sensitive plant consideration prior to placement.
Establish a timeline for implementation of protective measures and prioritize	10, 11	Monitoring	(3) Procedural	A detailed monitoring plan is included as part of this project, and is shown in appendices to the environmental document. An implementation plan has been prepared for internal use and is avaiable in the project record
Consider cross fencing, creation of temporary pastures, or short	10	Grazing Systems	(4) Alternative	Alternatives considered for this project are described in detail at the end of chapter 2 of the environmental document; alternatives for grass banks,

Comment	Com-menter	Focus Area	Concern Category	Disposition
duration grazing or other appropriate methods to get livestock to better utilize non-desirable cool season grasses and enhance establishment of warm season grasses, desirable native forbs and woody species and hardwoods				swing pastures and other methods for addressing future environmental uncertainty is described in that section. In addition, not all cool-season grasses are non-desirable and vice-versa with warm seasons. It depends on desired conditions; grazing management alone will not elicit a change in the current, stable, plant community.
The range of alternatives should address contingencies for drought, prescribed fire, wildfire and provide opportunities for rest. Such as swing pastures and grass banks	10	Climate Change	(2) Non-Key Issue	Alternatives considered for this project are described in detail at the end of chapter 2 of the environmental document; alternatives for grass banks, swing pastures and other methods for addressing future environmental uncertainty is described in that section.
The DEIS should include post-Jasper and Shack Fires monitoring results	10	NEPA	Procedural	Existing conditions in areas that were burned in these fires is included in chapter 3 of the environmental document and is based on results of monitoring.
Ensure DEIS includes long-term monitoring plan and mitigation measures; monitoring needs measurable objectives, schedule for completion of objectives with monitoring intervals and standards	10,11	Monitoring	Procedural	A detailed monitoring plan is included in the environmental document.
Livestock grazing affects structure of high grasslands. The BAE should address how loss of high grassland structure affects small mammals and upland birds	10	Wildlife	Procedural	Effects to mammals and birds will be addressed in the BAE and the Wildlife Specialist Report. Sensitive species, species of local concern, migratory birds, Partners in Flight species, and management indicator species will all be analyzed.
Livestock grazing can result in pine and juniper encroachment into grasslands	10	Wildlife	(2) Non-key issue	Effects of grazing on vegetation, including pine and juniper is adressed in the EA.
Livestock grazing can result in excessive browsing in canyon lands and woody draws and this reduces diverse wildlife habitats	10	Wildlife	(2) Non-key issue	Agreed. Effects will be analyzed in the Wildlife Specialist Report. This project is an effort to contribute to objectives and to follow Forest Plan standards and guidelines. Using an adaptive management approach will aid in enhancing wildlife habitats over time.
Consider an interagency, cooperative approach to this project with private land owners and other agencies	10		(3) Suggestion/Procedural	The Forest Service understands the value in collaborative relationships with projects and plans such as these. We continue to work with the permittees, landowners, and other agencies in development of this project.
We think this action warrants an EIS due to size and scope	11	NEPA	(3) Procedural	Based on preliminary effects analysis and the size and scope of the proposed action, the Forest Service does not agree that the analysis warrants preparation of an EIS. However, during preparation of the EA if

Comment	Com-menter	Focus Area	Concern Category	Disposition
				any analysis indicates the potential for significant adverse impacts or unusual or extraordinary circumstances, an EIS would be initiated at that time.
Grazing should be adjusted to take into account that an animal unit month (AUM) is one cow weighing 1,000 lbs, when in fact it is common to have cows weighing 1,300 lbs or more with larger calves as well; stocking rates have not been adjusted to take this into account; if this is not done, monitoring is essential to ensure appropriate forage is retained	11	Grazing Strategies/Monitoring	(3) Suggestion/Procedural	An animal unit month (AUM) is one animal unit (AU) for 1 month. An AU is considered to be one mature (1,000 lb) cow or the equivalent based upon average daily forage consumption of 26 pounds dry matter per day. Thus a 1,300 lb cow would be 1.3 AU. The Forest Service agrees that monitoring is essential to ensure appropriate forage, and will continue to adjust stocking rates based on monitoring results.
Consider the recent United States District Court of California ruling in Citizens for Better Forestry, et al. vs. US Department of Agriculture, et al. It applies to this project	11	NEPA	(3) Procedural	This ruling concerns primarily the National Forest Management Act and the Forest Planning Rule of 2000 and 2008 and is not directly applicable to this site-specific project. The Hell Canyon Range 2010 project is being conducted under NEPA and will fully comply with all applicable laws and regulations.
Please provide two hard copies of the DEIS to review	11	NEPA	Request	When the environmental document is ready for public review and comment, the Forest Service will provide two hard copies to you for review.
Please consider the literature and other documents we provided	5	Best Available Science	Request	A thorough review of literature citations and other documents mentioned in your comments on this project were reviewed and considered by the IDT, as documented in the project record.

Key to commenters:

1 – Custer County Highway Department

2 – US Fish and Wildlife Service

3 – Custer County Commissioners

4 – livestock permittee

5 – Western Watersheds Project

6 – livestock permittee

7 – private citizen

8- Norbeck Society

9-private citizen

10- South Dakota Department of Game, Fish and Parks

11 – Sierra Club

APPENDIX D: APPLICABLE FOREST PLAN STANDARDS AND GUIDELINES AND WATERSHED CONSERVATION PRACTICES

The proposed action and alternatives are guided by the Black Hills National Forest Land and Resource Management Plan (Forest Plan), as amended (USDA Forest Service 1997). The Forest Plan contains Forest-wide goals, objectives, and standards and guidelines related to livestock grazing. Furthermore, the Forest is subdivided into land allocations (management areas) with established desired conditions and associated management direction (standards and guidelines) which may apply to livestock grazing. The following is a summary of the direction that applies to this project area with respect to this proposal. All of this direction has been incorporated into the project assessment, design criteria, the proposed action, and alternatives.

Forest Plan Goals

Goal 1: Protect basic soil, air, water, and cave resources.

Objective 102. Use a qualitative survey which emphasizes riparian condition, such as proper functioning condition methodology, to refine preliminary watershed health assessments within the next planning period.

Objective 103. Maintain or improve long-term stream health. Achieve and maintain the integrity of aquatic ecosystems to provide stream-channel stability and aquatic habitats for water quality in accordance with State standards.

Objective 104. Maintain or enhance watershed conditions to foster favorable soil relationships and water quality.

> **b**. Achieve and maintain stable stream beds and banks, diverse riparian vegetation, and effective ground cover that controls runoff and erosion.
>
> (Riparian areas will support diverse plant species. The streams, wetlands, riparian areas of the Forest reflect healthy, functioning ecosystems.)

Goal 2: Provide for a variety of life through management of biologically diverse ecosystems.

Objective 213. Maintain or enhance existing riparian area biodiversity, physical structure and size.

Objective 217. Maintain habitat for game and fish populations at the state objectives in effect in 1996.

Objective 220. Conserve or enhance habitat for federally listed threatened, endangered and proposed species.

