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Environmental Assessment

North Zone Range 08 Project

Crook County, WY
Pennington County and Lawrence County, SD

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INTRODUCTION

The Black Hills National Forest proposes to reauthorize grazing by domestic livestock on ten allotments within the North Zone Range 08 Project Area (NZR08) is located in Lawrence and Pennington Counties, South Dakota and Crook County, Wyoming. The allotments are the Pettigrew, Griffith, Upper Elk and East Rapid allotments administered by the Northern Hills Ranger District and the Stearns Park, Grand Canyon, Willow Springs, Silver Creek, Black Haw and Huett Springs allotments administered by the Bearlodge Ranger District (Figure 1). These allotments total 92,664[1] acres including 9,384 acres of private lands. A total of 9,259[2] AUMS would be authorized.

The purpose of this project is to improve livestock management so that it is consistent with the goals, objectives, standards and guidelines of the Black Hills National Forest Land and Resource Management Plan, as amended (Forest Plan). 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, revision to current rangeland management practices. The underlying needs for this proposal include:

1) There is a need improve livestock management so that it is consistent with the goals, objectives, standards, and guidelines of the Forest plan.
2) There is a need to reduce soil disturbance (erosion and compaction), improve bank stability, and increase riparian vegetation diversity and abundance, including Region 2 sensitive species and BHNF species of local concern, in order to improve stream health and riparian ecosystem condition.
3) There is a need to reduce trailing and trampling by livestock in the Englewood Springs Botanical Area (MA 3.1) to protect and improve the values for which the botanical area was designated.
4) There is a need to reduce cheatgrass infestations within the Huett Springs Allotment to increase native grasses and improve rangeland health.

The action proposed by the Forest Service (Alternative A) to meet the purpose and need is to continue to permit livestock grazing by incorporating adaptive management strategies on all ten allotments within the NZR08 project area while meeting LRMP direction which provides for a wide range of values and uses. The Proposed Action is designed to maintain or improve resource conditions in rangeland health, vegetation, watershed conditions, designated Botanical Areas, and wildlife habitat relative to livestock grazing.

[1] Total acreage for these allotments is slightly higher than previously stated due to a correction in the number of private lands included in the allotments. Total acres of NFS lands remains the same.
[2] Total AUMs to be authorized is higher than previously stated due to a correction based on number of AUMs to authorized on waived private lands in conjunction with these allotments.

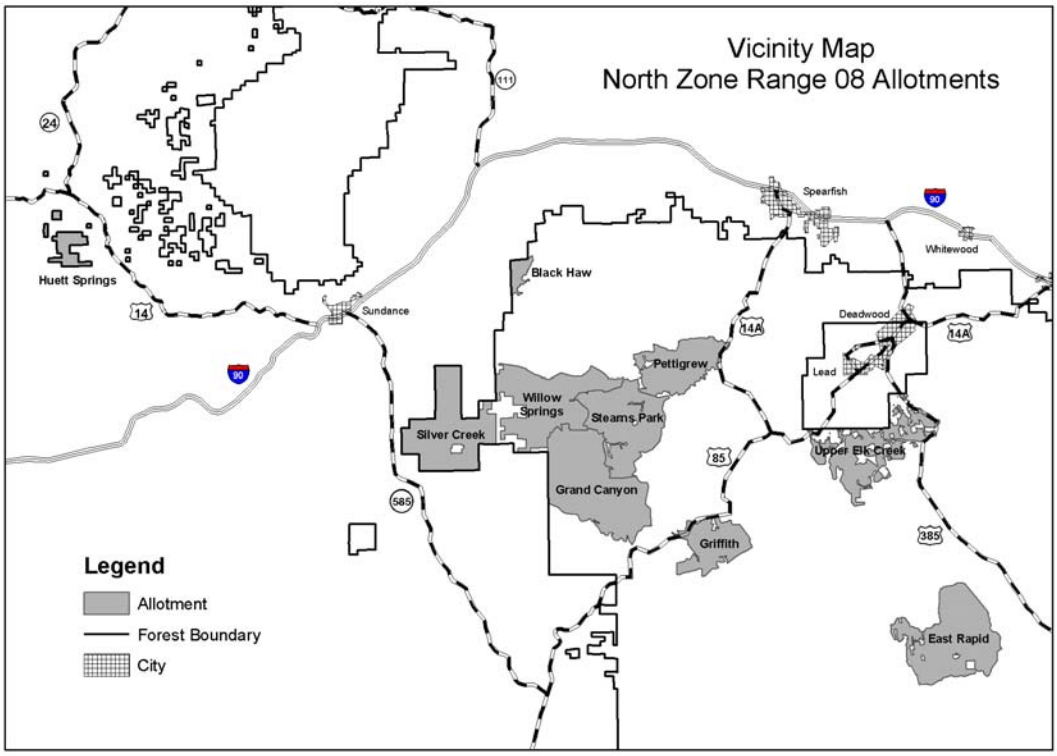

Figure 1. Vicinity map of the North Zone Range 08 allotments

Background

Livestock grazing has been occurring on the Black Hills since the initial explorations of the Custer Expedition. In fact, the 1874 Black Hills Expedition included a prodigious number of cattle, horses, and mules to sustain the expedition. This was in addition to the native grazers of the time: buffalo, elk, deer, and bighorn sheep.

The following history of grazing in the Black Hills is excerpted from "Historic and Contemporary Use and Occupation of the Black Hills" (USDA Forest Service 1994a) compiled during the 1997 Forest Plan revision process. This excerpt provides insight on the nature and intensity of historical grazing impacts in the Black Hills and provides a social perspective for the vegetative range conditions found in the Hills today:

> "With the 1870s gold rush, needs for meat, vegetables, dairy products and fodder for people and animals moving in to the Hills heightened. Over the next two decades, industries grew out of cattle and sheep production, both within and outside of the Hills (Cassells et al. 1984).
>
> By 1888, as many as 600,000 cattle were concentrated in the Black Hills region. Estimates from 1903 placed cattle at 300,000 head, sheep at 100,000, and horses at 7,000 head (Cassells

1984). Plains ranchers also brought cattle into the Hills in the summer in search of grazing lands. Livestock numbers for this era are phenomenal given the number of cattle allowed today. Currently 23,000 head of cattle graze on the Black Hills National Forest lands.

Like other parts of the West, "range wars" erupted between sheep and cattle interests. Although Belle Fourche and Rapid City supported a thriving wool industry with wool warehouses used as hubs for wool exports, cattlemen lobbied hard to drive sheep from the Hills. ....After holding public meetings, (Gifford) Pinchot opted to close the Forest to sheep. He did so in large part to protect the Forest's timber reserves, which were being degraded by sheep that often destroy pine saplings. Sheep were again allowed on the Forest in 1916, "probably because the price of wool was up and the price of beef was down" (Geores 1993). Sheep grazing on Forest System lands in the Black Hills has occurred since, but not to the scale it had early this century and late last century.

At the turn of the century, Forest Reserve regulations were adopted that favored small grazing permittee over leases to large companies. The Forest's administration felt that small operators would be better land stewards than large operators, who cared only for profits, and not the conditions their cattle operations created on the range (Geores 1993).

Homesteading ceased for a time in the Black Hills as a result of the creation of the Black Hills Forest Reserve in 1898. Those homesteads already established in the Hills were allowed to stay on. The Forest Homestead Act of 1906 dissolved the 1898 moratorium on homesteading on Forest Reserves. Homesteaders again arrived in the Hills. .....Since many of the lower-elevation areas had already been homesteaded, a number of people tried to homestead in the higher valleys and draws within the Black Hills. The usual pattern was to claim a homestead along a stream bottom, which included a long strip of land along the stream. This process along with those who filed mining claims, scattered parcels of private land in the public lands of the Black Hills National Forest.....In some instances, small grains were produced on meadows that were cleared of rocks. Hay was gathered from natural grasses. Nearly all of these early homesteads have been abandoned or subdivided. Because of the climate, successful homesteading above about 6,000 feet proved virtually impossible (Cassells et al. 1984).

A major effort was made in the Custer area to promote dairy farms...sometime in the 1930s the carrying capacity for grazing land was reached. As many applicants for grazing allotments were turned away as were accepted, so the grazing resource, which had seemed nearly endless a couple of decades before had finally reached an official saturation point.

By the early 1940s, some range land on the Forest was severely overgrazed.... As a result the Forest Service reduced the number of grazing permits to allow the land to recuperate.... Grass and forb species were in poor condition on many areas of the Forest and deciduous vegetation, like willows, berry bushes and aspen had been damaged by overgrazing. Big game, especially deer, were impacted.... Grazing permit cuts began again in 1951...Programs were implemented in the 1950s to improve range conditions, including rotational grazing systems and aerial spraying of weeds. These programs met with some success, and were undertaken cooperatively between the Forest Service and permittees."

Heavy grazing and agricultural development weren't the activities that have influenced vegetative components in the Black Hills. Other activities and programs have also contributed to the condition of uplands and riparian communities seen in the Hills today. The following excerpts

from The Range of Natural Variability for the Black Hills: A First Step (USDA Forest Service 1994b) describes these effects over the last 100 years:

> "Forest Service management has led to a dramatic shift in forest conditions over the past 120 years. Today mature ponderosa pine appears to be considerably more dense and extensive that what occurred prior to settlement....."
>
> "The area of non-forested land has decreased since 1874. Much of this change can be attributed to a decrease in fire frequency. This has allowed ponderosa pine to encroach into dry meadows and some historically wet meadows what have drier soils resulting from lower water tables in streams that historically supported beaver dam complexes...."
>
> "Not only has forest maturation during the past century influenced tree species composition, but herbaceous and shrub species also have been affected. Herbaceous and shrub species as a group attain their best productivity in meadows, early forest seral stages, and the understory of aspen and open-canopy forests. In the Black Hills, the increase in the density and extent of mature ponderosa pine and, to a lesser extent, white spruce has resulted in a concomitant decline in herbaceous and shrub species abundance."
>
> "Riparian areas adjacent to low-gradient channels have probably been modified most since settlement began due to their accessibility. As described by early explorers, these ecosystems historically had saturated soils that supported phreatophytic (ie.e water dependent) plant communities. Beaver colonies were a critical link in maintaining the integrity of these wet-meadow systems.....Beaver were heavily trapped by early settlers leaving only a few in remote places far away from settlements by 1887 causing a break in the natural cycle. The residual dam complexes failed or in many cases were breached by local landowners. This decline in beaver populations, along with other impacts to wet meadows such as draining, grazing, decreased fire frequency, and herbicide spraying resulted in lower water tables and a compositional shift to drier-site plants."

Thus over the last 100 years, there have been many social, economic, and ecological influences that have resulted in the vegetative communities that occur in the Black Hills today.

Livestock grazing is still an authorized use of National Forest System lands on the Black Hills (USDA Forest Service 1997). Goal 3 of the Black Hills National Forest Land and Resource Management Plan (the Forest Plan) states: "Provide for sustained commodity uses in an environmentally acceptable manner." Commodities, including livestock, contribute to the economies of local and regional communities and support local people. Because sustained commodity production depends on sustainable ecosystems, the Forest Plan further directs that "....livestock grazing will occur without impairing the health of ecosystems and in a manner compatible with other Forest uses." Therefore the management direction for the North Zone Range 08 project is to continue to authorize livestock grazing while ensuring that livestock use is consistent with the desired conditions in the Forest Plan. These allotments are managed in close cooperation with the range permittees.

Management Direction

The Revised Black Hills Land and Resource Management Plan (1997), as amended provides management direction for these allotments. Lands located within the allotments have been allocated to the following Management Area designations:

Table 1. Management Area designations within the North Zone Range 08 project area.

Management Area	Acres	Management Emphasis	Grazing allowed?
3.1	164	Botanical Areas	Yes, If no conflict with botanical values
3.32	227	Backcountry Non-motorized Recreation	Yes
4.1	6,142	Limited Motorized Use and Forest Products	Yes
4.2A	432	Spearfish Canyon	No
5.1	50,320	Resource Production	Yes
5.3A	1,631	Black Hills Experimental Forest	Yes
5.4	17,683	Big Game Winter Range	Yes
5.6	6,681	Forest Products, Recreation, Big Game	Yes

Suitable rangelands are those rangelands where there is no Forest Plan or other binding decisions to preclude the permitting of livestock grazing. Management area designations in the project area include those in Table 1. All of the Management Areas allow livestock grazing except MA 4.2A - Spearfish Canyon. About 432 acres of Pettigrew Allotment are mapped as within MA 4.2A. In fact, these acres are below the canyon walls and are neither accessible nor grazed by livestock. No changes in range suitability were needed based on this analysis.

Changes in management emphasis on the Black Hills NF occurred with the 1997 Forest Plan revision and the subsequent Phase II amendment in 2006. Botanical areas and sensitive plant populations were identified for protection. Reconnaissance for this project identified some isolated conflicts with management of these botanical resources related to livestock grazing.

Project Area Description

Wyoming Allotments

The Grand Canyon (16,036 acres), Stearns Park (10,878 acres) and Willow Springs (11,896 acres) allotments are located south of the town of Beulah, Wyoming. The topography of these allotments is characterized by long, flat, open to semi-open, north sloping ridgelines surrounded

by v-shaped to wider u-shaped floors. Elevations are generally higher than in other parts of the Bearlodge District of the Black Hills ranging from 5,000 to 6,784 feet. In 2005, the Cement Fire burned 3,013 acres; 1,409 acres of burn extended into the northwest portion of the Willow Springs Allotment.

The Silver Creek Allotment (11,296 acres) is located on the extreme southwest edge of the District in an area known as the Black Buttes. This area is characterized by narrow, north trending valleys and steep slopes. Elevations in the project area range from 4,700 to 6,010 feet above mean sea level.

The Black Haw Allotment (2,748 acres) is south of Beulah, Wyoming on the western periphery of the southern portion of the District. The area is characterized by a wide ridge top that drops steeply to the northwest; the eastern boundary is part of the Grand Canyon which is characterized by steep exposures of the Minnelusa Formation, which consists of cross-bedded sandstone and limestone at the top and inter-bedded sandstone, limestone and shale elsewhere in the profile. There are nearly continuous limestone outcrops with potential for rock shelters in the narrow canyon formed by Black Haw Gulch along the northwestern boundary of the allotment. Elevations in the project area range from 5,000 feet and 4,300 feet above mean sea level.

The Huett Springs Allotment (4,453 acres) is located on the far western edge of the Bearlodge Mountains, west and slightly north of the city of Sundance, Wyoming. The area is highly dissected with steep, narrow drainages below long, narrow finger ridges. The allotment is composed of a mixture of parcels of Forest Service administered lands and private land. Elevations in the allotment are between 4,200 and 4,600 feet.

South Dakota Allotments

The Pettigrew Allotment (7,318 acres) is on the western edge of the Northern Hills District in the historic Tinton Mining District. It is roughly 10 miles southwest of Spearfish, South Dakota, near the Wyoming State border and the ghost town of Tinton. Elevations range from 5,000 feet along Iron Creek to 6,100 feet on Old Baldy Mountain. Grazing has occurred in this area for over 100 years.

The Upper Elk Creek Allotment (8,813 acres) is located about three miles south of Lead, South Dakota. It is bound on the north by the Lead/Deadwood exemption area. Elevations range from 5,200 feet to 6,400 feet around Woodville Hills. Historically, much of this allotment was previously grazed by Dairy Cow herds.

The East Rapid Allotment (13,432 acres) is located approximately 15 miles south of Lead, South Dakota. This allotment overlaps the Northern Hills and Mystic Ranger Districts boundaries. Elevations range from 4,800 feet to over 6,100 feet. Historically this allotment grazed cattle, then converted to sheep and goats, then converted back to cattle in 1977.

The Pettigrew, Upper Elk Creek and East Rapid allotments are located in the Central Core area of the Black Hills. Soils in the central core are generally rocky, but well drained. The topography ranges from gently rolling hills with wide valley bottoms to steep narrow gulches bound by schist, shale and limestone.

The Griffith Range Allotment (5,704 acres) is located on the Northern Hills Ranger District of the Black Hills National Forest (BHNF) approximately 2 miles east of O'Neil pass. Elevations for the allotment range from 5,400 feet to over 7,000 feet near Crooks Tower.

Recent Management History

Allotment management plans (AMPs) have been in place on all of these allotments for many years. Prior to the 1970's many of the allotments were in poor to fair range condition (Wheeler et al. 2008). Grass species composition was dominated by naturalized non-native grasses such a timothy, Kentucky bluegrass and smooth brome. Bare ground was higher than desired and noxious weeds were present. However, the most recent set of AMPs completed in the 1990s instituted changes in management designed to improve range conditions. The most recent monitoring data indicate improvements in long-term trend including reductions in bare ground. There has also been a reduction in the amount of noxious weeds although some are still present. Most upland sites are still dominated by non-native grasses. Vegetation inside range exclosures built in the 1940s on other allotments in the Black Hills demonstrates that these species are very stable. Elimination of grazing inside the exclosures has had little to no effect on species composition in the last 60 years. Species are essentially the same both inside and outside the exclosures (USDA Forest Service 2006).

Trend is determined where possible by comparing historical records (transects plots, inspection records, etc.) and photographs with current conditions and determining if conditions have improved, declined, or stayed the same. These trends are described as upward, downward, and static relative to the desired conditions for the specific area. Areas for which no historic data was available were described based on current knowledge.

Recent range monitoring has placed more emphasis on riparian conditions. Streams/Riparian areas were evaluated using "Proper Functioning Condition" (USDI BLM 1998) assessments and the "Riparian Characteristics Evaluations" R2-2200-RCS USFS from the Rangeland Analysis and Management Training Guide (USDA 1996b) by interdisciplinary teams, including botany, wildlife, hydrology, and rangeland management field personnel from the U.S. Forest Service. Inventory and monitoring efforts including PFC assessments conducted since 2000 have identified some localized areas of concern where streambank trampling appears excessive and riparian shrubs are decadent or not regenerating. In general these problems are localized in nature and many riparian areas are healthy and support diverse plant communities.

Purpose and Need for Action

The purpose of this project is to authorize livestock grazing on all or part of the project area and to ensure that livestock grazing occurs 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, revision to current rangeland management practices. The underlying need(s) for this proposal include:

- Improve livestock management so that it is consistent with the Goals, Objectives, Standards and Guidelines of the Forest Plan.
- Reduce soil disturbance (erosion and compaction), improve bank stability and increase riparian vegetation diversity and abundance, including Region 2 Sensitive Species and Black Hills National Forest Species of Local Concern, in order to improve stream health and riparian ecosystem condition.

- Reduce trailing and trampling by livestock, where needed, in botanical areas in order to improve the values for which botanical areas were designated.
- Reduce cheat grass infestations within the Huett Springs Allotment in order to increase native grasses and improve rangeland health.

These needs were developed by comparing the existing conditions on the allotments to the desired conditions for these areas.

Desired Condition

Desired condition is the specific condition of rangeland resources on a landscape scale that meets management objectives as identified in the Forest Plan. Desired condition is based on ecological, social, and economic considerations. Goal 2 of the Forest Plan describes the desired condition of lands and resources and also describes standards and guidelines for various resources that are intended to guide management into meeting or trending towards desired conditions. Appendix C includes all of the appropriate Forest Plan direction that helped define the desired conditions for the NZR08 project.

Desired plant community (DPC) selection is crucial to effective rangeland planning. DPC is part of the overall desired condition developed by the interdisciplinary team (IDT). They must 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 (R2 Rangeland Analysis and Management Training Guide, USDA Forest Service 1996c). Much of the primary grazing areas in the Black Hills have been converted to non-native graminoid 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 easily 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. Many of these non-native species are acceptable for the current and proposed management of the project area. The following species are considered acceptable: timothy *(Phleum pretense*), smooth brome (*Bromus inermis*), and Kentucky bluegrass (*Poa pratensis*).

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). 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). The ratings listed in the previous sentence are based on a yearly forage preference and may vary by season. These ratings are based on the relish and degree of use shown by livestock and wildlife for a plant or plant part. The high reading indicates the plant is highly relished and consumed to a high degree and the moderate rating correlates to a plant that is consumed or relished to a moderate degree.

It is not the goal or objective of this project to manage for these species, however reducing them through grazing management is not practical and not unlikely to succeed. Grazing exclosures that have been in place for over 40 years have nearly identical species composition to grazed areas outside the exclosures (USDA Forest Service 2006a). 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 too is expensive and often the seed available for this sort of project 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. These options were only considered for the Huett Springs allotment where the non-native grasses present (*Bromus tectorum* and *Bromus japonicus*) have lower values for livestock, wildlife, and watershed management.

The overall desired condition for the project area that was developed by the interdisciplinary team is described below in Table 2.

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 5-20% bare ground depending on soil type) to maintain soil stability and provide wildlife habitat. Maintain quality of desired plant communities by managing for native species. Primary native graminoid species may include: *Stipa viridula* (green needlegrass), native wheatgrasses, *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) *Trifolium* spp. (clovers), and *Taraxacum officinale* (dandelion). Noxious weeds should be less than 2% of the species composition. In high quality endemic Black Hills Montane Grassland communites, maintain diversity and canopy cover of native signature species which may include *Stipa richardsonii* (Richarson's needlegrass), *Sporobolis heterolepis* (prairie dropseed), *Geum triflorum* (prairie smoke), *Solidago* spp. (goldenrod), and *Potentilla* spp. (cinquefoil).

Community Type	Desired Conditions
Riparian Communities (Including Seeps & Springs)	Maintain riparian plant communities that provide overhanging vegetation and effective ground cover (not more than 10% 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)). In shrubland systems, plant species may include black hawthorn and *Salix* spp. (willows). Tree species may include *Betula papyrifera* (paper birch), *Betula occidentalis* (water birch), *Acer negundo* (boxelder), *Quercus macrocarpa* (bur oak) *Cornus sericea* (redosier dogwood), 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. High quality habitat for sensitive species will be maintained.
Aspen	In landscapes with multiple aspen clones, maintain aspen communities with diverse age structures including old growth communities, regeneration, openings, standing snags and down woody debris across aspen areas. Vigorous and diverse native grass and forb understory is present. Aspen shoots are present and develop into saplings over time.
Ponderosa pine	Maintain diverse understory of native grasses including *Nassella viridula* (green needle grass), native wheatgrasses, *Carex inops* ssp. *heliophila* (sun sedge), *Schizachyrium scoparium* (little bluestem), and *Koeleria macrantha* (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 *Vicia americana* (American vetch), *Achillea millefolium* (common yarrow), *Trifolium* spp. (clovers), and *Taraxacum officinale* (dandelion). Noxious weeds should be less than 2% of the species composition.
Botanical Areas (MA 3.1) & Sensitive and SOLC Plant Occurrences	Maintain current extent of known sensitive and SOLC plant occurrences. Impacts by livestock (utilization, trampling, trailing) on sensitive and SOLC plant species and suitable habitat will be incidental. In Botanical Areas, vegetation, habitat, soil productivity and water quality are usually unaffected by livestock.

Existing Condition

Existing conditions at benchmark areas for all allotments in the NZR08 are shown in Table 3. The table shows how the existing conditions for each key area compare to what is actually desired for that site or that pasture in terms of meeting the desired conditions, not meeting the desired conditions or moving toward the desired conditions.

Table 3. Existing range health, trends and status of benchmark areas in the NZR08 allotments

Allotment	Existing Condition*	Benchmark Area - Trend Toward Desired Conditions
Black Haw	**Riparian –** High percent bare ground, high level of trampling, limited extent of riparian vegetation. Stock tank located in riparian area.	**Black Haw Gulch** – Not meeting
Grand Canyon	**Grassland –** 57% perennial grasses, 1% grass-like sedges, 40% forbs, 1% noxious weeds, 3% bare ground **Grassland** – 44% perennial grasses, 52% forbs, 1% grass-like sedges, 3% shrubs, 1% noxious weeds **Grassland** – 49% perennial grasses, 1% grass-like sedges, 48% forbs, 2% shrubs, 0% noxious weeds, 3% bare ground **Riparian –** Trampling, hummocking, no willow regeneration, willows decadent	**Smith Draw –** Meeting **Rifle Pit -** Meeting **Scott Hardy -** Meeting **South Spring and seeps –** Not meeting
Huett Springs	**Grassland –** 30-40% cheatgrass (ocular estimate), average 6-8% bare ground across the allotment	**Lake Divide –** Moving toward **Kudlock** – Moving toward
Silver Creek	**Grassland –** Bluegrass dominated but good species diversity, 51% perennial grasses, 2% grass-like sedges, 22% native forbs, 25% shrubs, 2% bare ground, 0% noxious weeds **Riparian –** Reduced trampling and hummocking, willows are regenerating	**Meadow above Boardinghouse Spring –** Meeting **Pete Spring** – Moving toward
Stearns Park	**Grassland –** 45% perennial grasses, 25% grass-like sedges, 28% forbs, 2% shrubs, 0% noxious weeds, 6% bare ground **Grassland** – 58% perennial grasses, 1% grass-like sedges, 39% forbs, 2% noxious weeds, 8% bare ground **Riparian –** Trampling evident in spring and wetland, willows are decadent with no regeneration	**Buffalo Park** – Meeting **Sec. 16** – Not Meeting **Three Willows Spring** – Not meeting
Willow Springs	**Grassland –** 31% perennial grasses with 10% grass-like sedges, 29% forbs, 9% shrubs, 2% bare ground, 10% noxious weeds. Static trend. Season-long use in Calvert/Sackett pasture **Grassland** – 55% perennial grasses, 17% grass-like sedges, 17% forbs, 6% shrubs, 5% noxious weeds, 0% bare ground.	**Calvert/Sackett –** Not meeting **Katan Spring** – Meeting **Guidinger Meadow** – Moving toward

Allotment	Existing Condition*	Benchmark Area - Trend Toward Desired Conditions
	Grassland – 47% perennial grasses, 10% grass-like sedges, 42% forbs, 1% noxious weeds, 10% bare ground but reduced from previous **Riparian –** Some trampling and streambank alteration occurring, willows and aspen are regenerating but older willows are decadent	**Guidinger Creek** – Moving toward
East Rapid	**Grassland –** 95% perennial grasses, 5% forbs, <1% bare ground, no noxious weeds **Riparian –** Less than 74% stable streambanks, extent of deep-rooted riparian species less than desired	**Gimlet Meadow** – Meeting **Gimlet Creek** – Moving toward
Griffith	**Grassland –** 45% perennial grass, 2% grass-like sedges, 53% forb, <5% bare ground, 0% noxious weeds **Grassland** - 43% perennial grasses, 57% forb, 3% bare ground, 0% noxious weeds	**Moses pasture (NW ¼ Sec. 23) –** Meeting **Arnold pasture (SE ¼ Sec. 24)** – Moving toward
Pettigrew	**Grassland –** 44% perennial grasses, 11% grass-like sedges, 32% forbs, 12% shrubs, 0% noxious weeds, <3% bare ground **Grassland –** 58% perennial grasses, 40% forbs, 2% aspen, 0% noxious weeds, <3% bare ground **Riparian –** Trampling and hummocking evident in riparian and springs, mostly decadent willow but with recent regeneration **Sensitive Plants –** *Carex alopecoidea* and habitat being impacted by livestock **Sensitive Plants –** *Carex alopecoidea* and habitat being impacted by livestock	**Baldy pasture (NW ¼ Sec. 33)** – Meeting **Red Lake pasture (NE ¼ Sec. 35)** – Meeting **Baldy Lake** – Moving toward **Ladyfinger Gulch** – Not meeting **Pettigrew Gulch** – Not meeting
Upper Elk	**Grassland –** 99% perennial grasses, trace forbs, trace shrub, <1% noxious weeds, <3% bare ground **Grassland –** 27% perennial grasses, 14% grass-like sedges, 26% forbs, 32% shrub/tree, <1% noxious weeds, <1% bare ground **Sensitive Plants –** Livestock are impacting SOLC occurrences and suitable habitat	**SW ¼ Sec. 29** – Meeting but lacks diversity **SE ¼ Sec. 32 –** Meeting **Englewood Springs Botanical Area –** May not be meeting; insufficient information

* - Note: % for vegetation is based on species composition as estimated using cover-frequency index (CFI), % bare ground is based on ground cover and does not include rock, wood, or vegetation. Totals may exceed 100%.