Objective 221. Conserve or enhance habitat for R2 sensitive and species of local concern (SOLC).

Objective 238. (New). The following are objectives for management indicator species. MIS will generally be monitored using trends in habitat; however, when available, population trends may be used as a strong indicator of management response. Population monitoring will be discretionary as provided by 219.14.f.

- Maintain or enhance habitat for ruffed grouse, beaver, song sparrow, grasshopper sparrow, white-tailed deer and brown creeper; as outlined in specific direction pertaining to aspen, other hardwoods, riparian areas, grasslands, spruce and ponderosa pine (e.g., Objectives 201, 205, 211, 200-01, 5.1-204).
- Maintain habitat opportunities for black-backed woodpeckers across the Forest, as outlined in specific direction pertaining to conifer habitat, snags and recently burned habitat (e.g., Objectives 211, 11-03, 5.1-204, Standard 2301).
- Maintain habitat for golden-crowned kinglets, as outlined in specific direction pertaining to spruce habitat (e.g., Objective 200-01).
- Maintain or enhance habitat quality and connectivity for mountain suckers, as outlined in specific direction pertaining to aquatic resources (e.g., Objectives 103, 104, 215, Standards 1201, 1203, 1205, Guideline 1115).

Objective 240. Manage and/or install structures to provide water for livestock and to protect the aquatic, shoreline and upland vegetation around ponds or water catchments containing leopard frogs.

Goal 3: Provide for sustained commodity uses in an environmentally acceptable manner.

Objective 301. Produce on a sustained basis and make available up to 233 million pounds of forage for livestock and wildlife use each year (weather permitting). The location and amount of forage produced under the forest canopy will vary with the density of the overstory. This may necessitate changes in where and how both livestock and wildlife grazing takes place on a local basis over the rotation of a stand of timber.

- Livestock use will be up to 127 million pounds of forage per year or approximately 128,000 AUMs.
- Wildlife use will be up to 106 million pounds of forage per year or approximate population levels of 70,000 deer and 4,500 elk or other combinations that use the same amount of forage.

Objective 302: Maintain rangelands in satisfactory range condition. (Commodities including livestock grazing contribute to the economies of local and regional communities. Ecosystem management can be more cost effective when commercial benefits can result. Livestock grazing will occur without impairing the health of ecosystems and in a manner compatible with other Forest uses.)

Goal 4: Provide for scenic quality, a range of recreational opportunities, and protection of heritage resources in response to the needs of the Black Hills National Forest visitors and local communities.

Objective 405: Manage all heritage sites listed in the National Register of Historic Places in consultation with the State Historical Preservation Officer (SHIPO) and the President's

Advisory Council on Historic Preservation (ACHP). (Heritage resources will be protected and interpreted.)

Goal 7: Emphasize cooperation with individuals, organizations and other agencies while coordinating planning and project implementation.

Objective 701: Continue to cooperate with interested parties and organizations in the development of plans and projects.

Objective 704: Consult with tribal governments, traditional practitioners, and other knowledgeable individuals to identify important areas of American Indian religious significance.

Goal 8: Promote rural development opportunities.

Objective 804: Coordinate with local communities to recognize local goals to maintain desired lifestyles and social values to participate with and provide appropriate assistance to development groups, and to be a reliable partner in giving sufficient advance notice about potential changes that may affect local economies.

(Management of human, natural, technical, and financial resources to improve living conditions, provide employment opportunities, enrich the cultural life, and enhance the environment of rural America.)

Forest Plan Standards and Guidelines

Soil

Direction on Soil Quality Standards is provided in Rocky Mountain Region Supplement (FSH 509.18) and is incorporated by reference into the Forest Plan.

1101. When doing projects, analyze the cumulative effects of disturbances on long-term soil productivity.

1102. Maintain or improve long-term levels of organic matter and nutrients on all lands.

1103. Manage land treatments to limit the sum of severely burned and detrimentally compacted, eroded, and displaced land to no more than 15 percent of any land unit. “Land treatments” are human actions that disturb vegetation, ground cover or soil. “Land unit” is a mapped land type polygon or a mapped soil unit. (WCP Handbook Standard 13)

Additional information: Region 2 Supplement No. 2509.25-2006-3 (USDA Forest Service 2006) to the Forest Service Soil Management Handbook provides additional information for meeting this standard. This document specifies that no more than 15 percent of an activity area will be left in a detrimentally compacted, displaced, puddled, severely burned, and/or eroded condition—not including the permanent transportation system.

1109: Reclaim roads and other disturbed sites when the use ends, as needed, to prevent resource damage.

1112. Manage land treatments to maintain enough organic ground cover in each land unit to prevent harmful increased runoff. (WCP Handbook Standard 2)

Design Criteria (a) Maintain the organic ground cover of each land unit so that pedestals, rills, and surface runoff from the land unit are not increased.

1116. Manage land treatments to conserve site moisture and to protect long-term stream health from damage by increased runoff. (WCP Handbook Standard 1)

Water

Direction on Water Quality Standards is provided in Rocky Mountain Region Watershed Conservation Practices (WCP) Handbook (FSH 2509.25) and is incorporated by reference into the Forest Plan. This handbook includes design criteria associated with each standard listed below; management measures are repeated in the following section titled Watershed Conservation Practices.

1201: Conduct actions so that stream pattern, geometry, and habitats are maintained or improved toward robust stream health.

1206: When stabilizing damaged stream banks, preferentially use methods that emphasize vegetative stabilization. Use native vegetation for streambank stabilization whenever possible.

1208: Design water developments to minimize damage to channel capacity, aquatic habitat, and riparian vegetation.

1210: Maintain enough water in perennial streams to sustain existing health.

1211: Place new sources of chemical and pathogenic pollutants where such pollutants will not reach surface or ground water.

1214: Where natural background water pollutants cause degradation, it is not necessary to implement improvement actions. Short-term or temporary failure to meet some parameters of the applicable Federal or State standard, such as increased sediment form road crossing construction or water resource development, may be permitted in special cases.

Riparian Areas, Water Influence Zones and Wetlands

1301. In the water influence zone next to perennial and intermittent streams, lakes, and wetlands, allow only those actions that maintain or improve long-term stream health and riparian ecosystem condition. (Regional WCP Handbook Standard 3)

1302. Maintain long-term ground cover, soil structure, water budgets, and flow patterns in wetlands to sustain their ecological function, per 404 regulations. (Regional WCP Handbook Standard 6)

1304. As opportunities arise, and need dictates, relocate or implement mitigation measures for roads, trails, watering tanks, ponds, water catchments, and similar facilities currently located within the Water Influence Zone.

Forested Landscapes–Hardwoods and Shrubs

2207. Locate new livestock/wildlife water sites (i.e., drinking structures) outside of hardwood communities, except when no other option is available.

Range–General

2502. Convert season-long grazing systems to systems which require more intensive management, such as multiple-pasture deferred- or rest-rotation systems, as opportunities permit.

2504. The site-specific rangeland analysis necessary for preparation of allotment management plans shall document selected desired conditions and evaluate whether the designated area is at, moving towards, or moving away from, the desired conditions.

- Satisfactory range conditions occur when the existing conditions are at, or progressing towards the desired conditions identified through the project planning process.
- When trends towards satisfactory range conditions are not achieved within 5 years by changes in grazing systems, allowable use or residual guidelines, more restrictive use or residual guidelines, or changes to the grazing systems shall be adopted.

Range–Proper Use or Residual Levels–Riparian/Uplands

2505. Livestock and wild herbivore allowable forage use or residual levels on rangelands by grazing system and range condition are:

Proper allowable use guidelines (percent utilization by weight each year)

Season of Use	Satisfactory Condition (%)	Unsatisfactory Condition (%)
Continuous Use Spring/Summer	0-45	0-40
Continuous Use Fall/Winter	55-60	0-55
Deferred Rotation	0-50	0-45
Rest Rotation	0-55	0-50

Residual Levels for Wetlands and Riparian Areas

Residual levels (or remaining height of key plant species) can be prescribed for riparian areas in the AMP or the annual letter of operating instructions (AOI) to the livestock permittee. Residual levels will be based upon specific objectives for the location in question and take into account season of use and range conditions.

Allowable use and/or residual levels:

- Utilization of willow, shrubs, woody vines or young deciduous trees (such as aspen, birch, and oak) in any year by livestock or wildlife is limited to browsing only 40 percent of the total individual leaders produced in that year (not to be confused with 40 percent use on each and every leader produced).
- Remove livestock from the grazing unit or allotment when further utilization on key areas in that year will exceed proper allowable use or prescribed residual level in the Forest Plan, AMP, or AOI for either grass and forbs or shrubs.
- No authorized utilization will be allowed on known occurrences of willow emphasis species (e.g., *Salix candida*, *Salix serissima*, *Salix lucida*).

- Implement additional measures to assure avoidance of livestock use on *Carex alopecoidea*. Restrict livestock use of all or portions of the five largest geographically spaced occurrences at site numbers CAAL8-19, CAAL8-20, CAAL8-22, CAAL8-30, CAAL8-31.

2506. Develop site-specific vegetation utilization or residual guidelines during rangeland planning, and document them in AMPs. In the absence of updated planning, the utilization guidelines as shown or residual guidelines documented in the AOI will apply.

2507. Allow use of forage by livestock and wildlife in fenced riparian pastures so long as it meets the objectives of maintaining, enhancing or conserving the riparian ecosystem and emphasis species persistence.

Endangered, Threatened or Sensitive Specie –Protection and Management

Sensitive Species

3103. Manage known sensitive species and species of local concern (SOLC) snail colonies to:

- Retain overstory sufficient to maintain moisture regimes, ground level temperatures and humidity.
- Retain ground litter, especially deciduous litter.
- Avoid burning, heavy grazing, off-highway vehicles (OHVs), heavy equipment and other activities that may compact soils or alter vegetation composition and ground cover.

3104. Protect habitat for sensitive plants and animals associated with moist soil conditions. Do not develop springs or seeps as water facilities where sensitive species exist.

3106. Riparian areas or wetlands where populations of sensitive species are located are to be avoided during ground disturbing activities. Use one or more of the following (or other mitigation measures) tied to the site-specific conditions for disturbances adjacent to known occurrences: Avoid removing riparian or wetland vegetation; filling or dredging the riparian area or wetland; diverting stream flow from the current channel; prevent storm runoff from washing silt into the stream or wetland; reseed and/or replant cut and fill slopes with native seed and/or native plants promptly to control erosion and for prevention of noxious-weed infestations. Use appropriate measures to control erosion on disturbed areas that are steep, are highly erosive, and/or adjacent to the riparian area. Timing, placement, and installation of temporary stream diversions shall allow passage of aquatic life and protect sensitive and species of local concern.

3111. From April 1 through August 15, minimize additional human-caused noise and disruption beyond that occurring at the time of nest initiation (e.g., road traffic, timber harvests, construction activities) within one-half mile of all active goshawk nests up until the nest has failed or fledglings have dispersed.

3115. A R2 sensitive species or species of local concern located after contract or permit issuance will be appropriately managed by active coordination between permittee, contractor or purchaser, Forest Service line officer, project administrator, and biologist

and/or botanist. Solutions need to be based on the circumstances of each new discovery and must consider the species need, contractual obligations and costs, and mitigation measures available at the time of discovery.

3116. Avoid creating barriers (e.g., new open roads) between red-bellied snake hibernacula and wetlands.

General Wildlife and Fish Direction

3202. Structures, such as fences and roads will be designed and built so that they do not create unnecessary or unreasonable barriers or hazards for wildlife and people.

3210. Provide riparian habitat by maintaining or establishing riparian shrub and tree species, and protect riparian habitat from animal damage if needed.

3211. Provide riparian habitat diversity through vegetation treatments or in conjunction with other resource activities designed to maintain or improve wildlife or fisheries habitat and stream stability.

3212. Manage for high quality riparian communities.

- Provide stable stream banks.
- Retain woody vegetation along streams and lakes to provide shading for aquatic life and habitat for terrestrial species.
- Provide large woody material for aquatic life.

Fire and Fuels

4107. Defer prescribed burned areas from livestock grazing for a portion or all of the following growing season to ensure regrowth of forage species.

Noxious Weeds

4301. For all proposed projects or activities, determine the risk of noxious weed introduction or spread, and implement appropriate mitigation measure.

4302. Use biological control methods whenever practical, and whenever protecting other resources is desired, such as water quality.

4306. Use certified noxious weed-free seed, feed and mulch.

Heritage resources

6101. Consider long-term Forest management needs in determining appropriate use of mitigation of effects to, or avoidance of, heritage resources during project planning.

Indian Uses

1702. Tribes will be notified of culturally significant artifacts or burial sites are found during project implementation.

7102. Recognize American Indian religious and spiritual beliefs regarding the disposition of human remains and make provisions for their proper reburial and treatment according to applicable FSM.

Forest Plan Management Area Direction

Management Area 2.2–Research Natural Areas

Research natural areas (RNAs) are selected to preserve a spectrum of relatively pristine areas that represent a wide range of natural variability within important natural ecosystems and environments (coniferous forest, shrubland, grassland, alpine, aquatic, and geological environments) and areas that have special or unique characteristics of scientific importance.

1001. Conserve the natural condition of the ecosystem, its processes, and any species or values for which the research natural area was established.

1002. Allow uses that maintain or improve the ecological characteristics for which the RNA was designated. If monitoring reveals that a use begins to affect the ecological characteristic, the use will be removed from the RNA.

2501. Do not increase permitted livestock animal unit months or developments pending the RNA management plan in RNAs. Grazing suitability and desired vegetative conditions will be determined by the RNA management plan.

Management Area 3.7–Late Successional Forest Landscape

These areas are managed to emphasize late successional forest structure.

201. Manage each contiguous unit within this management area as a late-successional landscape, so that late-successional structure is always present within some portion of each unit.