To summarize Table 3, based on monitoring at the benchmarks in the project area, 42% currently meet the desired conditions, 29% are moving toward meeting the desired conditions and 29% are not meeting or moving toward the desired conditions in a satisfactory timeframe. Therefore, 71% of the benchmark areas in the project area are meeting or moving toward the desired conditions for the ecosystem types represented in those benchmark areas relative to factors associated with livestock management. The remaining areas are in need of changes in management to meet or move toward desired conditions.

Proposed Action

This is the action proposed in the scoping letter dated October 23, 2007. The Black Hills National Forest proposes to reauthorize grazing by domestic livestock on the following allotments: the Pettigrew, Griffith, Upper Elk and East Rapid allotments administered by the Northern Hills Ranger District and the Stearns Park, Grand Canyon, Willow Springs, Silver Creek, Black Haw and Huett Springs allotments administered by the Bearlodge 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 9,259 AUMs would be authorized on a total of 92,664 acres. Maximum allowable forage utilization would range from 40-50% depending on the vegetation type and the current range conditions. One allotment could be grazed up to 70% utilization to reduce cheat grass infestation. Three miles of fence would be built to split two pastures. One-half mile of fence would be relocated. About 4.5 miles of pipeline, six stock tanks, and one storage tank would be added to improve livestock distribution. One stock tank would be removed or relocated. Thirty-eight springs, ponds, or riparian areas would be protected with fences. Fences would be built over the 10-year permit period based on priority and as funds become available. A map of each allotment is included in Appendix A.

The proposal includes an adaptive management approach to livestock management that is 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 effect improvement in resource conditions (see Table 5).

Decision Framework

Based upon the effects of the alternatives, the District Rangers will decide whether or not to continue to authorize livestock grazing on none, all, or portions of the ten allotments; and if so, what adaptive management actions and monitoring will be included, so as to meet or move toward meeting Forest Plan objectives.

Management on each allotment is implemented through an allotment-specific Allotment Management Plan (AMP) based on the alternative selected in the NEPA Decision. The AMP 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 analysis area are being operated under AMPs developed 10 to 15 years ago and are being proposed for revision.

This environmental assessment is not a decision document. This EA discloses the environmental consequences of implementing the proposed action and alternatives to that action. The Forest Service decision will be stated and explained in one or more separate Decision Notices (DNs).

This EA focuses on these National Forest System lands administered by the Northern Hills and Bearlodge Ranger Districts. It does not evaluate livestock grazing activities on other allotments,

other Ranger Districts, or other National Forests. This EA does evaluate cumulative actions associated with livestock grazing effects on both the National Forest System lands, and to the degree feasible, the adjacent or associated private lands.

Public Involvement

The proposal was listed in the Schedule of Proposed Actions on October 1, 2007. A scoping letter was sent to interested parties on October 23, 2007. The letter asked that comments on the proposed action be received by December 3, 2007. Approximately eighteen comments on the proposed action were received. Using the comments from the public and other agencies, the interdisciplinary team developed a list of issues to address.

(A Notice of Intent (NOI) to prepare an Environmental Impact Statement (EIS), for this North Zone Range 08 Project was published in the Federal Register on November 5, 2007 and subsequently withdrawn on March 21, 2008**.)**

On July 18, 2008 the Forest sent out the revised North Zone Range 08 Proposed Action and Additional Information for a 30-day review and comment period in accordance with 36 CFR 215.5 (iv). A total of 14 responses were received during the comment period. A complete list of the comments received and the Forest's responses to those comments are included in Appendix D of the EA.

Issues

The Forest Service separated the scoping issues into two groups: significant and non-significant issues. Significant issues were defined as those directly or indirectly caused by implementing the proposed action. Non-significant issues were identified as those: 1) outside the scope of the proposed action; 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 on 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)…" A list of non-significant issues and reasons regarding their categorization as non-significant may be found in the project record.

As for significant issues, the Forest Service identified 4 topics raised during scoping. These issues include:

Issue #1 - Vegetative Diversity: Some commentors felt that grazing was currently having adverse impacts to Botanical Areas and/or populations of sensitive plant species, hardwoods, willows, and wetland ecosystems by direct consumption or through trampling. Others were concerned that eliminating grazing could adversely impact certain sensitive plant populations by allowing competition from grasses. Some undesirable annual grass species (cheatgrass) are present. Changes to the Proposed Action were suggested including fencing, no grazing, or creating buffers to reduce or eliminate adverse impacts from grazing. This issue will be used to develop design criteria for all allotments, allotment-specific design criteria, and adaptive management actions. Effects to vegetative diversity are analyzed in the EA.

Measures: Risk to known sensitive or SOLC plant populations, risk to values of Englewood Springs Botanical Area, effects to riparian shrubs, reductions in cheatgrass, and plant composition meeting or moving toward the desired conditions.

Issue #2 - Soil and Water Quality: Some commentors felt that livestock grazing under the Proposed Action grazing would have adverse impacts to soil and water conditions. They were concerned that livestock grazing would result in water quality impairments such as bacterial loads, sedimentation, turbidity, loss of streambed structure, loss of streambank vegetation, widening of channels, temperature increases, trampled vegetation and soils, flow alterations, and degradation of riparian dependent species. Changes to the Proposed Action were suggested to reduce or eliminate adverse impacts including fencing, water developments, herding, and/or changes in grazing systems/seasons. This issue will be used to develop design criteria for all allotments, allotment-specific design criteria, and adaptive management actions. Effects to soils and water quality are analyzed in the EA.

Measures: Compliance with State water quality standards, trend in bank alteration and stability, trend in bare ground, number of springs protected.

Issue #3 - Wildlife and Wildlife Habitat: Some commentors were concerned that livestock grazing under the Proposed Action would have adverse impacts to various management indicator species and TES species. Specifically, there were concerns regarding direct impacts to sensitive snail populations through trampling; indirect impacts to big game through competition for forage; indirect impacts to small mammals and birds through reduction of grassland and riparian vegetative structure; and indirect impacts to northern leopard frogs from sedimentation and reduced water quality. Others were concerned that proposed range improvements (fences) would have direct and indirect impacts on big game animals, and spring developments could adversely impact snail species and frogs by drying up wetlands. Changes to the Purposed Action were suggested to reduce or eliminate adverse impacts from livestock grazing or range improvements. This issue will be used to develop design criteria for all allotments, allotment-specific design criteria, and adaptive management actions. Effects to wildlife and wildlife habitat are analyzed in the EA.

Measures: Effects to vegetative structure in grasslands and riparian areas, miles of fence to be constructed, and number of springs to be protected.

Issue #4 - Range Improvements: Several commentors disagreed with the use of range improvements as described in the Proposed Action. Some commentors felt that the proposed range fences would interfere with wildlife movements while others felt that the local elk population would render fences ineffective. One individual thought that the proposals for fencing in Ladyfinger Gulch would not be effective in protecting *Carex sp*. Others were concerned that funding was not available to construct or maintain the improvements. Suggestions were made to make the proposals more effective while others disagreed with the use of any range improvements. Some commentors requested a timeline for implementation of proposed improvements. This issue will be used to develop design criteria for all allotments, allotment-specific design criteria, and adaptive management actions. Effects from range improvements, as well as effectiveness and costs of range improvements are analyzed in the EA.

Measures: Miles of fence/pipeline to be constructed, number of springs to be protected, costs of range improvements, and effectiveness of range improvements.

ALTERNATIVES, INCLUDING THE PROPOSED ACTION

This chapter describes and compares the alternatives considered for the North Zone Range 08 project. It describes alternatives considered in detail as well as those eliminated from detailed evaluation. The end of this chapter presents the alternatives in tabular format so that the alternatives and a summary of their environmental impacts can be readily compared.

Alternatives Considered in Detail

Alternative A

Proposed Action

This is the action proposed in the scoping letter dated October 23, 2007. The Forest Service proposes to continue to authorize livestock grazing with some modifications on ten allotments on the Bearlodge (Black Haw, Huett Springs, Grand Canyon, Stearns Park, Willow Springs, and Silver Creek Allotments) and Northern Hills Ranger Districts (Pettigrew, Griffith, Upper Elk and East Rapid Allotments). 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 9,259 AUMs would be authorized on a total of 92,664 acres. Maximum allowable forage utilization would range from 40-50% depending on the vegetation type and the current range conditions. One allotment could be grazed up to 70% utilization to reduce cheat grass infestation. Three miles of fence would be built to split two pastures. Four and one-half miles of pipeline, 6 stock tanks and 1 storage tank would be added to improve livestock distribution. One-half mile of fence would be relocated. One stock tank would be removed or relocated. Thirty-eight springs, ponds, or riparian areas would be protected with fences. Fences would be built over the 10-year permit period based on priority and as funds become available. Maps of each allotment are provided in Appendix A.

Monitoring will occur over time with evaluation of the results being used by the IDT and the District Rangers to determine what adjustments are needed to ensure adequate progress toward desired conditions. A monitoring plan for each allotment is included (See Appendix B). All adaptive actions will be within the scope of effects described in this document, or a supplemental NEPA document and decision will be prepared as appropriate.

Design Criteria for All Allotments

Based on the issues identified through public comment on the proposed action, the Forest Service developed the following design criteria for all allotments under Alternative A.

- Acceptable type of livestock to be grazed is cattle. Acceptable classes of livestock are mature (cow with/without calf) and yearling.
- Allowable utilization will range from 0-50% based on Forest Plan guideline 2505 (except for the Huett Springs allotment).

- Use salting to influence livestock distribution patterns. Do not salt within ¼ mile of water sources, eligible heritage sites, or developed recreation sites.
- Maintain existing range improvements as assigned in the term grazing permits.
- 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. (FP standard 2505, 2506, and 2507)
- Roads providing access to rangeland improvements will be evaluated and maintained as needed on a case-by-case basis.
- Locate new livestock/wildlife water sites out of hardwood communities when feasible. (FP standard 2207)
- Implement the following Region 2 Watershed Conservation Practices (USDA Forest Service 2006) as they pertain to livestock grazing:

o 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 1, Design Criteria(a)) (FP standard 1116)

o 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 2, Design Criteria (a)) (FP standard 1112)

o Allow no action that will cause long-term change to a lower stream health class in any stream reach. In degraded systems (i.e. At-risk or diminished stream health class), progress toward robust stream health within the next plan period. (Management Measure 3, Design Criteria (a)) (FP standard 1301)

o 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. (Management Measure 3, Design Criteria (b)) (FP standard 1301)

o 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 not meeting or moving towards desired condition objectives where monitoring information shows continued livestock grazing would prevent attainment of those objectives. (Management Measure 3, Design Criteria (f)) (FP standard 1301)

- 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 feasible. (Management Measure 3, Design Criteria (g)) (FP standard 1301)
- 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. (Management Measure 3, Design Criteria (h)) (FP standard 2505 and 2507)
- 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. Apply principles of the Grazing Response Index to livestock management (USFS, 1996a). (Management Measure 3, Design Criteria (i)) (FP guideline 2502)
- 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. (Management Measure 3, Design Criteria (j)) (FP standard 2505)
- Maintain the extent of stable banks in each stream reach 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. (Management Measure 3, Design Criteria (k)) (FP standard 1301)
- Adjust management in riparian areas and wetlands to improve detrimental soil compaction whenever it occurs. (Management Measure 3, Design Criteria (l)) (FP standard 1103)
- Avoid any loss of rare wetlands such as fens and springs. (Management Measure 6, Design Criteria (e)) (FP standard 1302)

- Ground disturbing activities such as installation of water developments, pipelines, fences or exclosure will require both heritage resource and sensitive species surveys approval by a Forest Service archeologist, botanist, and wildlife biologist prior to construction.
- Tribes will be notified if culturally significant artifacts or burial sites are found during project implementation. (FP standard 1702)

- When long-term drought situations occur, range permittees will be notified in writing that reductions in season or livestock numbers may be anticipated.
- Grazing in post-wildfire situations will be evaluated by an IDT based on burn severity, vegetative regrowth, and management objectives. (FP standard 1103)
- Defer prescribed burn areas from livestock grazing for a portion or all of the following growing season to ensure regrowth of forage species. (FP guideline 4107)
- Do not construct or maintain range improvements located within ½ mile of active goshawk nests from April 1 through August 15 or until the nest has failed or fledglings have dispersed. (FP Standard 3111)
- Locate and design structural range improvements in MA 4.1 to meet Scenic Integrity Objectives. (FP Guideline 4.1-2502)
- Restrict access of domestic livestock to protect R2 sensitive and species of local concern occurrences in designated Botanical Areas. (FP Standard 3.1-2503)

Using the list of possible adaptive grazing management actions displayed in Table 4, the IDT developed a specific proposed action and alternatives to the proposed action for each allotment.

Table 4. List of possible grazing management actions used to develop the Proposed Action (Alternative A) for the North Zone Range 08 allotments

Possible Grazing Management Actions
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)
Use water to control livestock distribution (turn water on or off at existing spring developments).
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)
Construct new permanent water development to influence livestock distribution (dugouts/ponds, wells, pipeline, tanks, pump, solar)
Remove existing water development to influence livestock distribution
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)
Implement specific dates of use or nonuse to protect areas of concern
Construct permanent fence to influence livestock distribution

Possible Grazing Management Actions
Use temporary electric fence for short-term control of livestock distribution
Remove (permanent or temporary) fence to influence livestock distribution
Use of range rider (herding) to control livestock movement (distribution)
Change class of animal (i.e. cow/calf to yearling) – do not exceed permitted AUMs (stocking rate)
Rest from livestock grazing for one or more seasons.
Change the permitted livestock number and season until demonstrated progress towards desired future condition is made (as evidenced by monitoring and inventory data)
Do not allow livestock grazing
Brush and clean cattle trails to improve livestock access and distribution
Rehabilitate areas with specific undesirable plants or noxious weeds back to native species (grass, shrub and forb species)
Restore or enhance hardwood regeneration by planting native hardwoods and/or shrubs
Split or combine allotments
Change allotment or pasture boundaries
Utilize forage reserve allotments or pastures
Construct brush barriers to protect sensitive resource area

The 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 2-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. In some cases certain management actions were precluded from use due to other management concerns. Table 5 shows the grazing allotment, project-specific design criteria, and the adaptive options to be applied as a means of meeting the need for action and moving toward the desired condition.

Table 5. Allotment-specific descriptions of existing condition, desired condition, need for action, proposed action and adaptive options for the North Zone Range 08 allotments.

Benchmark or Area of Concern	Desired Condition (See Table 4)	Existing Condition	Need for Action	Proposed Action	Adaptive Management Options
Black Haw Allotment					
Black Haw Gulch	**Manage for Riparian Communities** – Maintain diverse riparian plant community, achieve and maintain at least 74% stable stream banks.	High percent bare ground, high level of trampling, limited extent of riparian vegetation. Stock tank located in riparian area.	Reduce bare ground, reduce trampling in riparian, increase extent of riparian vegetation.	Maintain single pasture, season-long grazing system Remove or relocate existing stock tank and fence riparian area. Max. AUMs "On" = 379 under 10-yr. On/Off term permit Max. 40% utilization, 40% on riparian shrubs. Proposed "On" date: 6/10 Proposed "Off" date: 10/15	Adjust grazing season between 6/1 and 10/30 not to exceed 38 AUMs OR: Shorten season of use between 6/1 and 10/30 not to exceed 38 AUMs OR: Fence riparian area OR: Reduce AUMs

Benchmark or Area of Concern	Desired Condition (See Table 4)	Existing Condition	Need for Action	Proposed Action	Adaptive Management Options
Grand Canyon Allotment					
Smith Draw Benchmark	**Manage for Upland Grasslands** – Provide for diversity of desirable plant species, <5% bare ground, < 2% noxious weeds	58% graminoids 40% forbs 1% noxious weeds 3% bare ground	Maintain existing condition	Implement 3-pasture deferred rotation grazing system Max. AUMs = 1,860 under 10-yr. term and private grazing permits Max. 50% utilization Proposed "On" date: 6/11 Proposed "Off" date: 9/30	If monitoring shows unacceptable impacts, any appropriate adaptive management option listed in Table 4 may be used OR: Adjust grazing season between 6/1 and 10/30 not to exceed 1,882 AUMs OR: Reduce AUMs
Rifle Pit Benchmark	**Manage for Upland Grasslands** – Provide for diversity of desirable plant species, <5% bare ground, < 2% noxious weeds	45% graminoids 52% forbs 3% shrubs 1% noxious weeds	Maintain existing condition	See above	See above

Benchmark or Area of Concern	Desired Condition (See Table 4)	Existing Condition	Need for Action	Proposed Action	Adaptive Management Options
South Spring and other springs	**Manage for Riparian Communities** – Maintain diverse riparian plant community, achieve and maintain <5% bare ground, <40% of current years willow leaders browsed.	Trampling and hummocking in riparian area, willows are browsed, the majority decadent with no regeneration	Reduce trampling and hummocking in riparian areas, decrease browsing on willows and allow regeneration, improve overall habitat quality of riparian areas	Exclude livestock from spring sources and associated riparian habitat at the following springs: South, Silver, Bear, West Ike, Twin, Dugout, Big Mud, Billie, Crowley, Paige, U. Williams, Smith, Meadow, Gooseberry, and Smith Draw seeps. High priority springs (Twin, Dugout) will be fenced first. Reconstruct existing spring developments No new spring developments allowed at this time.	Further protection for springs and associated riparian areas will be evaluated based on monitoring. Any appropriate adaptive management option listed in Table 4 may be used Additional protection will be designed by an ID team and the permittee Future proposals for spring developments will be evaluated by an IDT prior to approval. Any future spring developments will be approved under a separate NEPA document.

Benchmark or Area of Concern	Desired Condition (See Table 4)	Existing Condition	Need for Action	Proposed Action	Adaptive Management Options
Huett Springs Allotment					
Lake Divide Benchmark	**Manage for Upland Grasslands** – Provide for diversity of desirable plant species, 15-25% bare ground, < 2% noxious weeds	30-40% cheatgrass 6-8% bare ground	Reduce cheat grass, increase perennial grasses	Continue 3-4 pasture deferred rotation grazing system Max. AUMs = 735 under 10-yr. On/Off grazing permit Allow 60% utilization on cheatgrass while protecting riparian areas and maintaining adequate ground cover 50% utilization on native grasses and riparian areas Proposed "On" date: 5/10 Proposed "Off" date: 9/30	If the frequency of desirable species is not increased in 5 yrs, allow livestock to begin grazing as early as April 15. OR Allow 70% utilization on cheatgrass while protecting riparian areas and maintaining adequate ground cover OR Allow up to 70% utilization on cheatgrass from 9/15 to 10/31 during years cheatgrass is actively growing OR Use herbicide to reduce cheatgrass, and plant native species

Benchmark or Area of Concern	Desired Condition (See Table 4)	Existing Condition	Need for Action	Proposed Action	Adaptive Management Options
					OR Reduce AUMs once cheatgrass is no longer palatable OR Reduce allowable utilization on native grasses
Kudlock	**Manage for Upland Grasslands** – Provide for diversity of desirable plant species, 15-25% bare ground, < 2% noxious weeds	30-40% cheatgrass 6-8% bare ground	Reduce cheatgrass, increase perennial grasses	Same as above	Same as above
Silver Creek Allotment					
Meadow above Boardinghouse Spring	**Manage for Upland Grasslands** – Provide for diversity of desirable plant species, <5% bare ground, < 2% noxious weeds	Bluegrass dominated but good species diversity 53% graminoids 22% forbs 25% shrubs 2% bare ground 0% noxious weeds	Maintain existing condition	Continue 2-pasture deferred rotation grazing system in both the Vore and Smith units; single-pasture season-long grazing in the Meisner unit; single-pasture deferred rotation grazing in the Moskee unit	Adjust grazing season between 6/1 and 10/30 not to exceed 288 AUMs in the Vore Unit, 443 AUMs in the Smith Unit, 92 AUMs in the Meisner Unit and 150 AUMs in the Moskee Unit

Benchmark or Area of Concern	Desired Condition (See Table 4)	Existing Condition	Need for Action	Proposed Action	Adaptive Management Options
				Max. AUMs = 973 under term, private, and On/Off grazing permits 50% utilization in Vore and Smith units; 45% utilization in Meisner and Moskee units Proposed "On" date: 6/11 Proposed "Off" date: 10/15 for Smith and Moskee units; 10/25 for Vore unit; 10/30 for Meisner unit	OR: Shorten season of use between 6/1 and 10/30 not to exceed 288 AUMs in the Vore Unit, 443 AUMs in the Smith Unit, 92 AUMs in the Meisner Unit and 150 AUMs in the Moskee Unit OR: Reduce AUMs
Pete Spring	**Manage for Riparian Communities –** Maintain diverse riparian plant community, achieve and maintain at least 74% stable stream banks.	Some trampling and hummocking is occurring, willows are regenerating	Continue to protect spring source and riparian vegetation	Exclude livestock from spring source and riparian habitat	Further protection for springs and associated riparian areas will be evaluated based on monitoring. Any appropriate adaptive management option listed in Table 4 may be used

Benchmark or Area of Concern	Desired Condition (See Table 4)	Existing Condition	Need for Action	Proposed Action	Adaptive Management Options
					Additional protection will be designed by an ID team and the permittee.
Stearns Park/Willows Springs Allotments					
Buffalo Park Benchmark	**Manage for Upland Grasslands** – Provide for diversity of desirable plant species, <5% bare ground, < 2% noxious weeds	45% perennial grasses 25% grass-like sedges 28% forbs 2% shrubs 0% noxious weeds, 6% bare ground	Maintain existing condition	Continue 8-pasture deferred rotation grazing system Use temporary or permanent fence to split the East pasture Extend the existing Rattlesnake, Miller Spring and Wagon Canyon Pipelines and add stock tanks to improve livestock distribution. Max. AUMs = 2,613	If monitoring shows unacceptable impacts, any appropriate adaptive management option listed in Table 4 may be used OR: Adjust grazing season between 6/1 and 10/30 not to exceed 2,768 AUMs OR:

Benchmark or Area of Concern	Desired Condition (See Table 4)	Existing Condition	Need for Action	Proposed Action	Adaptive Management Options
				under 10-yr. term and private grazing permits Allow 50% utilization Proposed "On" date: 6/1 Proposed "Off" date: 10/30	Reduce AUMs
Sec. 16 Benchmark	**Manage for Upland Grasslands –** Provide for diversity of desirable plant species, <5% bare ground, < 2% noxious weeds	58% perennial grasses 1% grass-like sedges 39% forbs 2% noxious weeds 8% bare ground	Reduce bare ground	See above	See above
Calvert/Sackett Benchmark	**Manage for Upland Grasslands –** Provide for diversity of desirable plant species, <5% bare ground, < 2% noxious weeds	31% perennial grasses 10% grass-like sedges 29% forbs 9% shrubs 2% bare ground 10% noxious weeds	Reduce noxious weeds, improve species diversity	Change from season-long grazing to include in the 8-pasture deferred rotation grazing system	See above

Benchmark or Area of Concern	Desired Condition (See Table 4)	Existing Condition	Need for Action	Proposed Action	Adaptive Management Options
Katan Spring Benchmark	**Manage for Upland Grasslands –** Provide for diversity of desirable plant species, <5% bare ground, < 2% noxious weeds	55% perennial grasses 17% grass-like sedges 17% forbs 6% shrubs 5% noxious weeds 0% bare ground	Maintain existing condition (Note: recent noxious weeds are due to timber management activity and are currently being treated)	See above	See above
Guidinger Benchmark	**Manage for Upland Grasslands –** Provide for diversity of desirable plant species, <5% bare ground, < 2% noxious weeds	47% perennial grasses 10% grass-like sedges 42% forbs 1% noxious weeds 10% bare ground	Continue downward trend in bare ground	See above	See above
Guidinger Creek	**Manage for Riparian Communities –** Maintain diverse riparian plant community, achieve and maintain at least 74% stable stream banks.	Some trampling and stream bank alteration occurring, older willows are decadent but willows and aspen are regenerating	Continue improvement in willow condition and age class distribution. Reduce stream bank alteration	Limit livestock use at Guidinger Spring until banks are stable and revegetated Once banks are stable/revegetated, determine if livestock grazing is appropriate here	Modify timing and duration of grazing OR: Reduce AUMs OR: Install permanent or temporary fence.