2101. Applicable management activities should replicate biological processes found in the areas and strive to replicate natural vegetative patterns and patch size.

Management Area 5.1–Resource Production Emphasis

These areas are managed for wood products, water yield and forage production, while providing other commercial products, visual quality, diversity of wildlife and a variety of other goods and services. Numerous open roads provide commercial access and roaded recreation opportunities, while closed roads provide non-motorized recreation opportunities. Livestock grazing is designated as a suitable use. (DFC - Trees are managed to produce forest products while providing forage production. The forest is largely a mosaic of tree groups of different ages and heights. There are some natural openings or meadows of various sizes and shapes, and these areas are enlarged as appropriate.)

Management Area 5.4–Big Game Winter Range Emphasis

These areas are managed to provide high-quality winter and transitional habitat for deer and elk, high-quality turkey habitat, habitat for other species, and a variety of multiple uses. Livestock grazing is designated as a suitable use. (DFC: The area is managed to provide big game winter range while maintaining healthy plant communities with a variety of species for food and cover. Livestock grazing is managed to be compatible with big-game habitat objectives.)

204. Improve forage on range areas.

2501. Design livestock management strategies including distribution and stocking rates to be compatible with big-game habitat objective.

2502. Feature big-game use of forage increases that result from the vegetative improvements, while also allowing for livestock increases. Follow Forest-wide proper allowable use guidelines or residual levels documented in AMPs or AOIs for combined use by wildlife and livestock.

Watershed Conservation Practices

In addition to design criteria specific to this project (see chapter 2) and Forest Plan direction, as summarized above, Region 2 Watershed Conservation Practices (USDA Forest Service 2006) would also be implemented as part of this project and are non-discretionary. The watershed conservation practices most applicable to this project and that are related to livestock grazing are listed below. These practices were reviewed during project development and in the creation of the monitoring plan.

Management Measure 1: Manage land treatments to conserve site moisture and to protect long-term stream health from damage by increased runoff (Forest Plan S&G 1116)

- In each watershed containing a 3rd-order and larger stream, limit connected disturbed areas so the total stream network is not expanded by more than 10%. Progress toward zero connected disturbed area as much as practicable. In watersheds that contain stream reaches in Diminished stream health class, allow only those actions that will maintain or reduce watershed-scale Connected Disturbed Area.

Management Measure 2: Manage land treatments to maintain enough organic ground cover in each activity area to prevent harmful increased runoff (Forest Plan S&G 1112)

- Maintain the organic ground cover of each activity area so that pedestals, rills, and surface runoff from the activity area are not increased. The amount of organic ground cover needed will vary by different ecological types and should be commensurate with the potential of the site.

Management Measure 3: In the water influence zone next to perennial and intermittent streams, lakes, and wetlands allow only those actions that maintain or improve long-term stream health and riparian ecosystem condition. The water influence zone (WIZ) includes the geomorphic floodplain (valley bottom), riparian ecosystem, and inner gorge. Its minimum horizontal width (from top of each bank) is the greater of 100 feet or the mean height of mature dominant late-seral vegetation. The WIZ protects interacting aquatic, riparian, and upland functions by maintaining natural processes and resilience of soil, water, and vegetation systems (Forest Plan S&G 1301)

- (A) Allow no action that will cause long-term change to a lower stream health class in any stream reach. In degraded systems, progress to robust stream health within the next plan period.

- (B) Allow no action that will cause long-term change away from desired condition in any riparian or wetland vegetation community. Consider management of stream temperature and large woody debris recruitment when determining desired vegetation community. In degraded systems, progress toward desired condition within the next plan period.
- (E) Locate new concentrated-use sites outside the WIZ if practicable and outside riparian areas and wetlands. Armor or reclaim existing sites in the WIZ to prevent detrimental soil and bank erosion.
- (F) Manage livestock use through control of time/timing, intensity, and duration/frequency of use in riparian areas and wetlands to maintain or improve long-term stream health. Exclude livestock from riparian areas and wetlands that are meeting or moving towards desired condition objectives where monitoring information shows continued livestock grazing would prevent attainment of those objectives.
- (G) Keep stock tanks, salt supplements, and similar features out of the WIZ if practicable and out of riparian areas and wetlands always. Keep stock driveways out of the WIZ except to cross at designated points. Armor water gaps and designated stock crossings where needed and practicable.
- (H) Manage dry meadow and upland plant communities, including Kentucky bluegrass types that have invaded into wetland/riparian areas in a manner that will contribute to their replacement over time by more mesic native plant communities to the extent practicable. Develop site-specific riparian stubble height standards or use the following default levels for *carex* and *juncus* species: 3-4 inches in spring-use pastures and 4-6 inches in summer or autumn use pastures; to leave adequate residual stubble height to retain effective ground cover.
- (I) Do not allow livestock grazing through an entire growing season in pastures that contain in riparian areas and wetlands. Apply short-duration grazing as practicable (generally less than 20 days) to minimize re-grazing of individual plants, to provide greater opportunity for regrowth and to manage utilization of woody species and reduce soil compaction. During the hot season (mid-to-late summer) manage livestock herds to avoid concentrating in riparian areas and wetlands.
- (J) Design grazing systems to limit utilization of woody species. Where woody species have been historically suppressed, or where the plant community is below its desired condition and livestock are a key contributing factor, manage livestock through control of time/timing, intensity, and duration/frequency of use so as to allow for riparian hardwood growth extension and reproduction. Manage woody species in riparian areas to provide for stream temperature, bank stability, and riparian habitat.
- (K) Maintain the extent of stable banks in each stream react at 74% or more of reference conditions. Consider degree of livestock trampling and riparian vegetation utilization on or immediately adjacent to stream banks when timing livestock moves between units.
- (L) Adjust management in riparian areas and wetlands to improve detrimental soil compaction whenever it occurs.

- (M) Do not excavate earth material from, or store excavated earth material in, any stream, swale, lake, wetland, or WIZ.
- (N) Emphasize natural stabilization processes consistent with the stream type and capability when restoring damaged stream banks. Use native vegetation for stream bank stabilization whenever practicable.

Management Measure 6: Maintain long-term ground cover, soil structure, water budgets, and flow patterns of wetlands to sustain their ecological function (Forest Plan S&G 1302)

- (C) Avoid long-term reduction in organic ground cover and organic soil layers in any wetland (including peat in fens).
- (E) Avoid any loss of rare wetlands such as fens and springs.

Management Measure 9: Limit roads and other disturbed sites to the minimum feasible number, width, and total length consistent with the purpose of specific operations, local topography, and climate (Forest Plan S&G 1105).

- (B) Avoid soil-disturbing actions during periods of heavy rain or wet soils. Apply travel restrictions to protect soil and water.

Management Measure 12: Reclaim roads and other disturbed sites when use ends, as needed, to prevent resource damage (Forest Plan S&G 1109)

- (D) Establish effective ground cover on disturbed sites to prevent accelerated on-sites soil loss and sediment delivery to streams. Restore ground cover using certified native plants as practicable to meet revegetation objectives. Avoid persistent or invasive exotic plants.

Management Measure 13: Manage land treatments to limit the sum of severely burned soil and detrimentally compacted, eroded, and displaced soil to no more than 15% of any activity area (Forest Plan S&G 1103)

- (B) Operate heavy equipment for land treatments only when soil moisture is below the plastic limit, or protected by at least 1 foot of packed snow or 2 inches of frozen soil.

APPENDIX E: SUMMARY OF DIRECT/INDIRECT AND CUMULATIVE EFFECTS FROM IMPLEMENTING ADAPTIVE MANAGEMENT OPTIONS

Table E-1: Summary of environmental effects from implementation of proposed adaptive management options under Alternative 3

Possible Grazing Management Actions		Soil and Water	Rangeland Vegetation & Botany	Wildlife and Fish
A	Implement different grazing system, and/or change number of pastures	Implementing different grazing systems could reduce the impacts to the soil and water resource. Rest rotation would allow areas to recover for a period of time with no livestock impacts. Short duration would allow for a shorter time of impacts. Both of these grazing systems, if implemented properly, would benefit the soil and water resource.	**Rangeland Vegetation:** Effects of implementing a different grazing system will vary with site, vegetation, animal behavior, permittee, range improvements, size of pastures, and management objectives. Changing the grazing system would likely elicit changes through the timing, frequency and intensity of defoliation by livestock. The division of large pastures can increase the evenness of animal distribution and forage utilization up to a point where further reduction in size is of no advantage (Heady and Child 1994). As management unit area size increases, effects of uneven grazing patterns through time and space increase (Senft et al. 1985; Stuth 1991; Bailey et al. 1996). Therefore, reducing the management area size through pasture division would likely result in reduced preferential use of specific patches of vegetation resulting in less pressure (both frequency and intensity) on patches of preferred forage. Management flexibility is increased by being able to more precisely control the timing and frequency of defoliation by cattle. However, the effectiveness of any grazing system is more a function of management commitment and ability than the inherent properties of any particular grazing system (Briske et al. 2008). **Botany:** Increasing number of pastures will likely increase eveness of grazing distribution and stocking densities (Senft et al., 1985; Stuth, 1991; Bailey et al., 1996). While this is not entirely adverse for botanical resources, additional impacts to Region 2 sensitive species and SOLC may incur with the increase or decrease in stocking density. Areas that have received little, if any, livestock grazing may see increases in livestock use and impacts. The positive aspects of this however are that areas that received more concentrated use, and therefore more impacts, will likely see reductions in livestock use and impacts. Mosaic, or uneven grazing patterns, have the potential to increase plant diversity.	For many species in this report, short-duration grazing is preferred of the different grazing systems. This can cause fewer negative effects than other rotations. Changing the number of pastures may involve building more fences. This would negatively affect ungulates (deer and elk) and flying squirrels. Beneficial effect to fish if it results in improved riparian/aquatic habitat condition along French and/or Ruby creeks.
B	Use water to control livestock distribution (turn water on or off at existing spring developments)	Controling livestock is key to protect the water resource. If controling livestock distribution limits time in riparian areas, this will mean less impacts to the water resource and riparian areas would occur.	**Rangeland Vegetation:** Making water available or unavailable to livestock will help control the timing and frequency of defoliation by livestock. This is based on the assumption that livestock will graze more readily within the area of influence of the water development while the water is on, and will vacate the area when the water is turned off. The area of influence of any particular watering station depends upon topography, surrounding vegetation, and its location relative to other water sources in space and time. Distribution of livestock within the pasture may improve. Evenness of forage utilization can result in overall improved rangeland condition. **Botany:** See effects of Management Action A.	This should benefit riparian habitats by decreasing impacts to vegetation. Riparian wildlife species, if present, should benefit. Beneficial effect to fish if it results in improved riparian/aquatic habitat condition along French and/or Ruby creeks.
C	Haul water to temporary tanks to influence livestock distribution	Getting livestock to distribute and utilize a broader area would overall benefit the soil and water resource. Less time on riparian areas would benefit the water resource. There would be detrimental soil impacts to the watering area, but the impacts are small and temporaty and would not be a concern related to the 15% detrimental impact standard.	**Rangeland Vegetation:** Distribution of livestock within the pasture will improve. Plants previously ungrazed may be consumed. The amount of defoliation depends on species, palatability, and phenological development of the plant. Shifting the mosaic of intensively grazed and underutilized patches may be critical to the maintenance of structural and biological diversity of rangeland ecosystems (Fuhlendorf et al.2006 [in Briske et al. 2008]). Individual plants immediately surrounding the water tank (5-10 meters) may be lost or lose vigor due to increased wildlife and cattle presence. **Botany:** See effects of Management Action A. Other potential effects are increased areas of concentrated use.	There may be effects to species that are present in the areas that have seen little to no use. Getting some grazing in areas with little use can benefit vegetation. Grasses and forbs may become more palatable and nutritious with light to moderate grazing. Beneficial effect to fish if it results in improved riparian/aquatic habitat condition along French and/or Ruby creeks.
D	Construct new permanent water development to influence livestock distribution	Sames as 'C', except the soil impact at the water development would be permanent.	**Rangeland Vegetation:** Permanent water sources serve as focal points for grazing animals (Heady and Child 1994). Distribution of livestock within the pasture will become more even. Individual plants immediately surrounding the development (5 to 10 meters) may be lost or lose vigor due to increased wildlife and cattle presence. There may be some vegetation and soil disturbance associated with some of the installation efforts however the effects will be isolated and confined to the immediate vicinity of the range improvement and reseeding or hardening of the surface will be done if needed. **Botany:** See effects of Management Action A. Other potential effects are increased areas of concentrated use.	New water developments could provide watering opportunities for many species. Water sources, dugouts and ponds, could also increase foraging sites for wildlife, such as bats and possibly predator birds, by drawing in insects and small mammals. However, there could be negative impacts to species already present by re-locating livestock. Beneficial effect to fish if it results in improved riparian/aquatic habitat condition along French and/or Ruby creeks.
E	Remove existing water development to influence livestock distribution	Removing an existing water development could influence livestock distribution by concentrating them somewhere else to get water. If the replacement water site is on a stream, impacts would occur. This could increase soil compaction, decrease infiltration, decrease vegetative growth, and speed up runoff. Decreased vegetation growth and	**Rangeland Vegetation:** There may be some vegetation and soil disturbance associated with the removal efforts, however the effects will be isolated and confined to the immediate vicinity of the range improvements and reseeding will be done if needed. No loss of site productivity or erosion problems is expected to result from the removal of improvements.	Effects could be an increase in vegetation where the development is removed. This may benefit ground dwelling species using taller grasses.