Benchmark or Area of Concern	Desired Condition (See Table 4)	Existing Condition	Need for Action	Proposed Action	Adaptive Management Options
Simmons Spring	**Manage for Riparian Communities –** Maintain diverse riparian plant community, achieve and maintain <5% bare ground.	Some trampling and hummocking are still occurring, but willows are regenerating	Continue to protect spring source and riparian vegetation	Reconstruct existing fence at Simmons Spr.	Further protection for springs and associated riparian areas will be evaluated based on monitoring. Any appropriate adaptive management option listed in Table 4 may be used Additional protection will be designed by an ID team and the permittee.
Three Willow Spring and other springs	**Manage for Riparian Communities –** Maintain diverse riparian plant community, achieve and maintain <5% bare ground.	Trampling evident in spring and wetland, willows are decadent with no regeneration	Reduce livestock impacts to spring source and wetland community, regenerate willows	Exclude livestock from spring sources and associated riparian habitat at the following springs: Three Willow, WY Stateline, Hillside, Andy, No Name, Sandpit, SD stateline, Wagon Canyon, Corwood, Lost, Two-way, Julius, and East Riflepit	If utilization in area along FSR 105 exceeds standards, exclude livestock through fencing or other means Further protection for springs and associated riparian areas will be evaluated based on monitoring. Any appropriate adaptive management option listed in Table 4 may be used

Benchmark or Area of Concern	Desired Condition (See Table 4)	Existing Condition	Need for Action	Proposed Action	Adaptive Management Options
				Reconstruct existing fences at Balm of Gilead Spring, and Anderson Spr. Reconstruct and expand fence at Deer Spr. No new spring developments allowed at this time Monitor riparian area along FSR 105.	Additional protection will be designed by an ID team and the permittee Future proposals for spring developments will be evaluated by an IDT prior to approval. Any future spring developments will be approved under a separate NEPA document.
East Rapid Allotment					
Gimlet Meadow Benchmark	**Manage for Upland Grasslands** – Provide for diversity of desirable plant species, <5% bare ground, < 2% weeds	95% perennial grasses 5% forbs <1% bare ground No noxious weeds	Maintain existing condition	Continue 2-pasture deferred grazing system Max. AUMs = 455 under 10-yr. term grazing permit Allow 50% utilization Proposed "On" date: 6/1 Proposed "Off" date: 10/15	If monitoring shows unacceptable impacts, any appropriate adaptive management option listed in Table 4 may be used

Benchmark or Area of Concern	Desired Condition (See Table 4)	Existing Condition	Need for Action	Proposed Action	Adaptive Management Options
Gimlet Creek	**Manage for Riparian Communities –** Maintain diverse riparian plant community, achieve and maintain at least 74% stable stream banks.	Less than 74% stable stream banks, extent of deep-rooted riparian vegetation less than desired	Reduce stream bank alteration, reduce livestock impacts on riparian vegetation	Exclude livestock from Gimlet Creek downstream of the pond through use of temporary fencing until banks are at least 74% stable	Remove temporary fence when desired conditions are met OR Construct permanent fence OR Change grazing system
Keloran Spring	**Manage for Riparian Communities –** Maintain diverse riparian plant community, achieve and maintain <5% bare ground.	The spring source was trampled and riparian species were heavily utilized	Reduce trampling, reduce utilization on riparian species	Exclude livestock from Keloran Spring and riparian area. Reconstruct existing spring and stock tank	Further protection for springs and associated riparian areas will be evaluated based on monitoring. Any appropriate adaptive management option listed in Table 4 may be used Additional protection will be designed by an ID team and the permittee

Benchmark or Area of Concern	Desired Condition (See Table 4)	Existing Condition	Need for Action	Proposed Action	Adaptive Management Options
Griffith Allotment					
Moses Pasture Benchmark	**Manage for Upland Grasslands** – Provide for diversity of desirable plant species, <5% bare ground, < 2% weeds	45% perennial grasses 2% grass-like sedges 53% forbs < 5% bare ground No noxious weeds	Maintain existing condition	Continue 5-pasture deferred rotation grazing system Max. AUMs = 729 under 10-yr. term and private grazing permits Allow 50% utilization Proposed "On" date: 6/16 Proposed "Off" date: 10/15	If monitoring shows unacceptable impacts, any appropriate adaptive management option listed in Table 4 may be used
Arnold Pasture Benchmark	**Manage for Upland Grasslands** – Provide for diversity of desirable plant species, <5% bare ground, < 2% weeds	43% perennial grasses 57% forbs < 1% bare ground No noxious weeds	Continue upward trend by increasing native species	See above	If monitoring shows unacceptable impacts, any appropriate adaptive management option listed in Table 4 may be used

Benchmark or Area of Concern	Desired Condition (See Table 4)	Existing Condition	Need for Action	Proposed Action	Adaptive Management Options
Lander Spring	**Manage for Riparian Communities –** Maintain diverse riparian plant community, achieve and maintain <5% bare ground.	Trampling in spring source, unacceptable level of ground disturbance	Reduce bare ground and soil compaction	Extend Lander Spring exclosure downstream to the meadow	If bare ground exceeds 5%, fence wet areas of meadow OR Develop spring and pipe water to earthern tank
Clayton Draw	**Manage for Riparian Communities –** Maintain diverse riparian plant community, achieve and maintain at least 74% stable stream banks.	Lack of willow regeneration	Reduce livestock impacts on willows	Extend Clayton Draw riparian exclosure fence	Further protection for riparian areas will be evaluated based on monitoring. Any appropriate adaptive management option listed in Table 4 may be used Additional protection will be designed by an ID team and the permittee.
Pettigrew Allotment					
Baldy Pasture Benchmark **(NW ¼ Sec. 23)**	**Manage for Upland Grasslands –** Provide for diversity of desirable plant species, <5% bare ground, < 2% weeds	44% perennial grasses 11% grass-like sedges 32% forbs 12% shrubs < 3% bare ground	Maintain existing condition	Continue 2-pasture deferred rotation grazing system Max. AUMs = 1,034 under 10-yr. term grazing permit	If monitoring shows unacceptable impacts, any appropriate adaptive management option listed in Table 4 may be used

Benchmark or Area of Concern	Desired Condition (See Table 4)	Existing Condition	Need for Action	Proposed Action	Adaptive Management Options
		No noxious weeds		Allow 50% utilization Proposed "On" date: 6/16 Proposed "Off" date: 9/30	
Red Lake Pasture Benchmark **(NE ¼ Sec. 33)**	**Manage for Upland Grasslands –** Provide for diversity of desirable plant species, <5% bare ground, < 2% weeds	58% perennial grasses 40% forbs 2% aspen < 3% bare ground No noxious weeds	Maintain existing condition	See above	See above
Baldy Lake	**Manage for Riparian Communities –** Maintain diverse riparian plant community, achieve and maintain at least 74% stable stream banks.	Trampling and hummocking evident in riparian area and springs above Baldy Lake, mostly decadent willow but some recent willow regeneration	Reduce trampling and hummocking, reduce livestock impacts to willows	Exclude livestock from riparian area above Baldy Lake	Further protection for riparian areas will be evaluated based on monitoring. Any appropriate adaptive management option listed in Table 4 may be used Additional protection will be designed by an ID team and the permittee.

Benchmark or Area of Concern	Desired Condition (See Table 4)	Existing Condition	Need for Action	Proposed Action	Adaptive Management Options
Prospect and Pettigrew Springs	**Manage for Riparian Communities –** Maintain diverse riparian plant community, achieve and maintain 74% stable stream banks.	Trampling and hummocking evident in riparian area and springs, tank at Pettigrew spring #3 is located in riparian area. Heavy browsing occurring on willows at Ladyfinger Seep and Prospect Spring. Streambank at and below Prospect Spring <74% stable	Reduce trampling and hummocking in riparian areas Decrease browsing on willows at Ladyfinger Seep and Prospect Spring. Increase streambank stability at and below Prospect Spring.	Exclude livestock from Pettigrew Spring #1. Extend exclosure at Pettigrew Spring #3 to better protect spring source and surrounding wetland habitat	Move stock tank at Pettigrew Spr. #3, if livestock use is moving away from desired conditions If livestock use exceeds 5% bare ground at Prospect Spring and Ladyfinger Seep, or if streambank alteration exceeds 26%, then exclude livestock from spring and riparian area
Ladyfinger Gulch	**Manage for Riparian Communities –** Maintain diverse riparian plant community, achieve and maintain 74% stable stream banks.	Excessive trampling and stream bank alteration is occurring due to livestock use	Reduce trampling and stream bank alteration	Annually monitor area and remove livestock from the affected area if trigger points have been reached.	Limit livestock use through felling of some spruce trees to limit livestock access to localized areas OR Limit livestock use of riparian areas through fencing OR Reconstruct water source at Ladyfinger Seep

Benchmark or Area of Concern	Desired Condition (See Table 4)	Existing Condition	Need for Action	Proposed Action	Adaptive Management Options
					OR Eliminate livestock grazing from entire area by connecting existing fences
Ladyfinger Gulch	**Manage for R2 sensitive and SOLC plant species –** Livestock will be restricted from all or a portion of *Carex alopecoidea* (foxtail sedge) site CAAL8-19	*Carex alopecoidea* and habitat being impacted by livestock	Protect sensitive plant population and habitat	Maintain existing exclosure, annually monitor area, implement adaptive management if unacceptable trailing, trampling, or grazing occurs to plants or habitat.	Limit livestock use through felling of some spruce trees to limit livestock access to *Carex alopecoidea* OR Further limit livestock use of *C. alopecoidea* by extending exclosure OR Eliminate livestock grazing from entire area by connecting existing fences.
Pettigrew Gulch	**Manage for R2 sensitive and SOLC plant species –** Livestock will be restricted from all or a portion of *Carex alopecoidea* Site	*Carex alopecoidea* and habitat being impacted by livestock	Protect sensitive plant population and habitat	Construct and maintain riparian exclosure designed in 2007 to protect *Carex alopecoidea*	If livestock use results in unacceptable impacts to *C. alopecoidea* site outside the exclosure, then extend exclosure

Benchmark or Area of Concern	Desired Condition (See Table 4)	Existing Condition	Need for Action	Proposed Action	Adaptive Management Options
	CAAL8-20				If lack of grazing reduces amount of *C. alopecoidea* revisit the need for an exclosure
Upper Elk Allotment					
Benchmark in SW ¼ Sec. 29	**Manage for Upland Grasslands** – Provide for diversity of desirable plant species, <5% bare ground, < 2% weeds	99% perennial grasses Trace - forbs Trace – shrubs <3% bare ground No noxious weeds	Continue upward trend by increasing native species	Continue season long grazing system Max. AUMs = 481 under term and private grazing permits Allow 45% utilization Proposed "On" date: 6/7 Proposed "Off" date: 9/1 for 260 AUMs 9/30 for other 221 AUMs	Implement a deferred rotation grazing system. If monitoring shows unacceptable impacts, any appropriate adaptive management option listed in Table 4 may be used
Benchmark in SE ¼ Sec. 32	**Manage for Upland Grasslands** – Provide for diversity of desirable plant species, <5% bare ground, < 2%	27% perennial grasses 14% grass-like sedges 26% forbs 32% shrub/tree	Maintain existing condition	See above	See above

Benchmark or Area of Concern	Desired Condition (See Table 4)	Existing Condition	Need for Action	Proposed Action	Adaptive Management Options
	weeds	< 1% bare ground <1% noxious weeds			
Upper Elk Spring #2	**Manage for Riparian Communities –** Maintain diverse riparian plant community, achieve and maintain 74% stable stream banks.	Livestock are causing unacceptable levels of trampling in area below the spring	Reduce trampling by livestock	Extend exclosure below spring	If City of Lead abandons spring, then the fence maintenance will be assigned to the permittee
Englewood Spring Botanical Area (MA 3.1)	**Manage for R2 sensitive and SOLC plant species –** Livestock use in Englewood Spring Botanical Area will be minimal, and livestock access to R2 sensitive and SOLC plant occurrences and suitable habitat will be restricted.	SOLC plant occurrences are being trampled by livestock	Eliminate impacts to SOLC plant occurrences	Monitor impacts to *Listera convallarioides* populations and suitable habitat per monitoring plan in Appendix B.	If use exceeds monitoring trigger point, then remove livestock from allotment. OR Construct alternate water source outside Botanical Area OR Fence the *Listera convallarioides* populations and habitat west of FSR 228 OR Fence entire botanical area

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Alternative B

No Action

Under the No Action/No Grazing alternative, no livestock grazing would be permitted on any of the allotments. This alternative would require the cancellation of all grazing permits upon implementation of the decision and resolution of any appeals. Pursuant to Forest Service Handbook R2 ID 2209.13, Section 16.13, this alternative could not be implemented until one year after the notification of each affected permittee (36 CFR 222.4(a)(7)(8)).

According to direction given in the Forest Service Handbook (FSH) 2209.13, Chapter 90, section 94.1, R2 ID of 12/19/2005 "the "no grazing" alternative will always be fully developed and analyzed in detail." "No action" is synonymous with "no grazing" and means that livestock grazing would not be authorized within the project area. Improvements such as stock tanks, spring developments and other water features used by wildlife would not be removed. Other funding sources would be used to maintain the water improvements left in place. Other improvements such as fences, gates, and cattleguards not needed for management of allotments sharing common boundaries would eventually be removed as time and funding allows. This alternative provides an environmental baseline for evaluation of the action alternatives as well as providing a viable alternative in its own right.

Alternatives Not Considered in Detail

Federal agencies are required to rigorously explore and objectively evaluate all reasonable alternatives developed in detail (40 CFR 1502.14). Public comments received in response to the Proposed Action provided suggestions for alternative methods for achieving the purpose and need. Some of these alternatives may have been outside the scope of the need for the proposal, duplicative of the alternatives considered in detail, or determined to be components that would cause unnecessary environmental harm. Therefore, a number of alternatives were considered, but dismissed from detailed consideration for reasons summarized below:

Current Management – Current management is not meeting the purpose and need in areas of several allotments. Where current management is meeting the stated purpose and need, those management practices have been incorporated into the Proposed Action.

Grass banks – One commentor suggested that grazing not be reauthorized these allotments but instead be used for replacement forage (grass banks) for livestock from other allotments displaced by fire, drought, or other circumstances. Currently all of the allotments are allocated to permittees. Should any of the current permittees, give up their permit then this option could be considered at that time. At this time this alternative is not feasible.

Graze wild horses –One commentor suggested that these allotments be used to provide forage for wild horses instead of cattle. Currently all of the allotments are allocated to permittees. Grazing allotments are administered in cooperation with permittees based on the nature of their ranching operations. None of the current permittees have requested grazing wild horses; nor has the Forest received any requests from the Bureau of Land Management for grazing of wild horses on the Forest.

Culling herd prior to grazing – One commentor suggested that herds be culled prior to grazing on National Forest system lands to reduce the number of grazing animals and reduce grazing

impacts. This alternative is outside the scope of this analysis. The Forest Service does not have jurisdiction over how cattle are managed while on private lands.

Weaning calves earlier – One commentor suggested that calves be weaned earlier to reduce the number of grazing animals and reduce grazing impacts. This alternative is outside the scope of this analysis. Grazing permits are issued for a maximum number of animal months for any given type and class of livestock based on forage utilization. Removing livestock earlier is an option available to the Forest Service once proper utilization is achieved under the terms of the grazing permit. Weaning calves earlier is an option the permittees can choose at any time.

Leasing additional pasture – One commentor suggested that permittees lease additional pasture to reduce grazing impacts on these allotments. This alternative is outside the scope of this analysis. The Forest Service does not have jurisdiction over how cattle are managed while on private lands although permittees often do lease additional pasture

Using irrigated pastures with improved forage species – The same commentor suggested that the Forest Service consider grazing irrigated pastures with improved forage species. This alternative is not feasible; there are no irrigated pastures on these National Forest System lands. Irrigating and planting non-native species are not authorized practices under the Black Hills National Forest Plan.

Focus on grazing areas least grazed years before – This is included in the Proposed Action as part of any deferred rotation grazing system.

Make all on and off dates the same – One commentor suggested that the Forest Service should standardize the dates for turning livestock onto the allotments and for removing livestock from the allotments. This alternative is not considered appropriate range management. Actual "On" dates are determined by range readiness and actual "Off" dates are determined by percent utilization.

Prohibit livestock grazing in Botanical Areas (MA 3.1) – Another commentor suggested that livestock grazing be prohibited in Botanical Areas (MA 3.1). The Forest Plan allows livestock grazing in Botanical Areas as long as there is no conflict with the values for which the Botanical Area was designated. One small area in Englewood Springs Botanical Area has been identified as being impacted by livestock including impacts to a BHNF plant Species of Local Concern at this location. Alternative A includes monitoring for this site and adaptive management actions to reduce impacts from livestock in the future including fencing to exclude livestock grazing from a portion or all of the botanical area. Livestock grazing would be prohibited under Alternative B, the No Grazing alternative. Excluding livestock grazing from other Botanical Areas is outside the scope of this analysis.

Use buffers around Botanical Areas to eliminate cattle straying into the areas – This alternative is not considered necessary or feasible. Other adaptive management options are included in the Proposed Action to protect Botanical Areas.

Do not allow new water developments – The Proposed Action includes only one new spring development at Lander Spring and prohibits new spring developments in several allotments. Other spring developments included are repairs, pipeline extensions, and new stock tanks to help improve livestock distribution and reduce impacts. No new water developments would be allowed under Alternative B, the No Grazing alternative.

Require mandatory range riders – On commentor suggested that range riders be required on all allotments. The use of range riders was considered as an adaptive management option for all allotments. This adaptive option may be still be used on any allotment if monitoring indicates unacceptable impacts.

Uses deferred rotation grazing on all allotments – One commentor suggested that deferred rotation grazing systems be used on all allotments. It was not deemed feasible for some of the allotments. Deferred rotation grazing was considered as an adaptive management option for all allotments. This adaptive option may still be used on any allotment if monitoring indicates unacceptable impacts.

Discontinue grazing on any lands that would support more wildlife if cattle grazing were ceased – This proposal is included in Alternative B, the No Action/No Grazing alternative.

Do not allow grazing within 200 meters of northern leopard frog breeding ponds – Another commentor suggested that livestock grazing not be allowed within 200 meters of northern leopard frog breeding ponds. This alternative was not considered necessary or feasible, because the Proposed Action includes other adaptive management actions to protect northern leopard frogs.

Move grazing allotments so they don't overlap with hiking trails – This proposal is not necessary. The only hiking trail in these allotments is the Old Baldy trail system, which was established largely on historic cow trails because cow trails made for easy trail placement and construction. Postings are placed at the Old Baldy trail head informing recreationists that livestock may be in the area. No incidents of hiker conflicts have been reported. The Mickelson Trail is located within the East Rapid and Upper Elk Allotments. Forest Service personnel have been in contact with SD Parks and Recreation staff in regards to the Mickelson Trail.

Monitoring

Monitoring and evaluation are key elements of adaptive management. Monitoring helps determine how LRMP 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 documents over many years.

Two types of monitoring are associated with allotment management plans (AMPs): implementation monitoring and effectiveness monitoring. Implementation monitoring (short-term) will measure whether or not LRMP standards and guidelines are being met, while effectiveness monitoring (long-term) will evaluate how effective management actions are at moving toward or achieving the desired conditions.

Budgets, personnel and resource condition will determine the scope and degree of rangeland monitoring activities. A realistic implementation monitoring strategy will 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 LRMP standards and guidelines. Upland and riparian monitoring areas will be the focus of effectiveness monitoring which is primarily the responsibility of the Forest

Service personnel. However range permittees are always welcome to participate in effectiveness monitoring.

Rangeland Implementation (Short-term) Monitoring

Short-term range monitoring techniques will vary depending on the resources being monitored. Monitoring will take place annually at key areas of livestock use on each allotment. All agency monitoring methods can be used in monitoring efforts. The following monitoring techniques will generally be used alone or 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 grazing many 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 (U.S. 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, 3-4 inches of residual *Carex* spp. are required for spring pastures and 4-6 inches for summer and fall pastures (U.S. Forest Service 1996b).
- Stream Bank Alteration: Monitoring stream bank alteration consists of walking the green line of a riparian area and determining the percentage of stream bank altered by livestock during the current grazing season. The overriding concept behind this procedure is ensuring stream bank stability. The current WCP Handbook (2006) does not provide any guidance on acceptable levels of stream bank alteration. An acceptable level of alteration that will maintain or promote stream bank stability is dependent upon many factors such as, stream type, water quantity, and riparian composition and condition. The IDT chose 26% as the preliminary guideline for bank alteration. This trigger point has not been validated on the various stream types in the Black Hills, and may be adjusted over time to ensure that the long term desired condition of stream bank stability is achieved and maintained.
- 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. This technique will be used to monitor impacts to some R2 sensitive plant and BHNF plant SOLC occurrences.

Rangeland Effectiveness (Long-term) Monitoring

Probably 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 will be monitored at benchmark areas on each allotment. All agency monitoring methods can be used in monitoring efforts. The following monitoring techniques will 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 (U.S. 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 Section's 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 (U.S. Forest Service 1996b).
- Streambank Stability: Streambank 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 3-5 year intervals. This method includes disturbance from natural processes, such as floods, and human caused impacts, such as mining or recreation vehicle crossings, as well as from livestock.
- 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 provide data needed to refine and make annual changes to livestock management in order to meet long-term management objectives. (Burton, Cowley, and Smith 2007)
- Presence/absence: Presence or absence of R2 sensitive species is monitored at known sites to determine whether management actions are being effective in maintaining sensitive habitat and populations.

A specific monitoring plan for each allotment is included in Appendix B. Documentation of rangeland monitoring results will be maintained in the allotment files at the respective District Office.

Water Quality Monitoring

WCP effectiveness monitoring will be conducted in allotments where necessary. This will act as monitoring for water quality. If we are properly implementing WCPs then we should be maintaining water quality.

Currently, there is no indication that grazing has degraded beneficial uses in any of the project area watersheds. With this said, the Black Hills National Forest will use a method developed on the Medicine Bow National Forest-Thunder Basin National Grassland to monitor WCP effectiveness. If WCPs are being implemented properly then they are, in theory, not degrading water quality. If they are not being implemented properly, then water quality degradation is likely occurring and a management change is needed. The following is direction from the method developed by the MBNF-TBNG (the entire document can be found in the planning record),

> "On range projects where there are no riparian concerns, a reasonable argument can be made that bacterial water quality problems directly associated with livestock grazing would not be significant. Livestock are assumed to not spend enough time in the riparian areas to cause degradation, and therefore less fecal matter is deposited either into and directly adjacent to water bodies.
>
> Where degraded riparian conditions associated with grazing exist, there is a probability of higher fecal contamination due to increased residence time and/or livestock concentration, and therefore a higher probability of bacterial water quality problems associated with livestock grazing. Where wildlife may be contributing to riparian degradation, the effects of livestock must still be considered as part of the cumulative effects on bacterial water quality.
>
> The Clean Water Act recognizes WCPs as the primary mechanism to control nonpoint sources, as supported in EPA memo NPS: FY-87-49 dated August 19, 1987. FSH 2209.13-93.3 Clean Water Act states:
>
> A key concept of WCPs is that if monitoring identifies any circumstance of noncompliance with State water quality standards, then the Forest Service is obligated to respond to the situation to restore compliance. As long as WCPs have been applied and monitoring and adjustments are ongoing, then the Forest Service is in compliance with the CWA.
>
> The Medicine Bow National Forest recently received a favorable decision in Center for Native Ecosystems, et al. v. Cables, et al., No. 04-CV-2409-PSF-CBS (D. Colo.) that supports following this Nonpoint Source Management Strategy (FSH 2509.25, Ch 20). The Court found that, despite fecal coliform violations, the Forest Service's implementation of a WCP program, in accordance with Wyoming Water Quality Standards for nonpoint source pollution, constituted good faith compliance with state standards.
>
> This strategy relies heavily on 1) management adjustments (WCPs) in degraded riparian areas that would improve riparian condition, 2) proper implementation and monitoring of WCPs, 3) monitoring to show improvement in degraded riparian areas. Monitoring may include field measurements and/or photo points, depending on the situation.
>
> If management adjustments and WCP implementation improve riparian condition, then direct input of fecal matter and bacteria into waterways should be reduced, which would reduce the potential for water quality impacts. Under this strategy *E.coli* monitoring is not recommended (as long as management adjustments are implemented), as any exceedance detected through

E.coli monitoring would be addressed through the process of changing management to improve riparian condition and proper WCP implementation. In other words, the response to *E.coli* samples indicating degraded water quality would be the same as the recommended process to correct riparian problems i.e., making management adjustments and monitoring WCPs. This strategy eliminates the time and expense of *E.coli* sampling in favor of correcting known problems and thereby minimizing potential effects to water quality.

This is the water quality approach that will be carried out with the North Zone Range 08 project.

Other Resource Monitoring

The following methods will 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 1-5 year basis in accordance with the SHPO concurrence letters for livestock grazing to verify that management practices are being implemented.
- **R2 Sensitive plant and BHNF plant SOLC monitoring:** Certain plant populations with known impacts or those adjacent to primary grazing areas will be monitored to determine level of impacts and to decide of adaptive management actions should be taken. Specifics regarding plant populations to be monitored, purpose of the monitoring, and the frequency of monitoring are include in Appendix B. Adaptive management options are listed in Table 5 previously.

Comparison of Alternatives

This section provides a summary table of the effects of implementing each alternative. Information in Table 6 is focused on activities and effects where different levels of effects or outputs can be distinguished quantitatively or qualitatively among alternatives.

Table 6. Comparison of alternatives and their environmental effects for the North Zone Range 08 project

	Alternative A	Alternative B
Compliance with State water quality standards	Yes	Yes
Trend in stream bank stability	Upward slowly	Upward more quickly
Trend in bare ground	Static to upward	Upward
Effects to vegetative structure	Up to 50% utilization on grasses (except up to 70% on annual brome species in Huett Springs Allotment) Up to 40% utilization on shrubs	Some utilization by wildlife Trend upward initially, then downward

	Alternative A	Alternative B
	Trend upward	
Frequency of cheatgrass	Reduced but not eliminated	Not reduced, may increase
Risks to R2 sensitive plants and BHNF plant species of local concern	Low to Moderate; Existing populations and habitat would be maintained	Low; Habitat and populations may expand
Number of springs/riparian areas to be protected	38	None, but protection from livestock not needed
Risk to values for which Englewood Spring Botanical Area was designated	Low-Moderate	Low
Miles of fence to be built	4.5	None
Costs of range improvements	$213,787 for construction	None for construction; ~$50,000 for removal of existing improvements
Maximum number of AUMs to be authorized on NFS and PVT lands	9,259	None

Summary of Effects

The effects of Alternative A (Proposed Action) and Alternative B (No Grazing) are discussed below for various resources that might be affected by the North Zone Range 08 project. Effects on resources are within Forest Plan standards and guidelines.

Watershed Resources

Overall, water quality within the project area is acceptable based on both the South Dakota and Wyoming 303(d) and 305(b) reports. Four streams are listed as impaired for temperature from an unknown source in the Upper Elk allotment. These streams are: North Fork Rapid Creek, Elk Creek, Bear Butte Creek, and West Strawberry Creek. West Strawberry Creek is also listed for fecal coliform from an unknown source. The contribution from grazing on the Upper Elk Allotment to the temperature impairments is expected to be non-detectable since the stream reaches on NFS lands are either in accessible to cattle or have a well developed riparian corridor

providing shade to the streams. Only about 0.25 miles of West Strawberry Creek lie within the allotment, limiting any contribution to the fecal coliform impairment to slight to non-detectable.

Stream geomorphology in the project area shows mixed conditions. Although there are impacted streambanks and degraded riparian and wetland conditions in localized areas throughout the project area, the majority of sites show acceptable trends based on PFC assessments. It appears that overall current stream health conditions are in an upward trend.

All allotments are well within the 15% detrimental soil disturbance guideline established in the BHNF LRMP and the WCP Handbook. Less than 1% of the soils in the NZRPA are considered to be compacted due to livestock grazing activities. Lastly, ground cover within all allotments appears to be at acceptable levels to protect soils from excessive erosion.

Under Alternative A, long-term aquatic/riparian ecosystem health and ecological function will be provided by compliance with Standards 1201, 1301, 1302, 1304, 2502c, 2505d, and 2507. Stream bank alteration should be maintained below 26% helping to improve long-term bank stability and water quality. Bare ground will be reduced to or maintained at 5-20% on all allotments to help protect water quality. Detrimental soil disturbance will continue to be maintained at levels of less than 15% on all allotments to protect soil productivity. Alternative A would limit grazing impacts to aquatic and riparian vegetation, allowing for continued aquatic/riparian improvement. Stream reaches and riparian areas impacted by livestock grazing would be enhanced.

Under Alternative B, livestock grazing would not be permitted; therefore there would be no impacts from grazing. This alternative would provide the most protection for watershed resources. Alternative B will fully protect stream channels, wetlands and riparian areas from the effects of livestock grazing on NFS lands and have less impact on the soil resource.

Both alternatives proposed for this project would move watershed conditions closer to desired conditions, although at different rates. Implementation of either alternative will not further degrade watersheds. Water quality is expected to continue to support assigned beneficial uses. No cumulative effects are expected under any alternative because both alternatives would reduce impacts from livestock grazing.

Range Resources

Most upland and riparian areas are at the desired conditions with about 29% of benchmark areas not meeting desired conditions. Some springs and associated riparian areas are being impacted by livestock. Under Alternative A, the condition and trend of the rangelands are expected to improve in areas that are not currently at the desired condition and be maintained in areas that are at desired condition. Alternative B is expected to be beneficial to rangeland conditions initially, and then would have either neutral or detrimental effects afterwards due to a build up of accumulation of dead plant material. This could cause a decrease in plant productivity, palatability and overall plant health. However, Alternative B would have the most beneficial effects on streambanks and riparian vegetation. Under all alternatives rangelands are expected to meet the Forest Plan definition of satisfactory range condition by meeting or moving toward desired conditions.

Alternative A is expected to maintain the existing native plant communities in the Huett Springs Allotment. Early spring grazing at higher levels is not likely to reduce annual brome species, but is expected to provide an interruption to its life cycle providing a competitive advantage to native species. Literature suggests that Alternative B would not meet desired conditions for this

allotment. No grazing would promote the accumulation of dead plant material that would deny native species sunlight and nutrients over time. However, annual brome species are known for their ability to grow in litter. It may actually increase the competitive ability of these undesirable species.

Wildlife and Wildlife Habitat

Existing conditions within the allotments are generally in satisfactory condition. Impacts to wildlife and wildlife habitat due to livestock grazing are site-specific and are mostly within acceptable limits. The ID Team identified certain areas (primarily riparian habitats) that were not meeting desired conditions and these areas are targeted for protective adaptive management techniques to alleviate unacceptable resource impacts including impacts to wildlife species and their habitats.

Under Alternative A, direct and indirect impacts may be expected for some wildlife species, particularly those dependent on riparian habitats. Direct impacts include possible mortality and indirect impacts include loss of suitable habitat. Impacts are greatest in riparian habitats. Up to 50% of annual herbaceous growth may be grazed, but adherence to this utilization standard should provide adequate cover for species persistence. Impacts are negligible for upland species.

Wildlife would generally benefit from implementation of Alternative B (No Grazing). Adverse direct and indirect impacts would not occur. More water would be available for wildlife. Prey species may be harder to detect, but may also be more abundant in the absence of grazing. The quantity of forage and hiding cover would increase. However, the quality of forage may decrease without livestock grazing. Riparian shrub habitat would increase under the no grazing alternative.

Under both alternatives, there will be adequate habitat to support all Region 2 Sensitive Species, Management Indicator Species and Species of Local Concern in compliance with Forest Plan standards and guidelines. Impacts to sensitive species are not expected to result in a loss of viability in the Planning Area, nor cause a trend to federal listing. No effects are expected to federally listed species, as no listed species occur within these allotments.

Fisheries Resources

Suitable fish habitat, as defined by perennial streams/lakes and assigned beneficial uses, occurs in about 26.7 miles of stream in Upper Elk, East Rapid, Pettigrew, and Stearns Park allotments. Suitable fish habitat is not present in the Black Haw, Grand Canyon, Griffith, Huett Springs, Silver Creek or Willow Springs allotments.

Limited fisheries surveys have been completed in the project area due to the limited amount of suitable fish habitat. The mountain sucker (R2 sensitive species and MIS) has been documented in Rapid Creek within the East Rapid Allotment and in Bear Butte and Elk creeks adjacent to or downstream of the Upper Elk Allotment. There are no natural lakes in the Black Hills but several impoundments within the project area provide recreational fishing opportunities. Other native fish species in the analysis area include the fathead minnow, longnose dace and white sucker. Non-native fish species include brook, brown and rainbow trout.

Alternative A is expected to have a positive indirect benefit to fisheries through improved water quality and habitat conditions upon implementation of the proposed action and adaptive management particularly at localized sites on Gimlet Creek, headwaters of Iron Creek, Ladyfinger Gulch, Pettigrew Gulch, Upper Elk Spring #2 and the unnamed stream in the

Englewood Botanical Area that currently are not at the desired condition. Direct effects (mortality/injury) to fish, primarily to eggs and fry, are expected to be minimal.

Alternative B would provide the quickest and most permanent attainment of the desired condition, specific to riparian vegetation and aquatic conditions at a few localized sites where the desired condition is currently not being achieved.

Under either alternative, improved riparian vegetation condition and reduced bank alteration would have a positive, but minor incremental impact to fisheries on the East Rapid, Pettigrew, Stearns Park and Upper Elk allotments. Given the localized area of these improvements, this incremental impact would not be of a magnitude or intensity to noticeably affect fish numbers or distribution when added to past, present or reasonably foreseeable actions.

The effect determination for the mountain sucker is 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. There are no federally threatened or endangered fish species known to occur or likely to be affected by management activities in Crook, Weston, Lawrence or Pennington Counties nor any designated critical habitat.

Botanical Resources

The project area was surveyed specifically for R2 sensitive plant species and plant Species of Local Concern (SOLC) as well as, suitable plant habitat. Twelve occurrences of five R2 sensitive plant species and seven occurrences of three SOLC species were located. For the majority of species analyzed, suitable habitat can be summarized as moist forested and/or riparian communities. For two species, *Botrychium campestre* and *Botrychium lineare*, suitable habitat can be generalized as grasslands, openings in forested areas and old (15-25 years) disturbances.

Under Alternative A, monitoring of a known plant SOLC occurrence in Englewood Springs Botanical Area will take place in order to limit impacts from livestock. Adaptive management actions will be taken if monitoring indicates that impacts are exceeding established trigger points. Monitoring would occur at other R2 sensitive plant and plant SOLC sites at highest risk of being impacted by livestock grazing. The five plant Species of Local Concern and the three R2 sensitive plant species with known occurrences or suitable habitat in the project area are likely to persist within the North Zone Range 08 project area based on implementation of site-specific design criteria, compliance with Forest Plan Standards and Guidelines, monitoring, and use of adaptive management options including fencing.

Alternative B would eliminate the direct and indirect effects associated with livestock grazing and would likely be beneficial to all rare plant species. The quality of habitat for riparian or wetland dependent R2 sensitive plant species and SOLC plant species is expected to improve with the removal of livestock. The improvement of habitats impacted by livestock grazing could thereby increase the extent of suitable R2 sensitive and SOLC plant habitat across the project area.

Under both alternatives, rare plant species are likely to persist and effects to R2 sensitive species are not likely to result in a loss of viability in the planning area, nor cause a trend toward federal listing. No effects are expected to federally listed species, as no listed species occur within these allotments.

Heritage Resources

Heritage resource inventories for the North Zone Range 08 allotments were completed between 1997 and 2007. A total of 258 sites are located within the boundaries of the ten allotments. The most current information available indicates that no effects from grazing or grazing activities were noted on any National Register of Historic Places eligible heritage resource properties in any of the allotments. All NHRP eligible sites will be protected and avoided during construction of proposed range improvements. There will be no direct effects to heritage resources from implementation of either Alternative A or Alternative B. However, the cumulative effects from not grazing vegetation under Alternative B may lead to more intense burning in the event of a wild land fire. Intense wild land fire can affect both historic and prehistoric properties.

Cumulative Effects

No additional cumulative effects are expected to any resource beyond those currently occurring because no additional livestock grazing will be authorized. Both alternatives are expected to reduce cumulative impacts from livestock grazing below current levels. The incremental contribution of this project to total cumulative impacts is expected to be less than what is presently occurring.

ENVIRONMENTAL CONSEQUENCES

This section summarizes the physical, biological, social and economic environments of the affected project area and the potential changes to those environments due to implementation of the alternatives. It also presents the scientific and analytical basis for comparison of alternatives presented in Table 6 above. For the purposes of this analysis and under federal regulations, "impacts" and "effects" are assumed to have the same meaning and are interchangeable.

This environmental assessment is based upon analysis prepared in the following reports:

The North Zone Range 08 Project Hydrology Report (Dempsey 2008)

The North Zone Range 08 Project Range Specialist Report (Wheeler et al. 2008)

The North Zone Range 08 Project Fisheries Specialist Report (Hirtzel 2008)

The North Zone Range 08 Project Biological Evaluation/Assessment for Plants and Botany Specialist Report (Mayer and Wheeler 2008a and 2008b)

The North Zone Range 08 Project Biological Evaluation/Assessment for Animals and Wildlife Specialist Report (Stefanich 2008b and 2008c)

The North Zone Range 08 Project Heritage Resources Report (Agard and Shierts 2008)

These reports are included in the project file, which is located on the Black Hills National Forest, Northern Hills Ranger District, 2014, N. Main St., Spearfish, SD.

Past, Present and Reasonably Foreseeable Actions ____

According the Council on Environmental Quality (CEQ) NEPA regulations, "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 such actions (40 CFR 1508.7). Cumulative effects are those effects from other actions that overlap in time and space with the proposed action. In determining cumulative effects, the effects of the past and present and future actions shown in Table 7 were added to the direct and indirect effects of the proposed action or alternatives, as appropriate for each resource.

Table 7. List of past, present, and future activities considered for the NZR08 project.

Allotment	Timber Sales	Fires	Other Activities
Black Haw	Rattlesnake Timber Sale (future)	None known	Roads, OHV use, dispersed recreation, hunting
Huett Springs	None	None known	Roads, OHV use, dispersed recreation, hunting
Grand Canyon	Coyote Timber Sale (1999-2006) Riflepit Timber Sale (2006-2009) Geranium Timber sale (2006) O'Brian TS (future) Tincan TS (future) Scott TS (future)	Adams Prescribed Fires (2002-2005 – 700 acres) Baldman Prescribed fires (2002-2005 – 2,100 acres) Moskee Fire (1936 - 4,700 acres)	Roads, OHV use, dispersed recreation, hunting Moskee Land Exchange (future - 340 acres)
Silver Creek	Wish Timber Sale (2001-2006) Buckley TS (future)	Lantz Fire (1985 - 372 acres)	Roads, OHV use, dispersed recreation, hunting Moskee Land Exchange (future - 340 acres)
Stearns Park	Geranium Timber sale (2006) Citadel Timber sale (2007)	None known	Roads, OHV use, dispersed recreation, hunting
Willow Springs	Scott TS (future) O'Brian TS (future) Buckley TS (future)	Cement Fire (2005 - ~3,000 acres)	Roads, OHV use, dispersed recreation, hunting Moskee Land Exchange (future – 340 acres)
East Rapid	Lost Park TS (2004	None known	Roads, OHV use,

Allotment	Timber Sales	Fires	Other Activities
	– 35 acres) Rochford TS 2005 - 874 acres) Angle TS (2001 – 24 acres) Flannagan TS (1994 - 519 acres) Crooked TS (1999 - 901 acres) Minnex TS (1995 - 6,454 acres)		dispersed recreation, hunting
Griffith	Power Pole TS (2005 – 2,917 acres) Brahma TS (1995 – 285 acres) Pond TS (1996 – 1,611 acres) Power TS (2005 – 75 acres)	Thein #2 Fires (1911 – 425 acres)	Roads, OHV use, dispersed recreation, hunting
Pettigrew	Rimrock TS (1998 – 7,126 acres) Salt TS (1990 - 262 acres) Breakneck TS (1997 – 48 acres) Citadel TS (2007)	Iron Creek Fire (1899 – 1,364 acres) Iron Creek Fire (1890 – 6,566 acres)	Roads, OHV use, dispersed recreation, hunting
Upper Elk	Hanna TS (2003 - 638 acres) Aspin TS (1994 - 255 acres) Dano TS (2002 - 541 acres) Peak TS (1993 - 259 acres)	Grizzly Gulch Fire (2002 - 156 acres) Rochford Fire (1931 - 245 acres)	Roads, OHV use, dispersed recreation, hunting

One action common to all allotments is the on-going analysis of travel management on the Black Hills National Forest. This effort focuses on addressing the effects of motorized travel routes both on and off of the developed Forest Road system.

There are also about 9,384 acres of private lands within these allotment boundaries. Most of these private lands are once grazed in conjunction with the allotments. Other adjacent private lands were once grazed but have been subsequently developed as residential properties. Livestock grazing, vegetation management, and presence of invasive weeds occur on these private lands.

Each specialist considered these actions if they continue to effect resource conditions in the allotments in a manner similar to livestock. For most resources, the project area boundary was used to address cumulative impacts. However, where cumulative affects were expected to occur outside that North Zone Range 08 project area, that area is described in the specific resource discussion.

Watershed

This section explains and discusses conditions and effects to soils and water. The information presented here is a summary with more detail information available the Watershed specialist report (Dempsey 2008) located in the project record.

This analysis for the North Zone Range 08 Project was done on an allotment boundary basis. The allotment boundary is being used instead of Hydrologic Units (HUC 7 or HUC 6) watersheds, because the allotment boundaries can cross many watersheds and generally any one watershed does not have much of the allotment within the watershed (see watershed map in Appendix A). 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. Analysis based on any one watershed could appear to diminish the effects analysis. Information for the ten allotments in the project area is broken out by allotment and not grouped together to give a clearer picture of the watershed conditions on each allotment.

A Watershed Condition Assessment was completed for each HUC 6 watershed in the process of developing the 1997 BHNF Land and Resource Management Plan (LRMP). The Watershed Condition Assessments were based on the watershed sensitivity, known impacts from all activities, and available monitoring data. Although the watershed boundaries used for Watershed Condition Assessments are slightly different than the ones used today, the information generated for the LRMP is adequate and will not be recalculated for this allotment review. Each watershed was assigned one of three Watershed Condition Classes. Watershed Condition Class I indicates that current and past management activities have not significantly affected the function of stream and riparian areas. These watersheds are in robust health. Watershed Condition Class II indicates that moderate concerns exist and some streams and soils may be in disequilibrium. A change in the rate or nature of management activity may be necessary or stricter implementation of Watershed Conservation Practices (WCPs) may be necessary to return these watersheds to a Class I condition. Watershed Condition Class III indicates that high concerns exist and management activities must be done with great care. Additional conservation practices and watershed improvement projects may be needed (USDA Forest Service 1996b).

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 team 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 pathway 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). 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 components will be discussed for each allotment.

Field Surveys

Field surveys have been completed on all ten allotments during 2007 and 2008. Surveys included several different springs, streams, and riparian areas within the allotments. Field soil surveys were conducted in the fall of 2007 on the Grand Canyon, Stearns Park, and Willow Springs allotments. Stream assessments were conducted using the Proper Functioning Condition (PFC) protocol in the fall of 2007 for the Willow Springs, Pettigrew, East Rapid, and Upper Elk allotments. A PFC assessment was also done on Gimlet Creek within the East Rapid allotment in 2005. Multiple Indicator Monitoring method (USDI Bureau of Land Management 2007) was also conducted on Gimlet Creek in the fall of 2007. PFC assessments and other monitoring results are discussed where available for each allotment below.

Black Haw Allotment

The Black Haw Allotment (2,748 acres) is located within parts of two Hydrologic Unit Code (HUC) 6 watersheds and within three HUC 7 watersheds (Dempsey 2008). This allotment represents a small percentage of each watershed as shown in Table 8. The Black Haw Allotment is located in watersheds in Condition Class III – High Concern.

Table 8. Watershed acres, percentages, and 1997 BHNF LRMP condition class for the Black Haw Allotment.

HUC 6 Watershed	Watershed Name	Acres	% of Watershed in Allotment	Watershed Condition Class
101202030203	Sand Creek	44855	2.4%	III
101202030204	Red Canyon Creek	53251	<1%	III

Soils

There are seven different soil map units within the Black Haw allotment (Dempsey 2008). The majority of this allotment (55%) has a moderate erosion potential. The two rock outcrop and soil

complex have a severe erosion rating, comprising 39% of the allotment. Only 6% of the allotment has a slight erosion rating. These soils correspond to the soils on lower slopes and that have formed under grass conditions.

The Black Haw allotment does not have any soils with high clay content that are subject to higher compaction rates. Approximately 2.4 acres of this allotment may have compacted soils due to heavy livestock use along fences, at salt licks, or at water developments. This is approximately 0.3% of the allotment and below the 15% soil compaction level as described by the Forest Plan (USDA Forest Service 2007).

Springs and Streams

There are an estimated of 2.1 miles of stream within the Black Haw allotment located primarily in Black Haw Gulch which is an intermittent streamcourse. Black Haw Spring is the only spring within allotment. It is the water source for the Black Haw tank in the South Pasture.

Floodplains and Wetlands

There are no mapped 100-year floodplains within the Black Haw Allotment. There are no mapped wetlands within the Black Haw Allotment as mapped by the US Fish and Wildlife Service National Wetland Inventory (NWI).

Water Quality and Beneficial Uses

The WYDEQ assigns water quality standards on the beneficial uses of each water body, as a part of the requirements of the Clean Water Act (CWA). Black Haw Gulch is either a 3B or 3A stream (WYDEQ 2008). Its designated beneficial uses are other aquatic life, wildlife, agriculture, industry, and scenic value. WYDEQ has not formally assessed this stream to determine if it is meeting its beneficial uses. It is assumed that Black Haw Gulch is meeting its beneficial uses by providing waters seasonally to livestock and wildlife.

No streams or waterbodies within the Black Haw Allotment are listed in the Wyoming 2006 303(d) Waterbody List (WYDEQ 2008). Stream health classifications, which relate to water quality, were not assigned to streams within Black Haw Allotment. Stream health classification is not normally done on intermittent and ephemeral streams.

Soil or Watershed Concerns

Black Haw Spring, tank, and road are all in close proximity to each other. This area currently is not meeting desired condition due to high percent of bare ground due to livestock trampling.

Huett Springs Allotment

The Huett Springs Allotment (4,435 acres) is within parts of three Hydrologic Unit Code (HUC) 6 watersheds and within parts of four HUC 7 watersheds as displayed in Table 9. The Huett Springs Allotment is located in watersheds with Condition Class of I or II (Low or Moderate Concern).

Table 9. Watershed acres, percentages, and 1997 BHNF LRMP condition class for the Huett Springs Allotment.

HUC 6 Number	Watershed Name	Acres	% of Watershed in Allotment	Condition Class
10120201701	Belle Fourche River- Spring Creek	24663	5%	I
101202010705	Miller-Arch Creek	35268	<1%	II
101202010804	Lower Inyan Kara Creek	39774	2%	I

Soils

There are 17 different soil map units within the Huett Springs allotment (Dempsey 2008). Primarily the soils in this allotment were formed under grass instead of timber. The majority of the soils within this allotment (87%) have a moderate erosion hazard rating. Twelve percent of the allotment has a slight erosion rating. These soils also have slopes less than 10%. One percent of the allotment has soils with a severe erosion rating.

The Gaynor-Limon clay loams, Nunn clay loams, and Samsil-Gaynor complex are soils with a higher clay component and could have compaction issues. These soils comprise of approximately 12% of the allotment. Approximately 4.9 acres of this allotment may have compacted soils due to heavy livestock use along fences, at salt licks, or at water developments. This area comprises about 0.2% of the allotment, below the 15% compaction limit from the Forest Plan (USDA Forest Service, 2005).

Springs and Streams

There is an estimated 6.5 miles of intermittent or ephemeral streams within the Huett Springs allotment.

Floodplains and Wetlands

There are no mapped 100-year floodplains within the Huett Springs Allotment. There are two small mapped wetlands (NWI) within the Huett Springs Allotment. NWI delineations are done by photo-interpretation and may not be accurate representations of actual wetland conditions. Field inventories have not been conducted to confirm these mapped wetlands.

Water Quality and Beneficial Uses

All streams within Wyoming are assigned the beneficial uses of other aquatic life, recreation, wildlife, agriculture, industry, and scenic value. Streams within the Huett Springs allotment are either a 3A or a 3B stream except for East Creek. East Creek has been designated as a 3B stream by the WYDEQ. The designated beneficial uses for all streams within this allotment are: other aquatic life, wildlife, agriculture, industry, and scenic value. WYDEQ has not formally determined if these streams are meeting their beneficial uses. It is assumed that the streams within in the Huett Springs allotment are meeting their beneficial uses by providing waters seasonally to livestock and wildlife.

No streams or waterbodies within the Huett Springs Allotment are listed in the Wyoming 2006 303(d) Waterbody List (WDEQ 2008). East Creek meets the Belle Fourche River approximately 1.5 miles downstream of the allotment boundary. This reach of the Belle Fourche River is listed in the Wyoming 303(d) Waterbody list (WDEQ 2008) for fecal coliform. Current monitoring of the Belle Fourche River by the Crook County Natural Resource Conservation District shows that levels of fecal coliform in the river have lowered. The Crook County is proposing to the Wyoming DEQ to de-list this reach of the Belle Fourche River as a 303(d) list stream. Talks will begin in 2009.

Soil or Watershed Concerns

There were no areas that were observed to be of concern or deviated from the desired condition. Current monitoring should continue to track for changes in the allotment near East Creek and the springs within the allotment.

Grand Canyon Allotment

The Grand Canyon Allotment (16,036 acres) is located within parts of three Hydrologic Unit Code (HUC) 6 watersheds (Dempsey 2008) and within six HUC 7 watersheds as displayed in Table 10. These watersheds are considered to be in Condition Class II (Moderate Concern).

Table 10. Watershed acres, percentages, and 1997 BHNF LRMP condition class for the Grand Canyon Allotment.

HUC 6 Number	Watershed Name	Acres	% of Watershed in Allotment	Condition Class
101202030201	Cold Springs Creek	45044	5%	II
101202030202	Grand Canyon	33097	42%	II
101202030303	Little Spearfish Creek	18244	<1%	II

Soils

There are 15 different soil map units within the Grand Canyon allotment. Majority of the soils within this allotment have a slight erosion hazard rating and comprise 58% of the allotment. Thirty-nine percent of the allotment has soils with a moderate erosion hazard rating including the Stovho-Trebor complex, Citadel-McCaffery complex, and Lail-Trebor complex. Only the Vanocker-Citadel complex has a severe soil erosion hazard rating comprising about 3% of the allotment.

There are no soils within the Grand Canyon allotment with high clay content; therefore there is limited concern for soil compaction. Approximately 56.9 acres of this allotment may have compacted soils due to heavy livestock use along fences, at salt licks, or at water developments. This area comprises about 0.4% of the allotment, below the 15% compaction limit from the Forest Plan (USDA Forest Service 1997).

Soil health assessments were conducted at there sites in fall of 2007 within the Grand Canyon allotment. In the Minturn Pasture, soil surveys were taken by Grand Canyon Reservoir and Smith Draw. Soils at both of these sites were assessed as properly functioning with high effective ground cover. Another soil survey was done in the Riflepit Pasture. This assessment also showed that soils were properly functioning.

Springs and Streams

There is an estimated 38 miles of intermittent and/or ephemeral stream within the Grand Canyon allotment and approximately 22 springs. Most of these springs have been developed to provide water for livestock.

Floodplains and Wetlands

There are no mapped 100-year floodplains within the Grand Canyon Allotment. There are 23 small mapped wetlands (NWI) within the Grand Canyon Allotment. Field inventories have not been conducted to confirm these small wetlands.

Water Quality and Beneficial Uses

All streams within this allotment are either 3A or 3B streams with the assigned beneficial uses of other aquatic life, recreation, wildlife, agriculture, industry, and scenic value (WYDEQ 2008). WYDEQ has not formally assessed the streams to determine if it is meeting its beneficial uses. It is assumed that the streams within the Grand Canyon allotment are meeting its beneficial uses by providing waters seasonally to livestock and wildlife.

No streams or waterbodies within the Grand Canyon Allotment are listed in the Wyoming 2006 303(d) Waterbody List (WDEQ 2008).

Soil or Watershed Concerns

Many springs were areas of concern within the Grand Canyon allotment due to a high percentage of bare ground due to livestock trampling. Existing fences are in need of repair at the following springs: Bear Spring, Dugout Spring, Gooseberry Spring, and Twin Springs because they are currently ineffective at keeping cattle out of the spring source and riparian area. There is evidence of wallowing (from wildlife and cattle) in the riparian area adjacent to the Silver Spring. Trampling was also a concern at Silver Spring.

Silver Creek Allotment

The Silver Creek Allotment (11,296 acres) is within parts of three Hydrologic Unit Code (HUC) 6 watersheds and within six HUC 7 watersheds as shown in Table 11. These watersheds are classified as condition Class II or III (Moderate or High Concern.)

Table 11. Watershed acres, percentages, and 1997 BHNF LRMP condition class for the Silver Creek Allotment.

HUC 6 Number	Watershed Name	Acres	% of Watershed in Allotment	Condition Class
101202030201	Cold Springs Creek	45044	2%	II
101202030203	Sand Creek	44855	7%	II
101202030204	Red Canyon Creek	53251	15%	III

Soils

There are 15 different soil map units within the Silver Creek allotment. The majority of this allotment (61%) has a severe erosion hazard rating. Approximately 31% of the allotment has a slight soil erosion hazard rating and 6% of the allotment has a moderate soil erosion hazard rating. Soils with a slope under 10% have the slight erosion rating. The only soil within the allotment with high clay content is the Work clay loam (map unit 208 and 209). Work clay loam soils comprise less than one percent of the Silver Creek allotment. Approximately 24.6 acres of this allotment may have compacted soils due to heavy livestock use along fences, at salt licks, or at water developments. These areas comprise about 0.2% of the allotment, below the 15% compaction limit from the Forest Plan (USDA Forest Service 1997).

There was no soil health assessments conducted in the Silver Creek allotment.

Springs and Streams

There is an estimated 24 miles of ephemeral or intermittent stream within the Silver Creek allotment. There are seven springs most of which have spring developments to provide livestock water.

Floodplains and Wetlands

There are no mapped 100-year floodplains within the Silver Creek Allotment. There are 13 small mapped wetlands (NWI) within the Silver Creek Allotment. Field inventories have not been conducted to confirm these sites.

Water Quality and Beneficial Uses

All streams within Wyoming are assigned the beneficial uses of other aquatic life, recreation, wildlife, agriculture, industry, and scenic value (WYDEQ 2008). Silver Creek is classified as a 2AB stream, so it has the additional beneficial uses of drinking water, game fish, non-game fish, and fish consumption (WYDEQ 2008). WYDEQ has not formally assessed these streams to determine if they are meeting their beneficial uses. It is assumed that the streams within the Silver Creek allotment are meeting their beneficial uses by providing waters seasonally to livestock and wildlife.

No streams or waterbodies within the Silver Creek Allotment are listed in the Wyoming 2006 303(d) Waterbody List (WDEQ 2008). Stream health classifications, which relate to water quality, have not been assigned to streams within Silver Creek Allotment.

Soil or Watershed Concerns

The one area of concern in the Silver Creek allotment was Pete Spring. There were observations of localized trampling and hummocking around the spring. Willows are regenerating but need continued protection.

Stearns Park Allotment

The Stearns Park Allotment (10,878 acres) is within parts of three Hydrologic Unit Code (HUC) 6 watersheds and within six HUC 7 watersheds. These watersheds have been classified as Condition Class II or III (Moderate or High Concern).

Table 12. Watershed acres, percentages, and 1997 BHNF LRMP condition class for the Stearns Park Allotment.