		infiltration could lead to more nutrients available for transport to streams and less of the ability of the landscape to trap sediment. Sediment, nutrient, and pathogen delivery to streams from upslope areas may be increased.	Use of forage within the water development area of influence would decrease in frequency and intensity over time and be shifted to other areas of the allotment. The grazing pattern of livestock within the allotment would be reconfigured as the spatial distribution of water would be altered. **Botany:** Both positive and negative effects could result under this management action. Negative effects would be additional concentration of livestock at and within the influence zone of other watering facilities, decreased forage use within the influence zone of the removed tank, and increased forage use within the influence zone of other watering facilities. Positive effects are dependant upon the particular plant species and its habitat preferences.	Beneficial effect to fish if it results in improved riparian/aquatic habitat condition along French and/or Ruby creeks.
F	Construct fence to exclude livestock from areas of concern	Excluding livestock from areas of concern could be beneficial if these areas are heavily impacted. Soil compaction would decrease, infiltration would increase, there would be an increase vegetative growth, and runoff would be reduced. Increased vegetation growth and infiltration should lead to fewer nutrients available for transport to streams and better ability of the landscape to trap sediment. Sediment, nutrient, and pathogen delivery to streams from upslope areas may be reduced if a stream is in the excluded area. Livestock have the tendency to walk along fences and livestock trails created may become bare paths that concentrate and accelerate runoff. These trails would become detrimentally impacted soils. If livestock trails become connected disturbed areas, they may deliver more sediment, nutrients, and pathogens to stream waters.	**Rangeland Vegetation:** Livestock have the tendency to walk along fences and livestock trails created may become bare paths that concentrate and accelerate runoff. These trails would become detrimentally impacted soils. The degree of impact would vary with soil moisture content, particle size, existing vegetation and location of the fence on the landscape. The area within the exclosure would be free from the effects of livestock. Those plant species previously grazed by livestock would initially respond to livestock exclusion with an increase in vigor, production and abundance. Over time, plants that had been grazed may lose palatability, become decadent as past years growth is not broken down, and inter plant spacing can become wider. An increase in litter would also occur because of decreased utilization. Those plants not previously grazed would either maintain or decrease their level of vigor and production. The decrease would be the result of increased competition. Late successional plant species would be favored and early successional plant species requiring ground surface levels of solar radiation afforded by open canopy for growth or establishment will decrease in abundance in the long term. **Botany:** Effects are highly dependant upon habitat preferences for a particular species. Some sensitive species may react positively to exclusion while other may react negatively. Any decision regarding exclusion of livestock and the effects on plant species would need to be on a case-by-case basis. See Management Action O for further explanation of effects of livestock removal.	Construction of fences can negatively affect deer, elk and flying squirrels. However, the beneficial effects for riparian species generally outweighs the impacts to ungulates, especially when the fences are built in a wildlife friendly design. Fencing riparian areas can enhance habitat for R2 sensitive species, such as the northern leopard frog and Black Hills redbelly snake. Birds and small mammals needing cover and vegetation in riparian areas would also benefit from building riparain exclosure fences. Beneficial effect to fish if it results in improved riparian/aquatic habitat condition along French and/or Ruby creeks.
G	Implement specific dates of use or nonuse to protect areas of concern	Protecting areas of concern by implementing specific dates of use or nonuse will benefit the soil and water resource if they are the areas of concern. Nonuse would provide the most benefit because the livestock will not continue to impact the area of concern. Specifice dates of use will not provide much benefit because the use and impacts would continue to occur, just at a different time.	**Rangeland Vegetation:** Specific dates of use or nonuse controls the timing of grazing. Grazing by one kind of animal at the same time every year generally drives species composition away from the forage preferred by that animal. **Botany**: See effects of Management Action F.	Any species within an area of concern would see more benefical effects from nonuse than specified use dates. Beneficial effect to fish if it results in improved riparian/aquatic habitat condition along French and/or Ruby creeks.
H	Construct permanent fence to influence livestock distribution	Livestock have the tendency to walk along fences and livestock trails created may become bare paths that concentrate and accelerate runoff. These trails would become detrimentally impacted soils. If livestock trails become connected disturbed areas, they may deliver more sediment, nutrients, and pathogens to stream waters. Fencing could be used as a means to control livestock distribution to allow riparian area recovery and allow natural recovery mechanisms to occur. Increased vegetation growth should lead to fewer nutrients available for transport to streams and better ability of the landscape to trap sediment. Sediment, nutrient, and pathogen delivery to streams from upslope areas may be reduced.	**Rangeland Vegetation:** Livestock have the tendency to walk along fences and livestock trails created may become bare paths that concentrate and accelerate runoff. These trails would become detrimentally impacted soils. The degree of impact would vary with soil moisture content, particle size, existing vegetation, and location of the fence on the landscape. **Botany**: See effects of Management Actions A and F.	Fences can negatively affect deer, elk and smaller mammals such as flying squirrels. Fences have caused mortality and injury to these species. Fences can be built in a wildlife friendly design, which will help mitigate negative impacts. There can be short-duration impacts to many species by causing displacement due to human activity and noise. Beneficial effect to fish if it results in improved riparian/aquatic habitat condition along French and/or Ruby creeks.
I	Use temporary electric fence for short-term control of livestock distribution	Same effects as 'H'. Temporary fence may not develop permanent trails and cause as severe of problems and if trails develp that cause problems, the temporary fence can be moved to a different location.	**Rangeland Vegetation:** Livestock have the tendency to walk along fences and livestock trails created may become bare paths that concentrate and accelerate runoff. These trails would become detrimentally impacted soils. The degree of impact would vary with soil moisture content, particle size, existing vegetation, and location of the fence on the landscape. Temporary fence may not develop permanent trails and cause as severe of problems. Fencing could be used as a means to allow for vegetation recovery through natural recovery mechanisms. The fenced out portion of pasture would experience the effects of rest for the duration of the temporary fence (see item M for further discussion of rest). Shifting the mosaic of intensively grazed and underutilized patches may be critical to the maintenance of structural and biological diversity of rangeland ecosystems (Fuhlendorf et al.2006 [in Briske et al. 2008]). **Botany**: See effects of Management Actions A and F.	Same effects as 'H'. Beneficial effect to fish if it results in improved riparian/aquatic habitat condition along French and/or Ruby creeks.
J	Remove (permanent or temporary) fence to influence livestock distribution	Removing an existing fence would have minimal impacts to the soil and water resource, unless it crosses a stream or is in close proximity. If livestock continue to use the area, a fence that no longer crosses the stream, would not concentrate livestock at the stream. These areas with a fence could be lacking vegetation, contribute sediment, nutrients and pathogens to the stream. Removing the fence would allow the area to heal and would stop contributing sediment, nutrients and pathogens to the stream.	**Rangeland Vegetation:** Removing a segment of fence would allow cattle to access forage previously ungrazed at a specific point in time. Cattle and wildlife would continue to use existing trails but with reduced frequency. The degree of influence on livestock distribution after fence removal depends largely on topography, water, cover, and mineral/supplement placement. **Botany:** See effects of Management Actions A and F.	Removal of a fence would benefit wild ungulates. Deer and elk are often injured, sometimes killed, at fencelines. Beneficial effect to fish if it results in improved riparian/aquatic habitat condition along French and/or Ruby creeks.
K	Use of range rider (herding) to control livestock distribution	Range riding involves actively pursuing and pushing livestock to get better utilization across the allotment and pasture. This techniques increases movements and may cause	**Rangeland Vegetation:** Range riding involves actively pursuing and pushing livestock to get better utilization across the allotment and pasture. Use of a range rider may help to achieve	Using a range rider to keep cattle out of riparian areas would be beneficial to riparian species. Using a range rider in other areas