HUC 6 Number	Watershed Name	Acres	% of Watershed in Allotment	Condition Class
101202030105	Crow Creek	26280	1%	III
101202030202	Grand Canyon	33097	18%	II
101202030303	Little Spearfish Creek	18244	25%	II

Soils

There are 29 different soil map units within the Stearns Park allotment. The majority of this allotment (49%) has a moderate erosion hazard rating and 44% of the allotment has slight erosion hazard rating. About 7% of the allotment has either a severe or a very severe erosion hazard rating. The soils with a severe or very severe erosion rating correspond to the soils with steeper slopes; just as the soils with a slight erosion rating have lower slopes (less than 10%). There are no soils within the allotment that have a high clay content that would cause a concern for soil compaction. Approximately 36.9 acres of this allotment may have compacted soils due to heavy livestock use along fences, at salt licks, or at water developments.. This only comprises of 0.3% of the allotment, below the 15% compaction limit from the Forest Plan (USDA Forest Service 1997).

One site in the Miller Pasture (near FSR 893.1 and 393.1I) was assessed for soil compaction in fall 2007. The soils were determined to be properly functioning because ground cover was between 90 and 95%. The only “At Risk” rating was given for sheet erosion. This assessment was due to the presence of slight pedestals on mature plants. There was no observed sheet erosion at this site though.

Springs and Streams

There is an estimated 17 miles of intermittent and ephemeral stream within the Stearns Park allotment. There are 18 springs, all of which have been developed to provide water for the livestock.

Floodplains and Wetlands

There are no mapped 100-year floodplains within the Stearns Park Allotment. There are 28 small mapped wetlands (NWI). These sites have not been field verified.

Water Quality and Beneficial Uses

All streams within Wyoming are assigned the beneficial uses of other aquatic life, recreation, wildlife, agriculture, industry, and scenic value. The streams within the allotment are classified as either a 3A or 3B stream (WYDEQ 2008). These streams have the designated beneficial uses of: other aquatic life, recreation, wildlife, agriculture, industry, and scenic value. WYDEQ has not formally assessed the streams within the Stearns Park allotment. It is assumed that the streams within the allotment are meeting their beneficial uses by providing water to livestock, wildlife, and non-contact recreation.

All streams in South Dakota are assigned the beneficial uses of irrigation and fish and wildlife propagation, recreation, and stock watering (South Dakota Administrative Rule 74:51:03:01). These beneficial uses would apply to the streams that are in South Dakota except Beaver Creek, Spearfish Creek, and Little Spearfish Creek. Beaver Creek, Spearfish Creek, and Little Spearfish Creek have been designated beneficial uses by the South Dakota Department of Natural Resources (SDDENR). The beneficial uses of Beaver Creek are coldwater permanent fish life propagation waters, and limited-contact recreation waters. The beneficial uses for Spearfish Creek are domestic water supply, coldwater permanent fish life propagation waters, immersion recreation waters, and limited-contact recreation waters. The beneficial uses of Little Spearfish Creek are coldwater permanent fish life propagation waters and limited-contact recreation waters. SDDENR has not formally assessed all of the streams within the Stearns Park allotment. The ones that have been assessed have not been rated as water quality limited or listed on the 303(d) impaired waterbody list (SDDENR 2008). Therefore it is assumed that all other streams are meeting their beneficial uses by providing waters for livestock and wildlife.

No streams or waterbodies within the Stearns Park Allotment are listed in the Wyoming 2006 303(d) Waterbody List (WDEQ 2008) or the 2008 SDDENR 303(d) Waterbody list. Stream health classifications, which relate to water quality, have not been assigned to streams within Stearns Park Allotment.

Soil or Watershed Concerns

There are a few areas of concern based on observations of trampling and lack of willow regeneration. Springs of concern are Three Willow Springs, East Riflepit Spring, Stateline Springs, Hillside Spring, Balm of the Gilead Spring, Anderson Spring, and Two-Way Spring.

Willow Springs Allotment

The Willow Springs Allotment (11,986 acres) is within parts of five Hydrologic Unit Code (HUC) 6 watersheds and within nine HUC 7 watersheds. These watersheds have been classified as Condition Class II or III (Moderate or High Concern).

Table 13. Watershed acres, percentages, and 1997 BHNF LRMP condition class for Willow Springs Allotment.

HUC 6 Number	Watershed Name	Acres	% of Watershed in Allotment	Condition Class
101202030105	Crow Creek	26280	1%	III
101202030201	Cold Springs Creek	45044	1%	II
101202030202	Grand Canyon	33097	25%	II
101202030203	Sand Creek	44855	7%	III
101202030303	Little Spearfish Creek	18244	1%	II

Soils

There are 20 different soil map units within the Willow Springs allotment. Half of the allotment has soils with a moderate erosion rating. Thirty-four percent of the allotment has a slight soil erosion rating. Only 16% of the allotment has severe or very severe soil rating. The soils with a slight erosion rating are on lower slope, less than 15%. The soils with a severe or very severe soil erosion rating are on steeper slopes, greater than 50%.

The Willow Springs allotment does not have any soils with high clay content for soil compaction concerns. Approximately 36.8 acres of this allotment may have compacted soils due to heavy livestock use along fences, at salt licks, or at water developments. These areas comprises about 0.3% of the allotment, below the 15% compaction limit from the Forest Plan (USDA Forest Service 1997).

One site near Guidinger Springs was assessed during the fall of 2007 for soil compaction. The overall rating for this site was Properly Functioning. It was assessed as properly functioning and the effective ground cover was between 90 and 95%. The only area where it was considered at risk was for sheet erosion. Field observations noted that the “At Risk” rating was not based upon seeing evidence of sheet erosion in the field, but seeing areas with pedestalled plants. The areas with pedastalled plants comprised less than 15% of the pasture.

Springs and Streams

There is an estimated 22 miles of stream within the Willow Springs allotment. Only Cold Springs Creek and Guidinger Creek are perennial streams within the allotment. All other streams are either intermittent or ephemeral streams. Cold Springs Creek is primarily on private property along the western boundary of the allotment. Approximately 0.5 miles of Cold Springs Creek is actually within the Willow Springs Allotment. There are 11 springs within the allotment. Most of the springs have been developed to provide water for livestock.

Floodplains and Wetlands

There are no mapped 100-year floodplains within the Willow Springs Allotment. There are six small mapped wetlands (NWI) within the Willow Springs Allotment. These sits have not been field verified.

Water Quality and Beneficial Uses

All streams within Wyoming are assigned the beneficial uses of other aquatic life, recreation, wildlife, agriculture, industry, and scenic value. Cold Springs Creek has additional beneficial uses because it is classified as a 2AB stream (WYDEQ 2008). Its additional beneficial uses are drinking water, game fish, non-game fish, and fish consumption. WYDEQ has not formally assessed the streams to determine if they are meeting their beneficial uses. It is assumed that the WY streams within the Willow Springs allotment are meeting their beneficial uses by providing waters seasonally to livestock and wildlife.

All streams in South Dakota are assigned the beneficial uses of irrigation and fish and wildlife propagation, recreation, and stock watering (South Dakota Administrative Rule 74:51:03:01). These beneficial uses would apply to the streams that are in South Dakota. No waters within SD were assigned any additional beneficial uses by SDDENR. SDDENR has not formally assessed these streams determine if they are meeting their beneficial uses. It is assumed that the SD streams within the Willow Springs are meeting their beneficial uses by providing waters seasonally to livestock and wildlife.

No streams or waterbodies within the Willow Springs Allotment are listed in the Wyoming 2006 303(d) Waterbody List (WDEQ 2008) or in the South Dakota Department of Natural Resources 303(d) Waterbody List (SDDENR 2008).

A Proper Function Condition (PFC) assessment was completed on Guidinger Creek in the fall of 2007. This assessment described the stream as “Functional-At Risk.” The trend was not apparent because the team did not know past conditions to determine if the stream and riparian area were improving or not.

Soil or Watershed Concerns

Simmons Spring and Deer Spring are of concern due to observations of cattle trampling around these springs and a lack of willow regeneration. Also, Guidinger Creek is of concern for streambank stability and willow regeneration. Despite the fence around the spring head, cattle are still able to access the spring. Primary concerns from field assessment of the stream were stream bank trampling, reduced vegetative protection on streambanks, and reduced willow regeneration. There was a lack of age class diversity amongst the willows both inside and outside of the exclosure. However, it was noted that aspen has started growing within the spring exclosure at Guidinger Spring since its construction.

Griffith Allotment

The Griffith Allotment (5,704 acres) is within part of one Hydrologic Unit Code (HUC) 6 watersheds and within four HUC 7 watersheds. These watersheds are classified as Condition Class II (Moderate Concern).

Table 14. Watershed acres, percentages, and 1997 BHNF LRMP condition class for the Griffith Allotment.

HUC 6 Number	Watershed Name	Acres	% of Allotment in Watershed	Condition Class
101202030301	Upper Spearfish Ck	41409	14%	II

Soils

There are 10 different soil map units within the Griffith allotment. All of the soils under slopes of 15% have a slight erosion rating. This is approximately 22% of the allotment. The majority of the allotment (65%) has a moderate soil erosion rating, based on two different soil types: Lail-Trebor complex and Stovho-Trebor complex. Only one soil type had a very severe soil type-Trebor-Rock outcrop complex. This soil type is about 13% of the allotment. There are no soils within the Griffith allotment with a severe erosion rating.

There are no soils within the Griffith allotment that have a high clay content that could cause soil compaction concerns. Approximately 25.1 acres of this allotment may have compacted soils due to heavy livestock use along fences, at salt licks, or at water developments. These areas comprise about 0.4% of the allotment, below the 15% compaction limit from the Forest Plan (USDA Forest Service, 1997).

Springs and Streams

There is an estimated nine miles of stream within the Griffith allotment. Only Spearfish Creek coming out of the Yellow Jacket Pasture is a perennial stream. The rest of the streams within the Griffith allotment are either intermittent or ephemeral streams. There are eight springs within the allotment. Most of the springs have been developed for water within the allotment.

Floodplains and Wetlands

There are no mapped 100-year floodplains within the Griffith Allotment. There are nine small mapped wetlands within the Griffith Allotment according to the NWI. These sites have not been field verified.

Water Quality and Beneficial Uses

All streams within the state of South Dakota are listed with the beneficial uses of irrigation and fish and wildlife propagation, recreation, and stock watering (South Dakota Administrative Rule 74:51:03:01). There are no additional beneficial uses assigned to streams within the Griffith allotment. SDDENR has not formally assessed the streams within the Griffith allotment to determine if they are meeting their beneficial uses. It is assumed that the streams are meeting their beneficial uses by providing waters to livestock and wildlife.

No streams or waterbodies within the Griffith Allotment are listed in the South Dakota 2006 303(d) Waterbody List (SDDENR 2008).

Stream health classifications, which relate to water quality, were not assigned to most streams within Griffith Allotment. However, the seep within Clayton Draw was assessed during field visits in the summer of 2007 as “robust.”

Soil or Watershed Concerns

Lander Spring is a concern because field observations in 2007 showed high amounts of bare ground and trampling. Bare ground here was nearing the five percent threshold that is considered acceptable to provide adequate ground cover and for minimizing the spread of noxious/invasive weeds. The high amount of trampling may be causing areas of soil compaction and therefore reducing the plant productivity of the site.

Clayton Draw was another site where the IDT had some concerns due to the lack of willow regeneration. Currently, cattle and other ungulates appear to be having an effect on the ability of willow population in Clayton Draw to regenerate.

Pettigrew Allotment

The Pettigrew Allotment (7,318 acres) is within parts of three Hydrologic Unit Code (HUC) 6 watersheds and within three HUC 7 watersheds. These watersheds have been classified as Condition Class II or III (Moderate or High Concern).

Table 15. Watershed acres, percentages, and 1997 BHNF LRMP condition class for the Pettigrew Allotment.

HUC 6 Number	Watershed Name	Acres	% of Watershed in Allotment	Condition Class
101202030105	Crow Creek	26280	4%	III
101202030301	Upper Spearfish Ck	41409	14%	II
101202030302	Middle Spearfish Ck	31857	13%	III
101202030303	Little Spearfish Creek	18244	12%	II

Soils

There are 28 different soil map units within the Pettigrew allotment. Soils with a lower slope, below 15%, have a slight erosion hazard rating. These soil comprise about 23% of the Pettigrew allotment. The majority of the allotment, 57%, has a moderate soil erosion rating. About 20% of the allotment has a severe or very severe soil erosion rating.

There are no soils within the allotment that have high clay content. However, there are 15 acres, or less than one percent, of the allotment composed of Marshbrook soils which formed under wet conditions. These soils may be susceptible to soil compaction. Approximately 19.2 acres of this allotment may have compacted soils due to heavy livestock use along fences, at salt licks, or at water developments.. This comprises of 0.3% of the allotment, below the 15% compaction limit from the Forest Plan (USDA Forest Service 1997).

Springs and Streams

There is an estimated 11 miles of stream within the Pettigrew allotment. Only Ladyfinger Gulch is a perennial stream within the allotment. All the rest of the streams are either intermittent or

ephemeral. There are nine springs within the allotment. Most of the springs are developed for water for the allotment. There are three springs within the allotment that are not developed for livestock water.

Floodplains and Wetlands

There are no mapped 100-year floodplains within the Pettigrew Allotment. There are seven small mapped wetlands (NWI) within the Pettigrew Allotment. These small wetlands have not been field verified.

Water Quality and Beneficial Uses

All streams within South Dakota are assigned the beneficial uses of irrigation, fish and wildlife propagation, recreation, and stock watering (SD Administrative Code 74:51:03:01). Additional beneficial uses are designated to Beaver Creek, Iron Creek, Pettigrew Gulch, Spearfish Creek, Ladyfinger Gulch, and Little Spearfish Creek. Beaver Creek, Iron Creek, and Little Spearfish Creek have the same beneficial uses of coldwater permanent fish life propagation waters and limited-contact recreation waters. Pettigrew Gulch has the additional beneficial uses of coldwater marginal fish life propagation waters and limited-contact recreation waters. The beneficial uses of Spearfish Creek are: domestic water supply waters, coldwater permanent fish life propagation waters, immersion recreation waters, and limited-contact recreation waters. Ladyfinger Gulch has the additional beneficial use of fish and wildlife propagation, recreation, and stock watering waters. Some streams within the Pettigrew have been assessed by SDDENR (2008) and are meeting their beneficial uses (SDDENR 2008). All other streams that have not been formally assessed by SDDENR are assumed be meeting their beneficial uses because they are providing water to livestock and wildlife.

No streams or waterbodies within the Pettigrew Allotment are listed in the South Dakota 2006 303(d) Waterbody List (SDDENR 2008). No other streams within that allotment were assessed for stream health. Ladyfinger Gulch was assessed following the Proper Functioning Condition (PFC) Assessment during the summer of 2007. Assessment on Ladyfinger Gulch was "Functioning-at Risk." This assessment came from sites where there the width to depth ratio was not in balance due to the presence of head cuts.

Soil or Watershed Concerns

Ladyfinger Gulch is an area of concern due to the "Functioning-At Risk" rating from the PFC assessment completed last summer. One concern is lack of riparian community on the streambank and floodplain of the stream. A riparian community was present, but was not dominant. Also there were areas of instability along the streambanks where cattle were watering from the stream. Baldy Lake is another area of concern due to observations of trampling and hummocking and a decadent willow population. Prospect and Pettigrew Springs are also areas of concern due to observations of trampling and hummocking within the riparian areas, high browsing on willows, and areas of unstable streambanks.

East Rapid Allotment

The East Rapid Allotment (13,432 acres) is within parts of six Hydrologic Unit Code (HUC) 6 watersheds and within nine HUC 7 watersheds. These watersheds were classified as Condition Class II or III (Moderate or High Concern).

Table 16. Watershed acres, percentages, and 1997 BHNF LRMP condition class for East Rapid allotment.

HUC 6 Number	Watershed Name	Acres	% of Watershed in Allotment	Condition Class
101201100101	North Fork Rapid Ck	22535	<1%	II
101201100103	Upper Rapid Creek	22044	59%	II
101201100106	North Fork Castle Ck	34520	<1%	II
101201100108	Pactola Reservoir	21360	1%	III
101201110101	Upper Boxelder Creek	37050	<1%	III
101201110102	Middle Boxelder Ck	31965	<1%	III

Soils

There are 15 different soil map units within the East Rapid allotment. Almost half of the allotment (48%) has a moderate soil erosion rating. Forty-two percent of the allotment has a severe or very severe soil rating. The only soil with the very severe rating was the Pactola-Rock outcrop complex (Map Unit Key 149G). Ten percent of the allotment has a slight erosion rating, which corresponds to the soils with the lower slopes (less than 12%). There are no soils within the allotment with a high clay content with the potential for soil compaction. However, the Marshbrook loam is within the allotment, covering approximately one percent of the allotment. Marshbrook loams form under wet conditions, and should be the focus of monitoring for soil compaction in the future. Approximately 20.9 acres of this allotment may have compacted soils due to heavy livestock use along fences, at salt licks, or at water developments. These areas comprise about 0.2% of the allotment, below the 15% compaction limit from the Forest Plan (USDA Forest Service 1997).

Springs and Streams

There is an estimated 40 miles of stream within the East Rapid allotment. Rapid Creek is the only fully perennial stream within the allotment. Irish Gulch, Minnesota Gulch, Gimlet Creek, East Gimlet Creek, and unnamed tributary to Rapid Creek in Section 34 have perennial reaches as they get closer to their confluence with Rapid Creek. Approximately 33 miles of stream within the allotment are either intermittent or ephemeral streams. There is only one spring within the allotment, East Gimlet Spring, which is part of the headwaters of East Gimlet Creek.

Floodplains and Wetlands

There is one mapped 100-year floodplains within the East Rapid Allotment along Rapid Creek. There are 34 small mapped wetlands (NWI) within the East Rapid Allotment. None have been field verified

Water Quality and Beneficial Uses

All streams within South Dakota are assigned the beneficial uses of irrigation, fish and wildlife propagation, recreation, and stock watering (SD Administrative Code 74:51:03:01). There are five streams that have designated beneficial uses by SD DENR: Rapid Creek, Gimlet Creek, West Gimlet Creek, East Gimlet Creek, and Silver Creek. Rapid Creek's beneficial uses are domestic water supply water, coldwater permanent fish life propagation waters, immersion recreation waters, limited-contact recreation waters. Gimlet Creek, East Gimlet Creek, and Silver Creek have the same beneficial uses of coldwater permanent fish life propagation waters and limited-contact recreation waters. West Gimlet Creek's beneficial uses are coldwater marginal fish life propagation waters and limited-contact recreation waters. All streams that have been formally assessed by SDDENR (2008) are meeting their beneficial uses except for North Fork Rapid Creek. All other streams within the allotment are assumed to be meeting their beneficial uses.

North Fork Rapid Creek is a listed waterbody as an impaired reach by the South Dakota Department of Natural Resources 303(d) list (SDDENR 2008). North Fork Rapid Creek is listed for temperature. Due to the steep access to North Fork Rapid Creek within the allotment boundary, this area is not used by cattle.

Stream health was determined to be "at-risk" for Gimlet Creek by the Forest Fisheries Biologist during the field visits (Hirtzel, 2008). Stream health classifications were not assigned to any other stream within the East Rapid Allotment.

Soil or Watershed Concerns

Monitoring in fall of 2007 showed that sections of Gimlet Creek has areas where streambank stability is not in compliance with the 74% stability rating as defined by the WCP handbook and Forest Plan. Monitoring showed that Gimlet Creek stream bank had a 33% alteration that can be attributed to grazing of cattle and ungulates and mole activity. The other concern at Gimlet Creek is the aerial extent of the riparian plant community away from either Gimlet or East Gimlet Creek. Right now, the plant community is immediately adjacent to the stream channel and there very little beyond the initial line of the plant community. Proper Functioning Condition (PFC) assessments were done in 2005 on Gimlet Creek. At that time, Gimlet Creek was assessed as "Properly Functioning" at two locations (at the dam and above the dam) and "Functioning At-Risk" below the dam. The number of ATV stream crossings was a primary concern here.

Keloran Spring is also an area of concern within this allotment. Field observations in 2007 showed a high amount of cattle trampling at this spring. This could be causing soil compaction. Also, there was high utilization of the riparian species that are supported by Keloran Spring.

Upper Elk Allotment

The Upper Elk Allotment (8,813 acres) is within parts of three Hydrologic Unit Code (HUC) 6 watersheds and within six HUC 7 watersheds. These watersheds have been classified as Condition Class II or III (Moderate or High Concern).

Table 17. Watershed acres, percentages, and 1997 BHNF LRMP condition class for

HUC 6 Number	Watershed Name	Acres	% of Allotment in Watershed	Condition Class
101201100101	North Fork Rapid Ck	22535	1%	II
101201110201	Elk Creek	44075	6%	III
101202020207	Upper Whitewood Ck	37327	9%	III
101202020601	Bear Butte Ck	46788	6%	III
101202030302	Middle Spearfish Ck	31857	<1%	II

Soils

There are 34 different soil map units within the Upper Elk allotment. The majority of the allotment (65%) has a moderate soil erosion rating. Twenty-three percent of the allotment has a slight erosion rating. This corresponds to the soils with slopes less than 15%. Twelve percent of the allotment has a severe or very severe erosion rating. The soils with the severe and very severe erosion rating are on slopes greater than 40%.

There are no soils within the allotment that have high clay content. Soil composition should not be an issue for soil compaction. Approximately 10.9 acres of this allotment may have compacted soils due to heavy livestock use along fences, at salt licks, or at water developments. These areas comprise about 0.1% of the allotment, below the 15% compaction limit from the Forest Plan (USDA Forest Service 1997).

Springs and Streams

There is an estimated eight miles of stream within the Upper Elk allotment. There are a few perennial streams within the allotment, but most streams are intermittent and ephemeral streams. Perennial tributaries to Whitewood Creek are within the allotment boundary, but Whitewood Creek runs through private property near the allotment. Elk Creek and Bear Butte Creek also have short perennial reaches within the allotment that run through Forest Service lands. There are six springs within this allotment. Only three springs have been developed for the allotment: Upper Elk spring, Upper Elk #2, and Upper Elk #3. The rest of the springs are not developed as water sources for cattle.

Located within the Englewood Springs Botanical Area, there are unmapped perennial streams and springs. Field visits in 2008 showed that there are areas where there are some localized spots of instability from hoof shear and cattle crossing. Overall, the stream looked to be in good condition the within the heart of the botanical area (away from Forest Service Road 228.1 and the private property).

Floodplains

There are five mapped 100-year floodplains in and bordering the Upper Elk Allotment. They are located along Whitewood Creek, Elk Creek, Bear Butte Creek, and two unnamed tributaries to

Bear Butte Creek. The mapped floodplains for the two tributaries to Bear Butter Creek actually enter Upper Elk Allotment. The rest of the mapped floodplains are on the allotment boundary or on private property parcels within or bordering the allotment.

Wetlands

There are 13 small mapped wetlands within the Upper Elk Allotment. These mapped wetlands have not been field verified.

Water Quality and Beneficial Uses

All streams within South Dakota are assigned the beneficial uses of irrigation, fish and wildlife propagation, recreation, and stock watering (SD Administrative Code 74:51:03:01). SD DENR had assigned additional beneficial uses for Bear Butte Creek, South Fork Bear Butte Creek, North Fork Bear Butte Creek, Elk Creek, and Whitewood Creek. Bear Butte Creek and South Fork Bear Butte Creek also have these designated beneficial uses: coldwater permanent fish life propagation waters and limited-contact recreation waters. North Fork Bear Butte Creek has the additional beneficial uses of coldwater marginal fish life propagation waters and limited-contact recreation waters. The additional beneficial uses for Elk Creek are coldwater permanent fish life propagation waters, immersion recreation waters, and limited-contact recreation waters. Whitewood Creek's additional beneficial uses are coldwater permanent fish life propagation waters and limited-contact recreation waters. All streams and headwater areas of streams within this allotment are assumed to be meeting their beneficial uses. There is some concern downstream of the allotment that the coldwater permanent fish life propagation waters beneficial uses is not being completely met because stream temperatures are high during the summer (SDDENR 2008). However, fish occupy the perennial streams within the Upper Elk allotment.

The Upper Elk allotment has five streams that are listed as impaired reaches with the South Dakota Department of Natural Resources 303(d) list (SDDENR 2008). North Fork Rapid Creek is listed for temperature. However, the reach of North Fork Rapid Creek that is within the allotment boundary is not grazed. Elk Creek is also listed for temperature, but downstream of the East Rapid allotment. There is approximately 0.5 miles of Elk Creek within the allotment. Photos of the reaches of Elk Creek show that there is a riparian corridor that will help keep stream temperature down. Bear Butte Creek is also listed for temperature downstream of the allotment boundary. Only the headwaters of Bear Butte Creek are on Forest Service lands within the allotment. Photos show that there is a riparian community to help mitigate for temperature. Also, downstream closer to the towns of Lead and Deadwood, Whitewood Creek becomes an impaired stream reach. The upstream extent of the impaired reach of Whitewood Creek does not extend up into Forest Service lands or within the allotment boundary. West Strawberry Creek is considered impaired for temperature and fecal coliform from the headwaters to the mouth of the stream. Approximately 0.25 miles of West Strawberry Creek are within the allotment and on Forest Service lands. This piece of Forest Service lands is surrounded by private property and the impairment of the stream is not specific enough on whether the fecal coliform levels are from private septic systems, livestock, or wildlife.

Stream health classification for Elk Creek was designated as "at-risk" by the Forest Fisheries biologist from field visits in 2007 (Hirtzel 2008). All other streams within the allotment were not assessed for their stream health classification. The two short reaches of Elk Creek were assessed through Proper Functioning Condition assessments during the summer of 2007. Both reaches were assessed as "Functioning At-Risk" due to concerns about stream bank stability and willow

regeneration. Both reaches of Elk Creek had a width to depth ratio that was not clear for the stream channel. Also there was a concern at both sites the lack of age diversity of the willows within the floodplain. Both reaches of Elk Creek are less than 0.5 mile and are bounded by private property. The upper 0.25 mile of Bear Butte Creek was assessed during the summer of 2007 following the Proper Functioning Condition protocol. The stream was assessed to being "Functional-At Risk with an upward trend." The concern came from the cattle grazing near historical beaver dams causing some areas of incision along the stream channel.

Livestock-related Soil or Watershed Concerns

Upper Elk Spring #2 is of concern because observations showed a high level of trampling by livestock below the spring. Elk Creek is a concern due the lack of willow regeneration and temperature exceedance for coldwater fisheries beneficial use below the allotment.

Environmental Consequences

A list of design features that are common to all action alternatives and adaptive management strategies can be found in Chapter 2 of the EA.

Potential effects on the proposed project, with respect to soil and water resources, may be summarized as those affecting soil productivity (compaction, erosion, heating, and nutrient removal), streams (streamflow and channel morphology), water quality (temperature/oxygen, sediment, nutrients, and pathogens), and special areas (riparian areas, wetlands, and floodplains). As discussed below, these are general effects that may occur within the allotments. Compliance with the Forest Plan and WCP Handbook standards is expected to keep these effects to an acceptable level.

The analysis area for cumulative effects was bounded in space as the allotment boundaries. The boundary was chosen because the effects of the action are not expected to go outside of the allotment boundaries. The allotments cross multiple watersheds and generally and one allotment comprises a small percentage of the watershed. Subsequently, the direct and indirect effects of the grazing would be "washed-out" at the watershed scale. All allotments where the effects could travel downstream would end at the loss zone where the stream crosses limestone outcrop and the stream flow is lost. The cumulative effects analysis was bounded in time in terms of approximately 100 years of forest succession, fire suppression, timber removal, livestock grazing and mineral exploration through the duration of the Allotment Management Plan, approximately 15 years into the future.

Alternative A (Proposed Action)

General Direct and Indirect Effects of Project Components

General effects of components of the Proposed Action and adaptive management options, with respect to soil and water resources, are discussed below. Benefits and adverse effects are discussed in a general context as actual outcomes would vary depending upon how the components are employed to address specific issues. Effects of actions that are more concretely defined are discussed under the individual allotments to the extent that they can be predicted.

Grazing Systems/Adaptive Management

Grazing system studies have shown wide variation in the ability of a particular grazing to improve range condition. Differences in results of grazing systems studied have been inconsistent and unexplained. The problem may stem from ascribing results to a given grazing system, when in fact they are due to the whole range management program and the ability to appropriately control time and place of grazing and degree of forage utilization. Numerous hydrologic studies have upheld the conclusion that little information exists to support the benefits to soil and water of any grazing system employed (Clary and Webster, 1989). Adaptive management that follows Design Criteria, Best Management Practices, and Watershed Conservation Practices and responds to the appropriate trigger points could have beneficial effects to soil and water resources when compared to existing non-adaptive management grazing systems.

Reduction of AUMs

No grazing system will counteract the impacts of overstocking on a long-term basis (Clary and Webster, 1989). Reducing Animal Unit Months (AUMs), 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 AUMs 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 AUMs with respect to soil and water resources would depend on how AUMs are distributed in time and place.

Reduction in Utilization

Clary and Webster (1989) recommend that for pastures in good to high ecological status, streamside vegetation utilization in summer-grazed pastures should not exceed 40-50% of the current growth and streamside vegetation in fall should not exceed 30%. These criteria may be used in conjunction with stubble height criteria to help provide for sufficient herbaceous biomass to maintain plant vigor, bank protection, and sediment entrapment. However, streambanks subject to early season grazing damage due to high soil moisture and fine-textured soils may need grazing to be delayed to a late season period; while channels that are highly erodible may require greater stubble heights (Clary and Webster, 1989). Benefits from reduction in utilization criteria would only be achieved if the standards can be enforced.

Period of Rest/ Rest Rotation

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 form excessive grazing in one to five years, degraded stream forms 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, greater exchange of water between the channel,

floodplain, and riparian soils takes place. Severe entrenchment, however is a catastrophic event and recovery, which is accomplished by rising of 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).

Fence Building

Livestock have the tendency to walk along fences, however, and cattle trails created may become bare paths that concentrate and accelerate runoff. If cattle trails become connected disturbed areas, they may deliver more sediment, nutrients, and pathogens to stream waters.

Fencing can be used as an exclusionary measure to remedy detrimental soil compaction and allow natural recovery mechanisms to occur. Reduced soil compaction should increase infiltration, increase vegetative growth, and slow runoff. 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. However, permanent removal of grazing may not guarantee maximum herbaceous cover as the accumulation of litter over a period of years may retard forage production (Buckhouse 1993 in EPA 2003). However, significant problems (such as increased runoff due to soil compaction or vegetation loss) originating in the upper watershed may still need to be addressed and the benefits of fencing would be limited to the area fenced.

Installation of Water Tanks and Pipelines

Installation of a pipeline and tanks may result in a better distribution of livestock and draw livestock away from streams. Erosion and sedimentation may occur due to construction activities; however, these would likely be minimal and short-lived. Actual reduction in the amount of time spent in the stream should translate to reduced deposition of feces directly in the channel and less hoofshear in streambanks. This may result in improved water quality based on reduction of sediment, nutrients, and pathogens.

Installation of water tanks and pipelines could also be used to draw livestock from riparian areas that are being over-utilized. This should decrease compaction in the riparian area, increase infiltration, increase vegetative growth, and slow runoff. 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. However, an increase in compaction would likely occur at the new tank location.

Use of Range Riders

Range riding involves actively pursuing and pushing cattle away from riparian areas. This techniques increases movements and may cause impacts to riparian areas and streambanks as cattle are driven away from these areas. Use of a range rider may help to achieve proper distribution of cattle and could reduce the amount of time that cattle 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.

Direct and Indirect Effects Common to All Allotments

Soils

There are currently no soil erosion problems related to livestock grazing in the project area. The proposed action was intended to maintain or improved resource conditions in riparian and upland vegetation communities. Adaptive management techniques would be used where monitoring shows that the desired conditions at benchmark sites are not being met within an acceptable timeframe. Improvements such as fencing and tank construction would be employed.

There could be a small potential for direct or indirect effect on soil productivity from soil compaction with Alternative A. This is because cattle would still be grazing with this alternative as well as elk and deer. Soils with high clay content have been identified in the Existing Condition section as susceptible to soil compaction. This is primarily within the Huett Springs allotment. Most any soil can be compacted under the right conditions. This could happen where animals tend to congregate when the moisture conditions are right. These areas can include cattle trails, salt licks, water tanks, and shade areas. Generally these areas would be small isolated areas and would not exceed the 15% detrimentally impacted soils as allowed under Forest Plan Standard 1103.

Watershed

Livestock grazing can have negative effects on aquatic ecosystem including water quality degradation, loss of stream bank vegetation and stability, and subsequent detrimental changes in channel morphology and increased sediment input (USDA Forest Service 2005a). Measures to maintain proper use or residual levels of vegetative cover should promote bank stability adjacent to aquatic habitats and maintain filtering function of riparian areas adjacent to water (Guidelines 2505 and 2506). The design criteria to limit bank alteration to less than 26% on an annual basis in intended to maintain stream health.

Sediment could come from cattle crossings the streams and trampling the banks while looking for water and lush vegetation. Generally the amount of sediment, bed and bank stability generated is not a large volume. However if animals spend a lot of time in the same area of the stream, stream banks can become unstable. This can cause failure of the stream banks with large amounts of sediment being generated.

Alternative A is similar to the current grazing practices except that there are adaptive management strategies to correct areas that have been identified in the proposed action and similar. Overall this alternative should have less impacts to the aquatic ecosystem from sediment from current grazing practices, because of the ability to correct stream related problems as they arise through adaptive management.

This alternative is consistent with Forest Plan Standard 1201 because no stream channel relocation is proposed and any rocks or wood in the waterbodies would be to promote bank stability. No instream structures are proposed to block flows or debris.

Alternative A would have less sediment input and more stable bed and stream banks than current grazing practices, but may produce more sediment than Alternative B (no grazing).

The improvement to aquatic ecosystems conditions in the allotments under Alternative A is not likely to have a noticeable benefit to watersheds because of the small, isolated areas that are currently not at the desired condition.

Riparian Areas

This alternative has the potential to positively affect riparian areas. Aquatic and riparian habitat at localized sites within each allotment (mentioned in the Affected Environment Section) that currently are not at the desired condition would be improved. This is anticipated to have a positive indirect benefit to streams through improved water quality and habitat conditions upon implementation of the proposed action and adaptive management. Observations from field visits, the lack of fence maintenance on some riparian exclosures was allowing cows to graze inside the exclosures, there by reducing the benefits to riparian protection. The riparian areas not fenced could continue to be impacted. Changes implemented through monitoring and adaptive management are expected to maintain proper utilization levels. These adaptive management actions are already described above. These actions are intended to move the riparian at several localized areas toward desired conditions. Riparian areas should slowly improve over time. The effects of this alternative on riparian areas would be less than current grazing practices, but more than Alternative B.

The improvement to riparian area condition in the allotments under Alternative A is not expected to have a noticeable benefit to watersheds because of the small, isolated areas that are currently not at the desired condition.

Floodplains

There would be not direct or indirect effects on floodplains with Alternative A. There are identified mapped floodplains only within the East Rapid and Upper Elk allotments. Even though there are floodplains with the two allotments, grazing cattle under Alternative A would not have any effect on the floodplains because there would be no change to the floodplains.

Wetlands

Alternative A has the potential to positively affect the wetlands. As identified in the Affected Environment Section, there is potential wetland vegetation within most allotments. These wetlands are in conjunction with riparian areas along streams having wetland or water-loving vegetation. Changes implemented through monitoring and adaptive management are expected to maintain proper utilization levels. Adaptive management actions are intended to maintain wetland conditions by reducing or eliminating livestock use. The effects of Alternative A on the wetlands would be less than current grazing practices, but more than Alternative B.

Allotment-specific Direct and Indirect Effects

Black Haw Allotment

Adaptive management options for the Black Haw allotment are to either adjust the grazing season between 6/1 and 10/30 not to exceed 379 animal unit months (AUMs). This could mean that the season could be longer with a smaller amount of cattle or shorter with a larger amount of cattle. Also, if conditions do not improve around Black Haw Spring, it is proposed to move the tank in a better spot, fence off the riparian area, or reduce AUMs. Implementing any of the options would reduce the amount of sediment that reaches Black Haw Gulch under current management. Monitoring following the guidance of the WCP Handbook would determine what management option could be used to improve the quality of Black Haw Spring.

Huett Springs Allotment

Currently annual brome and cheat grass are present in the Huett Springs allotment. Implementing the proposed action to reduce the annual bromes is expected to increase cover and frequency of native perennial grasses, which have better soil holding characteristics than the annual grass species. Monitoring will ensure that bare ground stays within acceptable levels. Suspended sediment from any overland flow during storm events is expected to be less than what is occurring presently.

Herbicides could be used if reducing the annual bromes is not accomplished through changing of grazing management. All herbicide use would follow the WCP Handbook and the Black Hills Noxious Weed EA (USDA Forest Service 2003a) to protect streams and springs from adverse impacts from herbicide use.

Other adaptive management options are to allow cattle grazing earlier in the season (4/15) or the increase the amount of utilization on cheat grass to 70%. Increasing the utilization could create greater patches of bare ground temporarily until native species become re-established. Monitoring will ensure that bare ground stays within acceptable levels. The effects are the same as discussed earlier.

There is a potential to increase soil compaction from allowing cattle on the allotment earlier in the season, when the soils could still be saturated. Soil monitoring would have to follow this option to determine if soil compaction is reaching the 15% as defined by the Forest Plan and WCP Handbook.

Grand Canyon Allotment

Reconstruction of spring development activities could cause some sediment to enter the streams that are near springs over the short term. The sediment that could enter the stream be minimal and would not have a negative effect on any of the streams within the allotment. Reconstruction of the spring developments probably would not occur all within one year. This would allow time for the springs, streams, and riparian areas to heal (with subsequent year vegetation growth) before commencement of the next reconstruction project.

Fencing off the springs, streams, and parts of the associated riparian area would have a positive effect. Installing the fences around the springs would decrease the stream bank trampling and hummocking around the springs. Also, it would decrease the utilization on the riparian species near the springs and cause in increase in ground cover.

However, with the new fences there still would be a chance to create new connected disturbed areas with the streams if trailing occurs around the fence boundary. Sediment could enter the stream from the trails around the fenced of spring areas. Sediment input is expected to be minimal and should not be moving downstream outside of the allotment boundary.

Silver Creek Allotment

An exclusion fence is proposed around Pete Spring. This would decrease the trampling and hummocking that is occurring around the stream. Also, building the fence is expected to help allow willow regeneration. Building the fence could have some short-term impacts with disturbance of the soils during fence construction. However, the short-term impacts of a small amount of sediment to enter the stream channel would not outweigh the long-term benefit of increased ground cover and willow regeneration within the fenced area.

All other springs within the allotment would continue to be monitored to see if their conditions degrade so that fencing would be an option. Pete Spring was the only spring identified that was not meeting desired condition.

Stearns Park Allotment

Approximately 7 tanks and 0.75 miles of fence are being proposed to be installed within the allotment. This could create 5.8 acres that could be affected by detrimental soil compaction. Combined with existing compacted acres, the total acres expected with soil compaction are 42.7 acres or 0.4% of the allotment. With the existing fences and tanks and new fences and tanks, the estimated lands with detrimental soil compaction are still less than the 15% that is considered acceptable from the Forest Plan and WCP Handbook.

Building the new East Pasture boundary fence could cause some trailing along the fencing. The cattle trails could intercept the streams and become a connected disturbed area. However, the road that is following the stream along the proposed fence line would contribute more sediment than installation and maintenance of the boundary fence.

Three Willow Springs and other springs have been identified as being affected by the cattle grazing by having decadent willows and trampling in the vicinity. Implementing adaptive management measures with salting and moving cattle away could improve spring health. If monitoring does not show an improvement, fencing could be an option. If the spring is fenced, there is a chance for sediment to be displaced and bare ground to be exposed. However, the short-term impacts from fence construction would be out weighed by the long-term impact of having vegetation growing and minimizing the bare areas around the spring.

Willow Springs Allotment

It is proposed to build one new tank and 1.5 miles of fence within the Willow Springs allotment to help with the implementation of adaptive management. This could create approximately 2.5 acres that could be affected by detrimental soil compaction. Combined with existing compacted acres, it comes to 0.3% of the allotment and below the 15% that is considered in the Forest Plan and WCP Handbook.

Guidinger Spring, Simmons Spring, and other springs have been identified as having decadent willows and tramping in near vicinity of the spring. The trampling around can cause soil compaction and bare ground. Monitoring would continue to see if the soil compaction and bare ground exceed standards. Currently there is bare ground around the springs that could contribute sediment into the stream channel. However, implementing the adaptive management bare ground should reduce through moving cattle through the area. If this still does not work, fencing might be an option. If this were to happen, sediment could enter the stream channel from fence construction. However, by gaining vegetation in the areas around the stream would reduce the bare areas, i.e. reduction of sediment within the streams. Soil compaction would need to be monitored to determine if it is detrimental. Implementing all of the adaptive management options, the potential for soil compaction should decrease.

Griffith Allotment

Lander Spring and Clayton Draw are two specific areas that need to be monitored for the effects of adaptive management. Currently there is a higher percentage of bare ground near Lander Spring than standards. This bare ground could be a sediment contributor to the stream. It is proposed to extend the current fence around Lander Spring to include a bigger area. This would

encourage vegetation growth, therefore reducing the area of bare ground. The other concern around Lander Spring is soil compaction because the meadow is more wet than dry. Again, the extension of the exclosure would protect a greater area of the wet soils where there could be soil compaction. With the exclosure and increased vegetation growth, areas with soil compaction should decrease.

Clayton Draw was identified for the lack of willow regeneration. Utilization of the willows would be continued to be monitored to see if that is the cause for the lack of willow regeneration. It is proposed to extend the Clayton Draw exclosure fence to include more of the willow community. The hope is to decrease the utilization from cattle on the willows, regeneration of the willows would occur. However, fencing off the willows would not prevent big game (deer and elk) to browse willows. There would still be some utilization of the willows that could impact willow regeneration.

Fencing building that is proposed for spring exclosures could have a short-term impact by creating areas of bare ground along the fence lines and could result in sedimentation into the adjacent streams. The amount of sediment that could be introduced to the streams is expected to be minimal. The long-term benefit of getting vegetation growing and willow regeneration would outweigh all of the short term impacts. Spring and stream health would improve from implementing the adaptive management activities.

Pettigrew Allotment

Adaptive management activities would be used to reduce the effect of trampling and hummocking around Baldy Lake, Prospect Spring, Pettigrew Spring, and Ladyfinger Gulch. Also, there has been observed high amounts of utilization on the willows around the springs. To reduce the effects of grazing, it is proposed to remove livestock from the area through movement of cattle, salt licks, and fencing. Bare ground and utilization measures would be the primary ways of monitoring to see if the adaptive management practices are being improving the ground. If not, then fencing could be used.

Implementing the adaptive management practices would allow for willow regeneration and vegetation growth. Both would have a positive effect on the ground from improving the riparian habitat and the reducing the potential sediment entering into the streams. If fencing is done, it could have a short-term impact of forming bare ground areas and increase of sediment that could enter the stream channel. The short-term impacts would be outweighed by the long-term response of willow regeneration and less bare ground/ vegetation growth. With fencing, willows would still be browsed by wildlife.

Ladyfinger Gulch has been identified as having areas where the streambank stability is exceeding 26%. It is proposed to fall trees in the more unstable and heavily trampled areas to limit access to livestock. This would direct livestock to more stable areas of the stream bank (i.e. more bedrock) and allow the areas with more easily erodible stream banks to heal. Riparian vegetation growth is required for the stream banks to heal. By implementing adaptive management activities, sediment entering the stream from livestock access or instable stream banks, would decrease. This would benefit Ladyfinger Gulch that already has areas of instability (headcuts).

East Rapid

Adaptive management activities are to fence out part of Gimlet Creek because it is not currently meeting standards for stream bank alteration. This exclosure would provide as a baseline for

monitoring stream bank alteration and stability for Gimlet Creek and to see how stream bank alteration and stability recover from excluding livestock grazing. Also, the exclosure would allow for riparian vegetation to recover from livestock grazing, but it would still be affected from wildlife browsing. Therefore, this exclosure would also provide a baseline for comparing utilization for wildlife browsing and livestock grazing.

Installing the exclosure would improve the stream bank stability and riparian community around Gimlet Creek. This would also indirectly help reducing the sediment that could enter into Gimlet Creek. The amount of sediment that could enter Gimlet Creek under current grazing management would decrease through implementation of Alternative A and the associated adaptive management activities.

It is proposed to reconstruct the existing spring development, stock tank, and fence around Keloran Spring to improve the area around it. Keloran Spring is currently impacted by heavy utilization on riparian species and high trampling. Installation of the improved stock tank would move livestock a little further away from the spring, thus benefiting the soil and riparian conditions at the spring. Also, by fencing the spring, utilization of the riparian vegetation would be reduced and meet Forest Plan Standards and Guidelines. Reducing utilization of the riparian species should also help promote regeneration of the species. In addition, the fencing would reduce the amount of trampling directly the spring and spring development. This would reduce the potential for detrimental soil compaction around the spring. Due to the more hydric conditions, or wet soils, around the spring, compaction here is more of concern than further away from the stream. Implementing Alternative A would have a positive effect around Keloran Spring than under current grazing management.

North Fork Rapid Creek is listed as an impaired reach for temperature. Implementing Alternative A would not affect the listing of this stream. Currently this area is not grazed due to the steep nature of the ground near the stream. Under Alternative A this section of the stream would continue not to be grazed by livestock.

Upper Elk

Adaptive management activities would improve soil and watershed condition and the riparian areas. Upper Elk Spring #2 is shown to have unacceptable levels of trampling below the spring. It is proposed to extend the exclosure fence further downstream of the spring and current fence location. This would reduce trampling within the immediate vicinity of spring where detrimental soil compaction could happen with the wet soil conditions. Also, controlling where livestock goes near Upper Elk Spring #2 would help increase stream bank stability by reducing alteration from hoof shear. This would reduce the amount of sediment that could enter the stream from stream bank instability. Finally, improving the fence at Upper Elk Spring #2 would help maintain riparian vegetation around Elk Creek. Maintaining and improving riparian vegetation around Elk Creek would benefit the stream because currently it is impaired for stream temperature. Riparian vegetation would provide shading to the waters of the stream, to keep stream temperatures closer to meeting its beneficial uses.

Whitewood Creek, West Strawberry Creek, Elk Creek, Bear Butte Creek and North Fork Rapid Creek would still be listed streams with implementing Alternative A. The listings for these streams are mainly due to natural conditions or the state of the streams on private property. Only short segments of the impaired reaches are within the allotment and Forest Service lands. Implementing Alternative A would improve the quality of these stream reaches, but not to effect

that the reaches would no longer be considered impaired. That is due to the short segments of the streams that are within the allotment and not private property.

Alternative B- No Grazing

Direct and Indirect Effects Common to Allotments

For all of the riparian ecosystems in the allotments, this alternative would provide the quickest and most permanent attainment of the desired condition, specific to the riparian vegetation and aquatic ecosystems at the stated localized sites where desired conditions are not currently being achieved. Under the No Grazing Alternative, no livestock grazing would be permitted on any of the allotments. Following current direction, existing permits would be phased out. There is likely to be a three year transitional lag time before livestock are removed (Forest Service Handbook 2208.13). No grazing means that livestock grazing would not be authorized within the project area. Improvements such as stock tanks, spring developments, and other water features used by wildlife would not be removed. Wildlife funding would assume the responsibility for these water improvements which would remain in place. Other improvements such as fencing, gates, and cattleguards not needed for management of allotments sharing common boundaries would eventually be removed as time and funding allows. Some of the existing sites that are not at desired condition would have a delayed response until livestock grazing stops.

Soils

An end to grazing would likely increase the ground cover initially, reduce sediment yield (due to increased ground cover), lead to less soil disturbance, improve soil bulk density characteristics, and increase infiltration rates (to the extent that they have been affected by the increased bulk density. Detrimental soil disturbance would improve most rapidly under the No Grazing alternative.

Watershed

An end to grazing would likely increase ground cover initially, reduce sediment yield (due to increased ground cover), lead to less soil disturbance, improve soil bulk density characteristics, and increase infiltration rates (to the extent that they have been affected by increased bulk density). Livestock feces would not longer be deposited directly in streams or within upslope areas, so there would be less adverse effects on surface water quality. Bacteria present in existing feces could remain viable for 100 days or more and could be transported during runoff events until such a time as they are no longer viable (Buckhouse and Gifford 1976 in USDA Forest Service 1996). Bacteria accumulated in stream bottoms from feces deposited directly in streams with low flows could still be resuspended during peak flows. As vegetative cover increases, enhanced filtering mechanisms would trap more sediment and nutrients, resulting in less sediment and nutrients delivered to streams. Increased plant cover would result in greater uptake of nutrients, which would enhance water quality. However, permanent removal of grazing may not guarantee maximum herbaceous cover as 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 animals (cattle) 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, 1996) and stream channels may take decades to recover from severe morphologic changes. There would a positive indirect effect because areas of localized steambank trampling and channel widening would begin to revegetate and stabilized, subsequently sediment input would decrease and bed and bank stability would increase.

There would be no direct or indirect effects on the aquatic ecosystems due to changes in the flow regime with alternative. Changes in flow regime would result from major changes in cover type or ground cover, dense road networks, or water projects. This alternative is predicted to result in major changes to these characteristics.

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

Stream connectivity would not be affected because no new instream barriers would be constructed nor are any existing instream structures proposed for removal. Also all existing road and stream crossings that are a connected disturbed areas (provide sediment into the stream) would stay the same as current condition.

Riparian Areas

There would be no direct or indirect effects on riparian areas than what has already been described above with this alternative because there would be no cattle grazing.

Floodplains

There would be not direct or indirect effects on floodplains with this alternative. There are identified mapped floodplains only within the East Rapid and Upper Elk allotments. Even though there are floodplains with the two allotments, the lack of cattle grazing would not have any effect on the floodplains because there would be no change to the floodplains.

Wetlands

There would be no direct or indirect effects on wetlands than what has already been described with this alternative because there would be no cattle grazing.

Allotment-specific Direct and Indirect Effects

There would be no direct effects on soils, watersheds, riparian areas, and wetlands because there would be no livestock grazing. There would be a positive indirect effect on soils, watersheds, riparian areas, and wetlands. Positive indirect effects would be by allowing springs and streams to revegetate and stabilize. Riparian areas would improve over time. Re-establishment of vegetation would decrease bare ground and potential of sediment to reach streams via overland flow or instable streambanks. Evidence of trampling and hummocking from livestock grazing would decrease to unobservable levels.

Black Haw Allotment

In the vicinity of Black Haw Spring, vegetation would re-establish and reduce bare ground. Also, evidence of livestock trampling would diminish until it is undetectable. There are no other specific direct or indirect effects expected within the Black Haw allotment than what is discussed above.

Huett Springs Allotment

There were no specific areas of concern for soil and water within the allotment except for the overall concern of the invasive species of annual brome and cheat grass within the allotment. Grazing would no longer be a tool to control these invasive species and without the use of herbicide they could continue to expand their range within the allotment. Annual brome species can take advantage of high levels of litter and mulch and actually increase in abundance. A dense litter cover reduces evaporation of soil water and this provides an optimum environment for seedling germination and emergence (Haferkamp and Karl 1999). Therefore, there could be less perennial and native grasses growing within the allotment to stabilize soils. If this were to occur, then there is a chance for overland flow to increase and sediment to enter the streams within the allotment.

Grand Canyon Allotment

There would be a positive indirect effect on all of the springs, streams, and riparian areas. This would be from allowing these areas would be able to revegetate and stabilize. Also, future soil compaction would cease and soils would begin to rebound from past compaction due to livestock grazing. These indirect effects would be very similar for all identified springs within the allotment and Proposed Action. Riparian vegetation would also have a chance to re-establish around the springs where currently the fences are ineffective. Re-establishment of vegetation would decrease bare ground and potential of sediment to reach streams via overland flow. Also, evidence of trampling by livestock would diminish until it is at undetectable levels.

Silver Creek Allotment

All of the positive indirect effects described above could also be seen at Pete Spring. Riparian vegetation would re-establish to provide ground cover. Roots and vegetation re-establishment would help with any of the soil compaction from current livestock grazing within the vicinity. Pete Spring would slowly improve under this alternative.

Stearns Park Allotment

All of the positive indirect effects described above could be seen at springs throughout the allotment. Springs that would have a positive effect are: Three Willow Springs, East Riflepit Spring, Stateline Springs, Hillside Spring, Balm of the Gilead Spring, Anderson Spring, and Two-Way Spring. Willows around these springs would have a chance to re-establish where currently the fences are ineffective. Also, evidence of trampling by livestock would diminish until it is at undetectable levels.

Willow Springs Allotment

All of the positive indirect effects described above could be seen at Simmons Spring, Deer Spring, and Guidinger Creek. Currently these indirect effects were observed at Guidinger Spring at the current exclosure. Riparian vegetation would also have a chance to re-establish along the streambanks and within the floodplain. Re-establishment of vegetation would help stabilize streambanks that are currently void or with little riparian vegetation. Streambank stabilization would decrease bare ground and potential of sediment to enter Guidinger Creek from instable streambanks.

Griffith Allotment

Lander Spring and Clayton Draw should experience the positive indirect effects listed above. Around Lander Spring bare ground would decrease and more riparian vegetation and perennial or native grasses would grow into the area. The encroachment of vegetation with no livestock grazing over time would subside any of the compaction problems at the current watering site. There would continue to be ungulate grazing on the willows along Clayton Draw. Not have the added competition of livestock grazing could benefit the willows and promote for some new willow growth from seed.

Pettigrew Allotment

Ladyfinger Gulch could see an increase in riparian vegetation within the streambanks and the floodplains, so that riparian vegetation would dominate the stream reach. Baldy Lake, Prospect Spring, and Pettigrew Spring would also experience positive indirect effects. Willows around these springs would have a chance to re-establish. Also, evidence of trampling by livestock would diminish until it is at undetectable levels.

East Rapid Allotment

North Fork Rapid Creek would still not be meeting is beneficial uses with implementing this alternative because the area near North Fork Rapid Creek is not grazed with livestock under current grazing management.

Gimlet Creek stream alteration would decrease with the removal of livestock. This would increase the streambank stability. However, removal of livestock grazing would remove the only source of instability from the streambanks. Gopher activity and ATV trails would still have effect the stability of the streambanks. ATV trails are one of the larger sources of instability along Gimlet Creek. Willows, sedges, and rushes would have a chance to re-establish more along the streambanks and meadow. Again, they would have the continued disturbance of ATV trails. Travel management problems with Gimlet Creek are addressed in the Travel Management Analysis that that Black Hills Forest is currently analyzing.