		impacts to riparian areas and streambanks when livestock are driven away from these areas. Use of a range rider may help to achieve proper distribution of livestock and could reduce the amount of time that livestock spend in streams and riparian areas overall. However, much of the success of this approach depends entirely on the dependability, energy, and amount of time spent by the ranger rider.	more even distribution of livestock and could reduce the amount of time that livestock spend in streams and riparian areas overall. However, much of the success of this approach depends on the dependability, energy, and amount of time spent by the ranger rider. **Botany:** See effects of Management Actions A and F.	of the pastures in order to promote better livestock distribution could be benefical for upland species as well. There could be negative effects to ground-dwelling species while pushing cattle. Beneficial effect to fish if it results in improved riparian/aquatic habitat condition along French and/or Ruby creeks.
L	Change class of animal (i.e., cow/calf to yearling)	Changing animal class would have little effect on the water and soil resource. Some animals could range more in riparian areas than others, thereby causing more impacts if not properly managed.	**Rangeland Vegetation:** Livestock differ in their use of rangeland. This difference is seen in willingness to access steeper terrain. Size, physiological status, and behavioral modification can have an effect on the terrain used and distance traveled to water. In general, yearling cattle make better use of rugged terrain than do cows with calves (Holechek et al. 2004). It is expected that large, heavy animals such as mature cattle will make little use of slopes with a gradient greater than 10%. Lactating females with calf are expected to travel less distance from water. However, behavioral modification of all classes of animal can influence degree of use in rugged terrain. Accessible areas of flat terrain containing palatable forage would continue to be preferred by all classes of livestock. **Botany:** Changing class of livestock has the potential to affect plant communities and species by alterning grazing patterns (See above). By changing to yearling cattle from cows with calves, areas that had typically seen little, if any use, may now see increases in use. This may result in disturbances to sensitive plant species in areas that were once relatively inaccessable to cows with calves. A positive aspect however may be that riparian areas, and species associated with those areas, possibly will receive less use.	Generally it is expected that cow/calf pairs will stay closer to the water sources and not travel upland as much as yearlings. In that case, yearling cattle would do less harm to riparian areas and therefore impact riparian dwelling species less. Grazing cattle more in the uplands may create more nutritious, palatable forage for wild ungulates. Beneficial effect to fish if it results in improved riparian/aquatic habitat condition along French and/or Ruby creeks.
M	Rest from livestock grazing for one or more seasons	If a period of rest were implemented, degraded riparian systems not able to begin recovery under current management may be able to begin the recovery process. The rest period required for recovery would depend on the type and degree of system degradation. While vegetation communities may be able to recover from excessive grazing in 1 to 5 years, degraded stream generally take longer to recover, particularly if the channel has become incised or confined (Platts and Raleigh 1984 [in Clary and Webster 1989]). Recovery of impaired, low to moderate gradient systems generally follows a predictable response pattern with vegetation along the stream margin first increasing in vigor and density, then trapping sediment and building up streambanks. Deposition causes spreading out on the floodplain. Channel erosion is reduced, and greater exchange of water between the channel, floodplain, and riparian soils takes place. With severely entrenched streams (incised streams), recovery, which is accomplished by rising the gully floor by annual deposition, may take decades. A period of rest would also allow soils to recover for compaction through cycles of wetting, drying, shrinking, and swelling; roots forcing their way through soil particles; and activities of large soil organisms and small mammals (USDA NRCS, 2001).	**Rangeland Vegetation:** Rest from grazing will allow the previously grazed plants time to recover vigor, produce seed, and establish new production. Changes in plant vigor would differ over time and between sites. Sites with deeper soils and more moisture available for plant growth than sites with shallow soils would experience more rapid changes (Holechek et al. 1995). Plants on deeper soils would not sustain the initial increase in vigor. This is expected because nutrients required for plant growth increasingly become tied up in live plant material and litter (Coyne et al. 1995). **Botany**: Rest from livestock grazing will likely only have positive impacts to sensitive species.	Rest from grazing can allow vegetation, grasses/forbs and shrubs, to recover from moderate to heavy impacts. Riparian resting can benefit species such as frogs, snakes, song sparrows and meadow jumping mice. Resting grassland acres can benefit species such as grasshopper sparrrows and upland sandpipers. Wild ungulates can see beneficial effects if there is more forge available during fall and winter months. Beneficial effect to fish if it results in improved riparian/aquatic habitat condition along French and/or Ruby creeks.
N	Change the permitted livestock number, permitted (AMs and/or season)	No grazing system would counteract the impacts of overstocking on a long-term basis (Clary and Webster 1989). Reducing animal months (AMs), if necessary, could be used to achieve compliance with Forest Plan and WCP Handbook standards. Studies have shown that grazing intensity has more of an effect on both vegetation (Clary and Webster 1989) and infiltration (Abel-Magid et al, 1987) than does the particular grazing system. However, it should be noted that reducing AMs in the context of a variable season of use does not necessarily equate to a reduction in grazing intensity at any given site (for example, a riparian area or an area prone to compaction) during a specific timefame (such as during times of high moisture content). The benefits of a reduction in AMs with respect to soil and water resources would depend on how AMs are distributed in time and place.	**Rangeland Vegetation:** Stocking rate is the most consistent management variable influencing both plant and animal responses to grazing (Heady 1961; O'Reagain and Turner 1992; Ash and Stafford Smith 1996; Holechek et al. 2001). Reducing animal months (AMs), if necessary, could be used to achieve compliance with project design criteria, Forest Plan and WCP Handbook standards. Studies have shown that grazing intensity has more of an effect on both vegetation (Clary and Webster 1989) and infiltration (Abel-Magid et al. 1987) than does the particular grazing system. However, it should be noted that reducing AMs in the context of a variable season of use does not necessarily equate to a reduction in grazing intensity at any given site (for example, a riparian area or an area prone to compaction) during a specific timeframe (such as during times of high moisture content). The benefits of a reduction in AMs with respect to rangeland vegetation would depend on how AMs are distributed in time and place. **Botany**: Impacts discussed under Management Action F would likely have similar results.	Decreasing livestock numbers, AMs and/or season length could be beneficial to those habitats where grazing has been moderate to heavy and those areas where livestock congregate. Increasing numbers, AMs and/or season length may have negative effects to some species, especially in those habitats where livestock tend to over-graze, such as riparian areas. Close monitoring would be necessary if employing one of these actions. Beneficial effect to fish if it results in improved riparian/aquatic habitat condition along French and/or Ruby creeks.
O	Do not allow livestock grazing	Little information exists to support the benefits to soil and water of any grazing system employed (Clary and Webster 1989). Not allowing livestock grazing would be the quickest way for the ecosystem to recover. This would decrease soil compaction, increase infiltration, increase vegetative growth, and slow runoff. Increased vegetation growth and infiltration should lead to fewer nutrients available for transport to streams and better ability of the landscape to trap sediment. Sediment, nutrient, and pathogen delivery to streams from upslope areas would be reduced. Riparian areas and streams would begin the recovery process from past impacts.	**Rangeland Vegetation:** Effects would be similar to that of Alternative 1 (no grazing). **Botany:** Effects of removing livestock are the most highly variable of these management actions for sensitive species and probably the least understood. Assuming that livestock will permanently be removed, litter, fine fuel accumulations, and reduced disturbances would have the most impacts. These impacts may be detrimental to some species while beneficial to others. Excess accumulation of litter has the potential to reduce plant diversity, increased thatch layers may impede plant growth, and reduce potential habitat. Excess accumulation of litter and other fine fuels that would have typically been reduced by livestock grazing may possibly lead to an increase in fire potential and severity. Severe, hot, and intense fires may lead to soil concerns, noxious weed infestations, and reduced/eliminated sensitive species habitat. Soil disturbance will also likely be reduced. Several sensitive plant species may rely on disturbances to reproduce. Positive impacts to certain species may arise from increases in litter and thatch layers to provide shading, cooling of soils, and retention of soil moisture. Many species also favor undisturbed areas for their preferred habitat.	The effects of this action, Alternative 1, are analyzed in this report. This action can benefit many habitats that are currently impacted moderately to severely. This is often the case of riparian areas where cattle congregate. Riparian species would benefit with this action. Deer and elk could benefit in the short-term. Vegetation may not be as nutritious or palatable without any cattle grazing. Some upland birds require patches of short grass for foraging. Same beneficial effect to fish due to improved riparian/aquatic habitat condition on French and Ruby creeks as the No Grazing Alternative.