Keloran Spirng would experience a long-term positive indirect effect. Livestock would no longer be browsing on the riparian vegetation. This could increase the vigor of the plant to seed and promote new growth. Also, native or perennial grasses could become more established to help with any compaction issues at the watering site and decrease bare ground.

Upper Elk Allotment

Whitewood Creek, West Strawberry Creek, Elk Creek, Bear Butte Creek, North Fork Rapid Creek would still not be meeting their beneficial uses with implementing this alternative because of the majority of the stream is on private property and the Forest Service sections of the streams are in good condition.

Upper Elk Spring #2 would also see the above described indirect effects from the removal of livestock. Vegetation growth around the watering site would alleviate the trampling and bare ground concerns. Along the short reaches of Elk Creek in Forest Service ownership, willows could have a better recruitment and get established. However, the density and ability of the willows to establish would be influenced some by the activities along the stream corridor on the private property. This is because Elk Creek is private within the majority of the allotment and the stream would be experiencing the effects of management on the private on the two short reaches

owned by the Forest Service. Bear Butter Creek's riparian corridor should continue to be at the good condition that it is in now. Currently, there is minimal use along Bear Butte Creek due to access and allotment management.

The unmapped springs and stream within the Englewood Springs Botanical area would improve their water quality and streambank from have the no livestock accessing the springs and streams. However, until the road-springs intersections from Forest Service Road 228.1 are improved there would still be degraded water quality in form of streambank instability and sediment entering the stream. Water quality would improve to certain level from the removal of livestock grazing, however, it would not fix all of the problems with this unmapped stream. The unmapped stream would improve its streambank stability closer down to the private property and within the botanical area below Forest Service Road 228.1.

Cumulative Effects

The following cumulative actions were considered common to all allotments: timber harvesting, past grazing, wildfires and associated suppression activities, roads, construction of range improvements, mining, and wildlife use of forage. Treatments of noxious weeds, OHV routes, timber harvest activities, road building, and prescribed fire are occurring presently in most allotments. In some allotments there is use by mountain bikers and equestrians. These activities have resulted in the current watershed condition classes and current soil and stream conditions.

Road-stream crossings, like culverts and low water crossings, exist within the project area. These crossings provide areas of stream instability through the instream structures and areas where sediment can readily enter the stream. Areas where sediment may enter the stream channels are called connected disturbed areas (CDAs). CDAs can also fragment the stream network.

Recent increases in off-highway vehicle (OHV) use has resulted in localized bank stability impacts on user-created trails where OHV's cross perennial streams or created CDAs. These types of impacts were most noticeable along Gimlet Creek, but do occur within every allotment. Decisions on travel management are outside of the scope of this project.

The Lead-Deadwood pipeline could still cause some negative cumulative effects within the Upper Elk allotment. However, the decision to repair and fix the leaking Lead-Deadwood pipeline is outside the scope of this project.

Cumulative Effects Common to Alternatives A and B

Soils

Detrimental soil disturbance caused by grazing for each allotment was analyzed under the Existing Condition section. All allotments were estimated to have detrimental soil disturbance below 1%. These estimates took in account trailing along the fence lines and drainages as well as impacts from water developments and salt licks. Past, present, and reasonably foreseeable effects for soil compaction could occur from past grazing, timber activities, and OHV routes. Alternative A could have a cumulative impact on soil compaction because cattle would continue to graze. None of the alternatives proposed would increase detrimental soil disturbance over existing condition. Alternative B would improve soil conditions by resting all allotments. Alternative A does not increase stocking rates above existing condition. As explained already, the expected detrimental soil compaction is less than one percent of the allotment is already occurring. There

may be a very small addition to the allotments from building new fences and tanks. However, this is expected to offset areas of compaction currently occurring in the riparian areas being fenced. Adding the impacts of from grazing, timber activities, and OHV routes, the cumulative effects to soil productivity from soil compaction is expected to be within Forest Plan Standard 1103 and not exceed 15%.

Similarly, it is expected that percent bare ground within allotments would remain static or improved based on the alternative selected. All allotments have bare ground less than 20% (from cover frequency data). Alternative A proposes new water developments and exclusion fences. These improvements may add trailing and bare ground around these areas but are expected to reduce trailing and bare ground in riparian areas and stream bottoms. This trade off is better for the soils and water quality. Alternative A would not protect soils as Alternative B, but it would move conditions toward the desired future condition, just at a slower rate. The soil surveys for Crook County, Wyoming and Lawrence County, South Dakota state that keeping 80% cover on project area soils would result in keeping soil erosion rates within tolerable levels.

There is not planned removal of humus, topsoil, leaves or limbs within any of the allotments, there are not cumulative impacts to the soil productivity with nutrient removal.

No cumulative effects for soils are expected under any alternative.

Watershed

Currently five bodies of water within the project area are listed as impaired for temperature form an unknown source in South Dakota. There are no stream reaches listed as impaired in the State of Wyoming. These five streams are Whitewood Creek, West Strawberry Creek, Bear Butte Creek, Elk Creek, and North Fork Rapid Creek. Most of these streams are within the Upper Elk allotment. Only North Fork Rapid Creek is in both Upper Elk and East Rapid allotment. However, the area around North Fork Rapid Creek is not grazed under current management and the two alternatives.

The project area is a multiple use area and other activities (other than grazing) contribute to water quality impacts. Other ongoing activities within the project area include roads, prescribed fire, vegetation management, noxious week management, mining, recreation and OHV use, and timber harvest. Grazing has been occurring in the project area for many years (>100). Over that time, livestock numbers have been reduced and improved grazing management has occurred. This project proposes further structural and non-structural range management improvements.

As with the direct and indirect effects, both alternatives would move the water conditions closer to desired future condition from a cumulative effect standpoint. Alternative B would move conditions along faster than Alternative A. Implementation of any of the proposed alternatives would not further degrade watersheds listed as Class II or III watershed condition class as discussed within the existing condition section.

All of the alternatives would comply with Forest Plan Standards & Guidelines to provide for long-term aquatic/riparian ecosystem health and ecological function. Stream bank alteration is expected to be maintained below 26% helping to improve long-term bank stability and water quality. Bare ground would be reduced to or maintained at 5-20% on most sites to protect water quality. Soil compaction due to livestock grazing would continue to be maintained at levels of less than 1% on most locations to protect soil productivity. Both alternatives would limit grazing

impacts to aquatic and riparian vegetation, allowing for continued aquatic/riparian improvement. Stream reaches and riparian areas impacted by livestock would be enhanced.

There would be no cumulative impacts to the aquatic ecosystems from changes in flow regimes with any alternative because the lack of direct and indirect effects would not result in an additive incremental impact.

Alternative A and B should not have a cumulative impact to the aquatic ecosystem from the temperature/oxygen parameter, because the change from implementing Alternative A would be negligible. Also, the cumulative impact would be difficult to detect because of the effects are already occurring and would be overshadowed by rainfall variability (drought) and dams. Past, present, and reasonably foreseeable impacts to the aquatic ecosystem from temperature/oxygen traditionally come from widening of the stream or removal of streamside vegetation.

The cumulative impact of either Alternative A or Alternative B would not violate water quality standards. With the cumulative impacts from Alternative A (adaptive management grazing), would be less than current grazing practices, but more than Alternative B. Thus when combined with past present, and reasonably foreseeable impacts, the incremental contribution from these allotments is expected to be reduced and to help meet beneficial uses and water quality standards in the future.

Riparian Areas

Alternative A would have an impact on riparian areas, because the impacts to riparian habitat that are already occurring would continue but at a reduced rate from current conditions because adaptive management actions would be implemented to move the riparian ecosystem to desired condition. Past, present, and reasonably foreseeable activities that impact the riparian areas of the allotments include cattle grazing, roads and trails within or adjacent to riparian areas, mining, and big game. Effects related to the road network and travel management may be expected to continue but may be reduced once a decision is made regarding Travel Management and OHV use on the Black Hills National Forest. Effects from wildlife browsing/grazing are likely to continue at current levels. Riparian areas are associated with water and cattle need water and preferentially select these succulent plans. If cattle are not managed properly they can have a detrimental impact to riparian areas, especially if they are allowed to loiter and the areas are grazed for extended periods of time. Alternative A would have a lesser cumulative impact that current grazing management, but a greater impact than Alternative B.

Floodplains

Since there are no effects to the floodplains within the East Rapid and Upper Elk allotments, there are no cumulative impacts to the floodplains.

Wetlands

This alternative would have an impact on wetlands, because grazing in some small wetlands may continue. However, impacts to many wetlands would be reduced or eliminated through proposed actions, monitoring, and adaptive management actions. Past, present, and reasonably foreseeable activities that impact there wetlands are primarily associated with cattle grazing, big game, roads, and non-system routes. Effects from big game browsing/grazing are likely to continue at current levels, though the effects are undoubtedly less dramatic than domestic livestock. Wetlands are associated with water and cattle need water and preferentially select these succulent plants. If cattle are not managed properly they can have a detrimental impact to riparian areas and wetland

vegetation, especially if they are allowed to loiter and the areas are grazed for extended periods. Alternative A would have a lesser cumulative impact on wetlands than current grazing management, but would have more of an impact than Alternative B.

Cumulative Effects Specific to Alternative A

Improved riparian condition and reduced bank alteration would have a positive, but minor incremental impact to soil or watershed condition for all allotments, but to a lesser degree than eliminating livestock grazing under Alternative B. Given the localized area of these improvements, this incremental impact would not be of a magnitude or intensity to noticeably affect soil or watershed condition when added to past, present or reasonably foreseeable actions. This incremental improvement in stream habitat conditions is not likely to change the watershed condition class rating. Other past, present or reasonably foreseeable actions would continue to affect fisheries, but some of these activities such as off highway vehicle (OHV) use on Gimlet Creek may be further restricted by other decisions.

Whitewood Creek, Bear Butte Creek, Elk Creek, West Strawberry Creek, and North Fork Rapid Creek are streams that are not currently meeting beneficial uses. These streams are likely to continue not meeting these uses because these stream reaches are impaired due to natural sources or the reaches within these allotments that are not at the desired condition are small enough that aquatic/riparian habitat improvement at these sites is not likely to have an influence on watershed level water quality parameters like temperature, or the impaired reach is at the desired condition within the allotment and no additional improvement due to the proposed action is predicted. Assigned beneficial uses that are currently being met are likely to continue to be attained.

Alternative A would have an impact on the aquatic ecosystem from sediment and bed and stream bank stability, because cattle would continue to graze along aquatic ecosystems. Past, present, and reasonably foreseeable impacts include sediment input from natural erosion, fires (natural or prescribed), roads, mines, and big game (elk/deer) that create connected-disturbed areas are likely to continue to contribute sediment. Past impacts to the aquatic ecosystem from sediment traditionally come from roads. Bed and bank stability impacts traditionally com from grazing and placer mining, but can also be associated to roads.

The impact of Alternative A added to past, present, and reasonably foreseeable impacts would not violate water quality standards. With the impacts from this alternative (adaptive management grazing), which would be less than current grazing practiced, and past, present, and reasonably foreseeable actions, beneficial uses of the streams and water quality standards would be met in the future. The impact of this alternative added to the past, present, and reasonably foreseeable impacts would not lead to detrimental bank instability. With the impacts from this alternative (adaptive management grazing), which would be less than current grazing practices, and past, present, and reasonably foreseeable impacts, stream bank stability would be maintained or improved.

This alternative would not have an additive incremental impact on stream connectivity, but existing instream barriers at dams or road-stream crossings that block fish movement are likely to persist.

Cumulative Effects Specific to Alternative B

Improved riparian vegetation condition and reduced bank alteration would have a positive, but minor incremental impact to the watershed condition of all allotments. Given the localized area of these improvements, this incremental impact would not be of a magnitude or intensity to noticeably affect watershed condition when added to past, present or reasonably foreseeable actions. This incremental improvement in stream habitat conditions is not likely to change watershed condition class. Other past, present or reasonably foreseeable actions would continue to affect soils and streams, but some of these activities such as off highway vehicle (OHV) use may be further restricted in the analysis area by other decisions.

Alternative B would eliminate grazing all together. No further water quality degradation is expected if all design criteria, monitoring, and adaptive management techniques are implemented within this project for any alternative. If no further water quality degradation is expected from the proposed project, then by definition, there can be no cumulative effects from this project.

Whitewood Creek, Elk Creek, West Strawberry Creek, Bear Butte Creek, and North Fork Rapid Creek are streams that are not currently meeting beneficial uses. These stream reaches are likely to continue not meeting these uses because these stream reaches are impaired due to natural sources or the reaches within the allotments that are not at the desired condition are small enough that aquatic/riparian habitat improvement at these sites is not likely to have an influence on watershed level water quality parameters like temperature, or the impaired reach is at the desired condition within the allotment and no substantial improvement due to livestock removal is predicted. Assigned beneficial uses that are currently being met are likely to continue to be attained.

There would be no cumulative impacts to the aquatic ecosystems from changes in flow regimes with Alternative B because the lack of direct and indirect effects would not result in an additive incremental impact.

There would be no cumulative impacts to the aquatic ecosystems from changes in temperature and dissolved oxygen parameter with Alternative B because the lack of direct and indirect effects would not result in an additive incremental impact.

This alternative would not have an additive incremental impact on stream connectivity but existing instream barriers at dams or road-stream crossings that block fish movement are likely to persist.

Riparian Areas

Because there are no direct or indirect effects to riparian areas, there are not cumulative impacts to riparian areas within all allotments.

Floodplains

Because there are no effects to the floodplains within the East Rapid and Upper Elk allotments, there are no cumulative impacts to the floodplains.

Wetlands

There would be no cumulative impacts to wetlands with this alternative because there would be no cattle grazing.

Rangelands

Rangeland is defined in the Region 2 Rangeland Analysis and Management Training Guide (RAMTG) (USDA Forest Service 1996c) 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. It includes all grasslands, forblands, shrublands, and those forested lands which can – continually or periodically, naturally or through management – support an understory of herbaceous or shrubby vegetation that provides forage for grazing or browsing animals.

Affected Environment

This analysis area encompasses the Pettigrew, Griffith, East Rapid and Upper Elk allotments on the Northern Hills Ranger District as well as the Stearns Park, Willow Springs, Grand Canyon, Silver Creek, Black Haw and Huett Springs Allotments on the Bearlodge Ranger District of the Black Hills National Forest.

Grazing is currently authorized under permit as summarized in Table 18 below.

Table 18. Currently authorized livestock use in NZR08 allotments.

Allotment	Grazing System	Pastures	Numbers [1]	Season of Use	AUMs (NFS + private)
Pettigrew	2 pasture deferred rotation	Baldy Red Lake	324 c/c term	6/16 – 9/20	1034
Griffith	5 pasture deferred rotation	Moses Yellow Jacket Arnold East Yearling West Yearling	118 c/c term 60 yrlg term 22 c/c pvt	6/16 – 10/15	729
Upper Elk	Season Long	Upper Elk	111 c/c term 38 c/c pvt	58 c/c from 6/7 – 9/30 91 c/c from 6/7 – 9/1	481
East Rapid	2 pasture deferred rotation	Gimlet Bloody Gulch	101 c/c term	6/1 – 10/15	455
Stearns Park/Willow Springs	7 pasture deferred rotation 1 pasture	East West Miller/Julius	289 c/c term 68 c/c pvt 309 c/c term	6/16 – 10/5 6/16 – 9/30	2613

Allotment	Grazing System	Pastures	Numbers [1]	Season of Use	AUMs (NFS + private)
	season long	Circle Plato Calvert/Sackett Lower Gathering Upper Gathering	60 c/c pvt		
Grand Canyon	3 pasture deferred	Minturn Grand Canyon Riflepit	429 c/c term 76 c/c pvt	6/11 – 9/30	1860
Silver Creek (Boardinghouse Unit, Duling Unit, North Unit)	2 pasture deferred 2 pasture deferred rotation Season Long	Roadifer Boardinghouse East West Moskee	35 c/c term 29 c/c pvt 91 c/c term 5 c/c pvt 22 c/c on/off (20 on) *15 c/c term plus 21 pvt	64 c/c from 6/11 – 10/25 106 c/c from 6/11 – 10/15 22 c/c from 6/11 – 10/15 36 c/c from 6/11 – 10/15	973
Black Haw	Season Long		90 c/c on/off (9 on)	6/10 – 10/15	379
Huett Springs	2 pasture rotation 1 pasture, short season	Huett Kudlock East/Sheep Ck.	150 c/c on/off (42 on) 25 yrlg term	5/10 – 9/30 6/1 – 7/1	735

*Unassigned numbers
[1] - c/c = cow/calf pair, yrlg = yearling

Livestock numbers, pasture rotations, and season of use can be modified on an annual basis to adapt to climatic conditions or administrative needs. This is accomplished through the Annual Operating Instructions (AOI) that are developed annually during spring meetings with permittees. These instructions implement the management direction set forth in the Allotment Management Plan that is developed following the project-level NEPA decision. A grazing permit is the instrument that authorizes use and occupancy by the specific holder of the grazing permit to graze

livestock on certain National Forest System or other lands under Forest Service jurisdiction. The AMP and AOI are incorporated into the terms and conditions of the grazing permit.

Field Surveys

The following methods were used to evaluate resource conditions on the allotments. Some field surveys were conducted annually while more intensive methods were conducted during the summer and fall of 2004-2007.

Suitable and Capable Rangelands

Suitable rangelands are those rangelands where there is no Forest Plan or other binding decisions 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 except MA 4.2A - Spearfish Canyon. About 432 acres of Pettigrew Allotment are mapped as within MA 4.2A. In fact, these acres are below the canyon walls and are neither accessible nor grazed by livestock. No changes in range suitability were needed based on this analysis.

Range capability can be a useful tool at the project level to identify where forage is available and how management can affect use of that forage. Capable acres for this analysis area were reviewed using the latest GIS data available (this information is available in the project file). Factors such as tree canopy cover, vegetative type and production, slope and aspect were all used to determine acres that were capable for grazing. 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.

The IDT determined that the initial capable acres (25,736 acres) derived from this data did not accurately represent the carrying capacity of the allotments as a whole or individually. The numbers generated by the "capability maps" indicated that some allotments would be overstocked and some allotments under stocked. However, this information did not correlate well with site-specific short and long-term monitoring data collected on the allotments.

In the absence of other information, rangeland inventories done at one point in time can be used to provide general estimates of present or potential carrying capacity of management units. However, carrying capacity estimates based upon one-point-in-time rangeland inventories do not produce results of sufficient accuracy to be the sole basis for adjusting time of grazing or stocking rates on specific grazing units. Additional adjustments are often needed to account for distance to water, livestock behavior, 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 within the actual carrying capacity for these allotments as discussed below.

Long-term Monitoring

Field surveys using cover-frequency methodology (RAMTG, USDA Forest Service 1996c) were conducted during the 2004-2007 field seasons. This methodology provides a current vegetation inventory as well as a baseline from which to measure trend. Cover Frequency transects can provide quantitative measurements of canopy cover and frequency by plant species as well as ground cover. Changes in bare ground, plant composition, and canopy cover or frequency over time can help determine if rangeland management objectives are being met or if changes in

management are required. If possible, previously established cover-frequency transects were reread. If they did not exist, either old transects of a different methodology were reread using cover-frequency methodology, or new cover-frequency transects were established. This allowed for a comparison of species composition change over time. The results of long-term monitoring are discussed for each allotment below.

Proper Functioning Condition

Proper Functioning Condition (PFC) assessments (BLM 1998) were also conducted during the 2005- 2007 field seasons. PFC is a qualitative approach for considering hydrology, vegetation, and erosion/deposition (soils) attributes and process to assess the condition of riparian-wetland areas. PFC assessments are discussed where available for each allotment below.

Forage Utilization

Utilization measurements taken over a period of time help to develop a picture of the health and vigor of the forage resource, and will indicate if the grazing system is compatible with resource objectives. Consistent over-utilization of plant communities can change their composition by allowing less desirable species to dominate or replac88desirable species. It can also lower forage production and limit the amount of residual forage available for wildlife. Short-term utilization studies, including the use of the Ocular Estimate Method (RAMTG, USDA Forest Service 1996c), have been taken over several years to monitor utilization in key areas. This helps to determine compliance with Forest Plan Standards and Guidelines. Recent forage utilization levels are discussed below for each allotment.

Black Haw Allotment

The Black Haw Allotment is located approximately eight miles southwest of Beulah, Wyoming. This allotment is comprised of 988 acres of National Forest System (NFS) lands and 1,760 acres of privately owned land. Currently this allotment has season-long use with one pasture as displayed in Table 18. Grazing is authorized under a term grazing permit with an ON/OFF provision. A total of ninety cow/calf pairs are permitted to graze from June 10 to October 15. Ten percent of the total numbers are authorized to graze on the NFS lands in conjunction with 90% from the private lands.

The allotment is isolated from adjacent National Forest by very steep ridges. Black Haw Gulch is the main landscape feature that identifies the allotment. The topography is very steep and rough. The Gulch itself averages approximately 100 feet in width with a road through part of it. There is a ridge that lies between the Gulch and Cold Springs Creek. This ridge makes up most of the allotment. Some open upland meadows exist among mostly timbered ponderosa pine ridges and slopes. An additional ridge west of the south fork of the gulch has more of an oak understory with grassland openings. Vehicle access to the uplands and the upper part of Black Haw Gulch is through the private land.

The ridge that lies between Black Haw Gulch and Cold Springs Creek contains most of the available forage. The rest is limited mostly to the bottom of Black Haw Gulch and the scattered uplands west of the south fork of the gulch. An EA done for this allotment in 1993 (USDA Forest Service 1993) indicates that most of the upland grasslands were in fair to good condition. The EA states that herbaceous communities were dominated by western wheatgrass and green needlegrass. Other species included bluegrass, sunsedge, snowberry, and a “variety of forbs”.

Hawthorn is the most common browse species and timothy the most common grass species in the drainage bottom.

Due to the size of the permit and the isolation of the allotment, administration has been limited. Actual use has been consistent for the last ten years except in 2002, 2003, and 2004 when cattle were removed early (9/1, early, and 9/15). Utilization has not been monitored on a regular basis. Allowable use is 40 - 45%. What little data there is suggests that it is probably exceeded along the bottom of the gulch.

A field review was conducted April 30, 2007 by an interdisciplinary team. There is not a lot of evidence of forage use on the uplands above the tank. There is more evidence of cattle use closer to the private. The junction of the two forks (see map in Appendix A) appears to have been grazed heavily in the past. Blue mustard, an annual weed was abundant, indicating heavy use and probably soil disturbance. According to Larsen and Johnson this plant "tends to establish around livestock pens and other areas disturbed by animals". The 1993 EA (USDA Forest Service 1993) also stated that higher use was found in this location, because cattle using the private land to the south and west pass through on their way to and from water.

There are two spring locations on the private land within the allotment. One is adjacent to the old homestead buildings in the SE ¼ of section 4. This one runs early and late in the year. It is not very reliable. The other one is located in the draw on the northeast part of the ranch in the SW1/4 of section 34. It is not a reliable source. This results in a lot of pressure on the spring in Black Haw Gulch through the driest part of the grazing season. This in turn results in heavier utilization along the bottom of the gulch.

The overall trend for this allotment is static. Two areas are not meeting desired conditions. Approximately four acres located in the bottom where the gulch forks, are not meeting desired conditions. The abundance of blue mustard present indicates unsatisfactory range condition; however this is not true for the rest of the upland areas and the remainder of the bottom. The one small riparian area associated with Black Haw Gulch Spring is not meeting desired conditions for riparian areas. It is directly adjacent to the road and the stock tank making it easily accessible by livestock. Trampling has occurred from the spring source located above the tank down to where the road crosses it. Beyond that point impacts are much less, probably because the cattle trail up the slope to private land prior to reaching that point.

Grand Canyon Allotment

The Grand Canyon Allotment includes 16,036 acres and is located approximately 14 miles south of Beulah, Wyoming and just north of US Hwy 85. It lies both in Wyoming and South Dakota. Grazing is currently authorized through one term grazing permit and one term private land permit for a total of 505 cow/calf pairs for the season of 6/11-9/30. Yearlings have occasionally substituted a number of pairs.

Notable topographic features include Riflepit, Grand, and Wagon Canyons and their side draws. The entire allotment is characterized primarily by large stands of ponderosa pine interspersed with stands of aspen with some pine encroachment occurring on the meadows. The meadows (totally approximately 1,456 acres), both broad and narrow, are dominated by Kentucky bluegrass and timothy. Willows are occasionally found along the edges of the meadows but very little riparian understory exists. Most of the large meadows are privately owned.

The long term transects were reread or established in 2004 using Cover-frequency Index methodology (RAMTG, USDA Forest Service 1996c). Twelve transects were read across the allotment (Wheeler et al. 2008). Timothy and bluegrass dominate in all transects. Native grass species such as green needlegrass, native wheatgrasses, prairie junegrass, poverty oatgrass, and tufted hairgrass exist. Forbs are similar to those discussed above across the allotment. Weeds such as hound's tongue, common mullein, and Canada thistle are often present in small amounts. Bare ground averages 3% on the eight transects that bare ground was recorded on.

The average resource value rating (RAMTG, USDA Forest Service 1996c) derived from specific species composition indicates that timothy is rated "high" early in the season for cattle and medium for deer and elk. Kentucky bluegrass is rated high all ungulates late into the year. The dominant forbs were yarrow and dandelion. Yarrow is rated low for all and dandelion high for all.

There are no stream courses with surface water on the allotment. Creeks are intermittent or ephemeral. Water generally surfaces as springs or seeps. The riparian areas associated with these springs and seeps are generally an acre or less in size. Spring exclosures in the allotment have not been maintained. According to the permittee the exclosures were to be left open to allow access to elk. With that in mind he did not collect all of the water available at the springs but used a method of collection that left water available around the source for wildlife (personal contact with Jesse Hoese). Spring sources and seeps are currently being impacted by cattle and large wildlife. Hoof action and resulting alteration are evident at all springs and seeps that are not currently fenced. The water from these sources is being piped to tanks for livestock use. Because they are still relatively close to the source they remain susceptible to trampling by livestock. Associated riparian vegetation is limited and cannot reach potential. Resting one of the pastures every year does allow for recovery, however anything gained due to rest is rapidly lost the following year.

Overall, this allotment has a static range trend in the Minturn and Grand Canyon pastures with an upward trend in the Riflepit pasture. Desired conditions are being met despite meadows being dominated by timothy and bluegrass (see Table 2). Early heavy grazing (beginning in the late 1800s), in combination with feed and seed brought in by settlers, changed species composition to include timothy and Kentucky bluegrass. Drought has had an effect on the allotment over the past few years during which time the permittee attempted to use only two pastures and completely rest the third. Utilization has been exceeded in the grazed pastures for the last two years.

Desired conditions for riparian areas are not being met. Hoof action and resulting alteration are evident at all springs and seeps that are not currently fenced.