P	Change allotment or pasture boundaries	Changing allotment or pasture boundaries would have minimal impacts to the soil and water resources as long as the Forest Plan standards are for utlization and riparian stubble height are adhered to.	**Rangeland Vegetation:** A boundary change could either increase or decrease the unit area or remain the same if pastures are divided. Incorporating acres into a management unit could increase the available forage or visa-versa if reducing acres. The pattern of grazing within the pasture or allotment may be altered, thus effecting livestock distribution within the unit area. The division of large pastures can increase the evenness of animal distribution and forage utilization up to a point where further reduction in size is of no advantage (Heady and Child 1994). Management flexibility is increased by being able to more precisely control the timing and frequency of defoliation by cattle. **Botany**: Impacts discussed under Management Action F would likely have similar results.	This would entail moving fences. Refer to 'H' above. Changing boundaries could change the route of travel for livestock and change areas of congregation. This could cause impacts to new areas but alleviate impacts at other areas. Short-term effects to a variety of species could be seen. Beneficial effect to fish if it results in improved riparian/aquatic habitat condition along French and/or Ruby creeks.
Q	Use salt or other supplements to draw livestock toward or away from specific areas	Salts or supplements to draw livestock away from areas generally mean better livestock distribution. Better livestock distribution could mean fewer impacts to the soil, streams and riparian area, by having livestock spend less time in these areas. This could decrease soil compaction, increase infiltration, increase vegetative growth, and slow runoff. Increased vegetation growth and infiltration should lead to fewer nutrients available for transport to streams and better ability of the landscape to trap sediment. Sediment, nutrient, and pathogen delivery to streams from upslope areas may be reduced.	**Rangeland Vegetation:** Salts or supplements to draw livestock toward or away from specific areas generally mean increased livestock distribution across the landscape. Supplement placement on high, steep terrain can improve uniformity of cattle grazing on rugged rangeland (Bailey and Jensen 2008). This would reduce preferential use of specific patches of vegetation resulting in less pressure (both frequency and intensity) on patches of preferred forage and more use in areas seldom grazed. Plants previously ungrazed may be consumed within the area of influence of supplement. Shifting the mosaic of intensively grazed and underutilized patches may be critical to the maintenance of structural and biological diversity of rangeland ecosystems (Fuhlendorf et al.2006 [in Briske et al. 2008]). **Botany**: Impacts discussed under Management Action F would likely have similar results.	The use of salt to pull livestock away from riparian areas is benefical to both the vegetation and species in the riparain habitat. Drawing livestock to upland areas that are under-grazed could create more palatable and nutritious vegetation for wild ungulates and create some short grass areas needed by some upland bird species. Beneficial effect to fish if it results in improved riparian/aquatic habitat condition along French and/or Ruby creeks.
R	Construct brush barriers to protect sensitive resource area	Constructing brush barrier to control livestock distribution to keep livestock from areas of concern could be beneficial. Soil compaction could decrease, infiltration could be increased, vegetative growth could increase and the runoff could be slowed. All of this could lead to fewer nutrients available for transport to streams and better ability of the landscape to trap sediment. Sediment, nutrient, and pathogen delivery to streams from upslope areas may be reduced if these barriers are used to limit livestock from streams and riparian areas.	**Rangeland Vegetation:** Brush barriers are typically used to re-route trailing cattle away from or towards a specific area. The effects of cattle trailing would be displaced from the original area. The degree of cattle dispersal would depend on the surrounding topography and vegetation structure. **Botany:** Impacts discussed under Management Action F would likely have similar results.	Constructing brush barriers to keep livestock from areas of concern could be beneficial to the resource being protected. If the sensitive area was a riparian habitat, compaction to banks would be decreased and vegetation would not receive as much browsing. This would allow the area to heal and riparian species to benefit. For a brush barrier to be effective with cattle it would have to be fairly tall and/or wide. This could affect ungulates as well. Amphibians and snakes need to be able to get through the barrier. If nearby trees are cut for the fence, this could change ground conditions. Vehicles may cause impacts in the area if used during the creation of the barreir. Overall, intensity of effects to species and their habitats is dependent on the size, materials used in construction and personnel/vehicles needed to create a brush barrier. Beneficial effect to fish if it results in improved riparian/aquatic habitat condition along French and/or Ruby creeks.
S	Move existing water developments, if feasible, away from streams and springs	Moving water developments away from streams and springs would have a benefit to these areas. The benefit would be that the livestock would not be encouraged to be or drawn to these areas. If they are not drawn to these areas, less impacts would occur. The closer the water development is to streams or springs, the more impacts can occur.	**Rangeland Vegetation:** Moving some developments will allow the riparian vegetation associated with the stream to recover by drawing grazing ungulates away from the stream. If the water development is moved to a different site, that site would experience increased use by livestock and wildlife. There would be detrimental soil impacts to the watering area, but the impacts are small and would not be a concern related to the 15% detrimental impact standard. **Botany:** Impacts discussed under Management Action F would likely have similar results.	This action may allow banks and riparian vegetation to repair. Healthier riparian habitat is beneficial to riparian species such as frogs, snakes and small mammals. Numerous species, including bats, that use the streams/springs as a water source would also benefit due to improving water conditions. Beneficial effect to fish if it results in improved riparian/aquatic habitat condition along French and/or Ruby creeks.