Huett Springs Allotment

The Huett Springs Allotment consists of 4,333 acres in the Huett (Mills) Unit and 120 acres in the Graham Unit and is located approximately six miles south of Devil's Tower and 1.5 miles east of where Inyan Kara Creek flows into the Belle Fourche River. This allotment is 10 miles west of the main Bearlodge Mountains; isolated from the rest of the district it is surrounded by private land on three sides and state land on the south. Currently this unit is managed under a three to four pasture rotation system. Due to water the East Creek and Sheep pastures are not always a part of the rotation. A total of 150 cow/calf pairs (42 "On") are authorized to graze this unit under a term on/off permit from 5/10 to 9/30.

The allotment is made up of open grasslands and timbered slopes. It consists of dry ponderosa forest and mixed grass prairie interspersed with shrubs. Many of the open grasslands have some pine encroachment occurring.

Cover frequency data was collected in 1993. Four transects were established; however the fourth one was taken on private land not considered in this analysis. The NRCS ecological site description for this area suggests that the Historic Climax Plant Community (HCPC) is composed of 75% grasses, 15% forbs, and 10% shrubs. Species composition derived from the 1993 data indicates 50-60% grasses, 20-35% forbs, and 1-5% shrubs. Bluegrass, big bluestem and *Carex spp*. dominated one site, while prairie junegrass, sideoats grama, and western wheatgrass dominated the other two sites. Japanese brome (*Bromus japonicus*) was identified in all transects making up 1-6% of the composition overall. Earlier inspections refer to cheatgrass (*Bromus tectorum*). For the purpose of this analysis the two *Bromus* species will be referred to as annual brome, collectively.

A field review with the interdisciplinary team in May, 2007 did not identify a change in overall composition. Species noted included both annual bromes, green needlegrass, western wheatgrass, cudweed sagewort, big sagebrush, and coneflower. The IDT felt that species composition was good except for the presence of annual brome which probably made up to 25% of species composition in some areas. The presence of the brome species isn't likely a response to recent management. The field review noted that there was a lot of plant residue left from the previous grazing year, indicating that utilization was within guidelines. It was also noted that vegetation was growing in the cattle trails and a noticeable lack of bare ground around the Huett Spring tank.

There are some known locations of leafy spurge present on the allotment. The permittee has been actively treating and controlling them.

Water has always been a limiting factor. Water flows early in the season, if at all. The only reliable water in the East Creek and Sheep pastures is the East Creek Well in the NW ¼ Section 30. The current permittee drilled it and piped water into the Huett pasture. The Huett pasture has several dry dams. A private well in the SW ¼ NW ¼ section 31 is a reliable source of water and serves both NFS and private. The private is fenced into the NFS lands. Huett Spring is a source of water but produces very little later in the season. The dam in the southwest corner of Section 32 holds water throughout the year. The Kudlock pasture is in similar straits. The existing springs and dams are dry. The dam in the SE ¼ NE ¼ 29 is a wet weather dam.

The Huett Allotment is not meeting desired condition due to the presence of Japanese brome (*Bromus japonicus*) and cheatgrass or downy brome (*Bromus tectorum*). Japanese brome is an undesirable weed of grazing lands, but is normally not a problem on well managed range. (*Bromus tectorum*) is generally more prevalent than Japanese brome, especially on the west side of the Black Hills and the Bearlodge Mountains. The two species often occur together (Larsen and Johnson, 1999). Annual bromes affect associated plant species and nutritional quality of herbage available to grazing livestock (Haferkamp et al. 1998). Data collection and field observations indicate that Japanese brome is more prevalent on the allotment than cheatgrass. Cheatgrass is a more significant weed in drier environments; on well-managed mountain foothill sites cheatgrass generally does not compete effectively with perennial grasses (Mosley et al. 1999).

The NRCS uses state-and-transition vegetation dynamics in describing rangeland ecological sites. Stringham et al. (2001) defines a state as the vegetation and soil components necessarily

connected through integrated ecological processes that interact to produce a sustained equilibrium that is expressed by a specific suite of vegetative communities. Transition then is the change that occurs with in a state and indicates the system is moving toward a threshold. Management action is required for reversal. Maintenance of the state requires vegetation management practices such as prescribed grazing and burning for maintenance (USDA 1997).

Without the *Bromus* component herbaceous communities in this allotment are very similar to those described in the NRCS ecological site description for the Historic Climax Plant Community (HCPC). The two native increasers, blue grama (*Bouteloua gracilis*) and threadleaf sedge (*Carex filifolia*), reportedly dominant in 1985 were part of the composition in 1993, but not dominant. Blue grama was within the 5-10% acceptable in the HCPC. *Carex* spp. were 6% higher than the HCPC. This suggests that grazing management has not had a negative impact and that trend in regards to the native plant community is upward. Both of these species increase dramatically with overgrazing (NRCS, Tech Guide, 2005).

Overall, trend in this allotment appears to be static. Additional monitoring is needed to determine this; however desired conditions are not being met as determined by the IDT. Consideration should be given to the capability of management of any kind reducing annual brome and instead focus on maintaining the native community and minimizing the potential for an increase of annual brome through monitoring and management.

Silver Creek Allotment

The Silver Creek Allotment is comprised of 11,296 total acres located approximately six miles southeast of Sundance, Wyoming. It sits between the Moskee Road to the east and Highway 585 to the west. A total of 921 cow/calf pairs (20 “On”) are authorized to graze this unit under both term and term on/off permits from 6/11 to 10/15.

Topographic features include the Black Buttes and Fish Canyon. This allotment is mostly surrounded by private land; barely connected to the main Black Hills of Wyoming to the east.

Early history for this allotment dates back to 1927. The allotment was season-long use until 1994 when significant changes were made based on the 1992 Allotment Management Plan. Three separate management units were developed. They are discussed separately below because they are managed independently of each other.

The North Unit (also known as the Meisner Unit): This unit consists of 840 acres; 26 acres are privately owned by the current permittee. Approximately 80 acres of private land is not waived but cattle are allowed to graze it. This parcel is not included under permit and has no numbers assigned to it. However, it is not fenced and so livestock are allowed to graze it. There is one spring (NW ¼ 12) located on NFS lands. This spring has gone dry so cattle must water at the buildings on adjacent private land. Due to its size and lack of water in this unit it remained season-long use. In 1985 the Lantz fire resulted in a change in species composition. Approximately 200 acres were seeded with a mix composed mostly of non-native grass species. An inspection one year later noted timothy, slender and streambank wheatgrass, smooth brome and tall fescue “best-established”. Prior to the fire this area was dominated by a ponderosa pine overstory. The pine has not come back. It is mostly a grassland type with scattered shrubs.

This unit has not been consistently monitored over the years. Field reviews in 2007 indicated that utilization of herbaceous species was within standards. Some browse utilization was occurring on

the shrubs scattered throughout the burn area. The spring on NFS is no longer functioning and cattle are trailing back to private land to water. As a result utilization of the upland grassland above the spring is light and the small meadow lower down near the private land is high.

Grazing on this unit currently authorizes a total of 22 head for a season of 6/11-10/15 under an On/Off permit. The Off numbers consist of two pair. Grazing is still season long use. This unit is meeting desired conditions.

Boardinghouse Unit: The Boardinghouse Unit consists of 3,560 acres total. Both pastures have private and NFS lands in them. There are 2,705 NFS acres. Most of the upland communities are dominated by ponderosa pine. There are approximately 40 acres of riparian and approximately 45 acres of upland grassland. Primary grazing areas are somewhat limited; however, grazing does occur under pine.

The Boardinghouse Unit is grazed in a "deferred" rotation system. The Roadifer pasture is used first and last each year. Any deferment provided is reflected in the Boardinghouse pasture as the season varies each year. There is approximately 792 acres, 352 acres of NFS. There is 440 acres of private land in the Roadifer pasture. There is only one spring in this pasture located on NFS. The first year it is grazed from 6/11-6/25 and from 9/16 to 10/25. The alternate year it is used from 6/11 to 7/15 and 10/8 to 10/25. The 1992 AMP allowed for 31 animal months (NFS) and 78 animal months (private) that had not previously been permitted.

The Boardinghouse pasture (also known as Forest, North Central, and Silver Creek) is 85% NFS and 15% PVT. The first year it is grazed from 6/25 to 9/16 and during the alternate year it is grazed from 7/15 to 10/8. To obtain livestock use on the north end of this pasture the 1992 AMP included the use of Mell Spring, on private land. Use of the Mell spring water gap may vary from year to year, based on utilization around Kunath Spring (a key area). The AMP states that it is also understood that Mell Spring may be used by non-permitted cattle from other private lands outside of the permitted season. This was allowed for when figuring the available capacity of the 42 acre water gap. Sixteen animal months were assigned to the water gap. This pasture was grazed season long with what is now the Duling Unit until a division fence was constructed in 1994.

Resource objectives from the 1992 AMP included the riparian area associated with Kunath Spring. This spring starts on private and overflows onto the allotment. Browse species was a concern and this area was and still is considered a key area. This area seems to be maintaining, it warrants further monitoring and should remain a key area. A cover-frequency transect was established in the meadow above Boardinghouse spring. The composition at this site consists of 51% grass species, 2% *Carex* species, 22% forbs, and 25% shrubs. Kentucky bluegrass is the dominant grass species. Other grasses present include, green needlegrass, sheep fescue, western wheatgrass, needleandthread, prairie junegrass, blue grama, and little bluestem. Japanese brome and smooth brome were also present in very limited amounts. American licorice and *Echinacea* were the dominant forb species. Others included cudweed sagewort, white prairie aster, threenerve fleabane, false dandelion, meadow anemone, dotted gayfeather, yarrow and vetch. Bare ground averaged 2% in this transect.

This benchmark is meeting desired condition. Species composition is diverse. Despite bluegrass dominating the site it is overall composed of native species. Trend is hard to determine without prior data on this site, however, field observations in the fall of 2007 indicate that this unit is probably trending upward.

Duling Unit (also known as the Smith Unit): Like the other two units the vegetation communities in the Duling Unit are dominated by Ponderosa pine uplands. It contains approximately 135 acres of upland grassland on NFS lands and 125 acres on private land. There are sufficient water sources to provide for distribution in this unit except in the northeast portion. There are three large reservoirs on private land that are reliable sources of water. In 1992 trampling of riparian vegetation was a concern and widening of the stream channel below Buckley Spring (on private land) and the spring in Fish Canyon as well as trampling around some of the developed springs. There is one water gap on Cold Creek in the northeast corner of the unit that has not been effective. Livestock do not use it well, the fence should be relocated. In 2006 the livestock tanks located at Pete's Spring and Left Overshoe were relocated outside of the riparian areas. The pipe at Pete's was laid over the ground to avoid soil disturbance through the riparian.

Until 2008 this unit was a single pasture system and grazed season-long. A division fence was constructed in 1994 that separated the Duling Unit from the main pasture of the Boardinghouse Unit. The 1992 AMP intended to implement a two pasture rotation. This never occurred. There have been recent changes in the numbers due to changes in private lands. This unit was rested from 2004-2006. It was restocked in 2007, but will probably be rested again in 2008.

A recent change in ownership of some of the private property within the allotment resulted in management changes on the ground. A boundary fence was constructed in the southeast portion of the allotment, effectively creating two additional pastures. The new East pasture will become part of the Duling Unit and the second pasture will become the Moskee Unit separate from the Duling Unit. An additional change occurred in the waived private land permit. The private land acres in T.50N, R.62W Sections 22, 23, 26 and 27 can no longer be claimed under a waived private land permit, therefore no numbers are assigned to them. This is a reduction in total numbers available on this unit. This private land parcel is not fenced out so cattle still graze it. Permitted numbers in this unit have changed from 106 cow/calf pairs from 6/11 to 10/15 (term) and 62 cow/calf pairs from 6/11 to 10/15 (waived private) to 91 cow/calf pairs (term) and 5 cow/calf pairs (waived private).

Data collected in 1993 was taken from grasslands located on waived private land near the Upper and Russell reservoirs. This land is no longer waived. However the transect near Russell Reservoir was reread in 2007. Analysis from 1993 indicated unsatisfactory range condition. The methodologies used to collect the data are different, however comparisons can be made from the composition and species lists. Kentucky bluegrass and snowberry continue to dominate the site. The 2007 data indicates good species diversity with native forbs making up 20% of the composition. The presence of litter is substantial at 78%. Bare ground averaged 1% in 2007 versus 8% in 1993.

Desired conditions are being met in this unit. Trend is upward in all areas. Currently there are no resource concerns with the exception of the riparian area at Pete's Spring. This area is still available for livestock use and trampling. The relocated tank will pull cattle away from the area of concern; however the source should be protected including the saturated soils surrounding it. A buck and rail fence was planned prior to this analysis.

Moskee Unit: This new unit is comprised mostly of private land. The following NFS parcels are currently part of this unit; T.50N, R.61W Sections 30 and 31 totaling 280 acres. These parcels except one are primarily Ponderosa pine dominated uplands with no resource concerns associated

with them. One parcel includes a dry portion of the Buckley drainage above the Buckley spring. The private land in this unit totals 880 acres. An application is pending for the following unassigned numbers and season (formerly authorized under permit on the Duling Unit): 15 cow/calf pair (NFS) and 22 cow/calf pair (private) for the season of 6/11 or 10/15 or the equivalent of those numbers. These numbers were determined using the grazing capacity numbers used in 1991. These numbers are believed to be accurate due to the fact that there have been no vegetation type changes as a result of timber sales or fire. There are no concerns with the capacity in this area based on the allotment files. Future monitoring may indicate a need for change. This unit is meeting desired condition.

Overall this allotment is meeting desired conditions with an upward trend.

Stearns Park/Willow Springs Allotments

These two allotments are located approximately 15 miles south of Beulah, Wyoming. The Cement Ridge Lookout sits just north of the boundary. The Stearns Park Allotment consists of 10,878 acres and the Willow Springs Allotment consists of 11,896 acres. Currently these two allotments are grazed together to form a seven pasture deferred rotation system. An eighth pasture is grazed season-long by yearling heifers. There is also some private land (not waived) that is used during the season. Currently a total of 357 pairs (68 private) are permitted from 6/16 to 10/5 and a total of 369 pair (60 private) are permitted from 6/16 to 9/30. The private land numbers are often converted to yearlings.

Topography is characterized by rolling hills with slopes up to 40%, dissected by some narrow canyons with steep sides. Elevations vary from 5600’ to 6300’. Rock outcrops on the western edge and central portion form the walls of the Grand Canyon and Rattlesnake Canyon. Stearns Park is drained by Rattlesnake Canyon, Balm of Gilead Gulch, and Schoolhouse Gulch as well as Little Spearfish Creek on the east. The allotment straddles the state line. A portion of Willow Springs also lies in South Dakota. The two allotments are connected with Willow Springs to the west and Stearns Park to the east.

Seeps and springs provide water, although a few seasonal and ephemeral water sources exist. There are numerous dry, grassy and timbered draws. Ponderosa pine overstory dominates the allotment. Common understory species include snow berry, chokecherry, service berry, and common juniper. Willow species are present; scattered across the landscape. Aspen clones are common, especially on the east side. Meadow bottoms make up approximately two percent of the landscape and are dominated by bluegrass and timothy

There were no long-term transects established in the Stearns Park allotment except in the Miller/Julius pasture when it was part of the Grand Canyon Allotment. Concerns listed in the 1991 Grand Canyon EA (which included the Stearns Park Allotment) were: protection of spring areas and bank stability. During the 1991 analysis it was determined that 50% of the primary range in the Miller pasture was in satisfactory condition. In 2004 eleven cover-frequency transects were established in the Stearns Park Allotment. Two benchmark sites are representative of the allotment: Buffalo Park and Section 16. Buffalo Park is dominated by Kentucky bluegrass (*Poa pratensis*), Carex species (*Carex* spp.), and smooth brome (*Bromus inermis*). Forbs are dominated by cinquefoil (*Potentilla* spp.), yarrow (*Achillea millefolium*), and dandelion (*Taraxacum officinale*). This site is composed of 45% perennial grasses, 25% grass-like sedges, 28% forbs, and 2% shrubs. Bare ground was 6%. Section 16 benchmark is dominated by

Kentucky bluegrass (*Poa pratensis*) and timothy (*Phleum pretense*). Forb species are dominated by clover (*Trifolium* spp.), yarrow (*Achillea millefolium*), and dandelion (*Taraxacum officinale*). . This site is composed of 58% perennial grasses, 1% grass-like sedges, 39% forbs, and 2% noxious weeds (Hound's tongue (*Cynoglossum officinale*). Bare ground was 8%. Bare ground can be an indicator of site health. A higher percentage of bare ground on a site indicates that there is a higher potential for soil erosion and/or an increase in undesirable species. Bare ground averaged 5% across the allotment.

Many of the primary grazing areas in the Willow Springs Allotment are made up of meadows that are dominated by introduced species such as Kentucky bluegrass and timothy. Cover-frequency transects established in 1993 were reread in 2004. Data gathered in 1993 in both allotments indicates that Kentucky bluegrass and timothy are the dominant grass species with the exception of the transect located in Rattlesnake. In that area Intermediate wheatgrass is co-dominate with bluegrass and C*arex* spp. Another transect in lower Grand Canyon included more native grass species. *Carex* spp. were not dominate but abundant. Forbs species dominating these sites include clover (*Trifolium* spp.), yarrow, dandelion, and occasionally plantago. Snowberry was common to most transects and weeds such as houndstongue, mullein, musk thistle, and Canada thistle were present in most of the transects. Data collected in 2004 indicates very little change. Green needlegrass appears to have increased near Straight Lake and *Carex* is co-dominant with the bluegrass and timothy on one site. In the benchmark areas in the Willow Springs allotment perennial grasses averaged 52%, *Carex* species averaged 13%, and forbs averaged 25%. Native perennial grass species such as western wheatgrass and green needlegrass are still present as are desirable forbs including vetch, columbine, and cinquefoil.

In 2007 two Proper Functioning Condition assessments were done on Guidinger Creek. One was done above the existing exclosure and one was done below the exclosure. Both reaches were determined by an interdisciplinary team to be functional at risk. Historic records indicate that there has been improvement in this area for many years. Utilization for the adjacent uplands was 54%.

Overall these allotments are meeting desired condition even though trend is static. The species composition present in both allotments is such that a significant change would not be expected. Current management has maintained desired conditions in most upland areas. A couple of the upland benchmarks are not meeting desired condition due to weeds or bare ground. Noxious weeds are present in several areas and can be attributed to disturbance from timber sales and road work. While livestock may contribute to their continued presence, species composition and acceptable levels of bare ground indicate that livestock management is not spreading noxious weeds outside of tank sites. Current management, the presence of competitive perennial grasses and a lack of soil disturbance seem to be holding these populations in check. The riparian areas around some springs such as Three Willow and Guidinger Creek are a concern. Trampling and stream bank alteration often occur in these areas. This may have slowed down improvement in Guidinger, however trend in this area is upward.

East Rapid Allotment

The East Rapid Allotment consists of approximately 13,432 acres of NFS land. Elevation ranges from roughly 4,800 feet to just over 6,100 feet. It is located nearly 15 miles SE of Lead, SD. The allotment is bounded to the north by the Pasture and Wolff allotments, to the west by the Wolff

and Reynolds Prairie Allotments, to the south by the Mystic Ranger District and to the east by the Mystic Ranger District as well as the Pasture Allotment (details on the history of grazing in this allotment can be found in the Range Specialist Report, Wheeler et al. 2008).

The current management consists of grazing 101 cow/calf pair from 6/1 to 10/15 for a total of 455 AUMs under a two pasture deferred rotation grazing system. Maximum allowable use is 50% in the uplands.

Long term transects read in 1964 showed that the site was dominated by Kentucky bluegrass with a lesser amount of quackgrass (*Agropyron repens*). Other species that were present include cinquefoil, clover, yarrow, iris, timothy, snowberry (*Symphoricarpos occidentalis*), pepperweed (*Lepidium densiflorum*), and fleabane (*Erigeron* spp).

In 2005, long term transects were read in a different location than the 1964 transects. The 1964 transects could not be relocated, and the description to the site was not sufficient to locate the general area. The 2005 transect location is near a key grazing area that is monitored annually, which will help to correlate short term use with long term changes. The 2005 transects were dominated by Kentucky bluegrass and timothy. Other species present include smooth brome (*Bromus inermis*), dandelion, American vetch, sedge and clover. Bare ground averaged less than 5% on these transects in 2005.

The average resource value rating indicated that 70% of the vegetation is rated either high or moderate for livestock. For both deer and elk, 90% is rated as high or moderate. In terms of watershed protection, 70% of the species are rated as either high or moderate.

PFC assessments were conducted on Gimlet Creek as well as Rapid Creek. Gimlet Creek assessments were conducted in 2005 on both lentic and lotic systems along Gimlet Creek. Gimlet pond was rated at Proper Functioning Condition while Gimlet Creek was rated as Functional At Risk with an upward trend. PFC assessments conducted in 2007 rated Rapid Creek at Proper Functioning Condition. MIM was conducted on Gimlet Creek during 2007 to gather baseline data. Results indicate that bank alteration was at approximately 33% and bank stability at 41%. This stream shows signs of improvement with the presence of riparian vegetation and 90% covered banks. This area should continue to be monitored to determine whether or not additional changes are needed in livestock management to continue with riparian recovery.

Currently, Keloran Spring is not fenced and livestock are accessing the area as a primary water source. Trampling and hummocking are occurring near the spring source. It is recommended that the spring source be protected and a tank located outside of the riparian area to provide an alternate watering location.

Overall, this allotment has an upward trend and is meeting its desired condition with the exception of a few isolated locations. Gimlet Creek is showing signs of improvement, however the possibility of installing temporary fence in this area to accelerate recovery is being proposed. Keloran Springs has historically received higher use than desired. Aside from these locations, the allotment is moving towards or has achieved its desired condition. Pasture dates have been adjusted as necessary, and livestock sent home when utilization standards were achieved, especially during the recent drought years. Riparian monitoring has been conducted and baseline data collected for key riparian areas on the allotment.

Griffith Allotment

The Griffith Allotment consists of approximately 5,704 acres of NFS land on the Northern Hills Ranger District of the Black Hills National Forest in South Dakota. It is located roughly 18 miles SW of Spearfish, SD and ranges in elevation from around 6,000 feet to just over 6,700 feet.

The Griffith Allotment has been managed under a number of different grazing systems, including a variety of deferred and rest rotational grazing systems. Most recently, a rest-rotational grazing system was in place from 1992 to 1994 to determine its feasibility. This was discontinued in 1994 when a deferred rotational grazing system was put back into place and has continued through 2007.

The allotment is currently managed in a single herd, five-pasture deferred rotation grazing system. Currently permitted livestock include 118 cow/calf pair and 60 yearlings from June 16 to October 15 under a Term permit (641 AUM) and an additional 22 cow/calf pair from 6/16 to 10/15 with a private land permit (88 AUM).

Transects read in the late 1980's show that Kentucky bluegrass, timothy and dandelion dominated the locations. Other species that were present included green needlegrass, sedge, yarrow, meadowrue, cinquefoil, violet, iris (*Iris missouriensis*), tufted hairgrass (*Deschampsia caespitosa*), chickweed and clover. Noxious weeds that were identified include thistle and hounds tongue.

Transects read in 2005 show that the sites are still dominated by Kentucky bluegrass, timothy, dandelion and yarrow. Several desirable native forbs and grasses have either persisted or have become established since the late 1980's including Columbia needlegrass (*Stipa nelsonii*), green needlegrass, American vetch, longspur violet, oatgrass (Danthonia spicata), Richardson's geranium (*Geranium richardsonii*), lanceleaf bluebells (*Mertensia lanceolata)*, rock jasmine (*Androsace septentrionalis*), prairie smoke (*Geum triflorum*) smooth blue aster (*Symphyotrichum leave*) and blanket flower (*Gaillardia aristata*). Bare ground on these transects averaged less than 5% in 2005.

The average resource value rating derived from specific species composition indicates that 56% of the vegetation is rated either "high" or "moderate for livestock. For deer, 86% is rated as either high or moderate compared to 81% at these levels for elk. The resource value rating for watershed protection averaged 67% at either the high or moderate level.

Spearfish Creek in the Yellow Jacket Pasture is a perennial stream. There are eight springs within the allotment. Most of the springs have been developed for water within the allotment.

Overall, the Griffith Allotment is meeting the desired condition. Short term monitoring indicates that guidelines are being met, and long term monitoring indicates that the condition of the vegetation is at or moving towards the desired condition. Several desirable native forbs and grasses have either persisted or become established over the last 20 years. Isolated locations that are not at desired condition, such as Lander Spring, are identified in this analysis and management changes have been developed for these locations.

Pettigrew Allotment

The Pettigrew Allotment consists of approximately 7,318 acres of NFS land on the Northern Hills Ranger District of the Black Hills National Forest in South Dakota. It ranges in elevation from

5000 feet along Iron Creek to 6100 feet at Old Baldy Mountain. It is located roughly 10 miles SW of Spearfish and bounded to the North by the Tollgate, Higgins Gulch and Bear Ridge Allotments, to the West by the Cement Ridge and Sterns Park Allotments, to the South by the Plateau, Little Spearfish and Stearns Park Allotments, and to the East by the Plateau and vacant Ragged Top Allotment.

Current management consists of grazing 324 cow/calf pair from 6/16 to 9/20 for a total of 1,034 AUMs under a two pasture deferred rotation grazing system. Currently, one permittee runs 324 pair on the Pettigrew allotment from June 16 to September 20 (1034 AUM). Estimated capacity was 324 pair for 60 days in the Red Lake pasture and 35 days in the Baldy pasture according to the 1993 AMP. From 1996 through 2002, 53 days were authorized on the Baldy pasture. Due to drought conditions, livestock were removed from the allotment 4 weeks early in 2002. Currently, use has been 324 pair for 53 days in the Red Lake pasture and 42 days in the Baldy pasture.

Many of the meadows and primary grazing areas on the allotment are dominated by non-native species. Heavy grazing during the early 1900s, in combination with feed and seed brought in by settlers, changed species composition to include timothy and Kentucky bluegrass. Transects read in the late 1980's show that Kentucky bluegrass (*Poa pratensis*) and timothy (*Phleum pratense*) dominate the site with a few other species present, including green needlegrass (*Stipa viridula*), clover (*Trifolium* spp.), yarrow (*Achillea millefolium*), dandelion (*Taraxacum officinale*), stinging nettle (*Urtica dioica*), American vetch (*Vicia americana*), cinquefoil (*Potentilla spp.*), chickweed (*Cerastium arvense*), sedgees *(Carex* spp.), dock (*Rumex acetosella*), beebalm (*Monarda fistulosa*) and harebell (*Campanula rotundifolia*). Noxious weeds identified included houndstongue (*Cynoglossum officinale*) and thistle (*Cirsium* spp.) .

Transects read in 2005 show that the sites are still dominated by timothy, Kentucky bluegrass and yarrow. Several desirable native forbs and grasses have either persisted or become established since the late 1980's, including green needlegrass, mountain brome (*Bromus marginatus*), American vetch, two violet species (*Viola adunca, Viola canadensis*), harebell (*Campanula rotundifolia*), blue eyed mary (*Collinsia* spp.), prairie star (*Lithophragma parviflorum*) and meadowrue (*Thalictrum venulosum*).

Achieving good distribution and even utilization has been an issue in certain portions of the allotment for over 20 years; with some areas reaching or exceeding proper utilization while most of the allotment is well under allowable use. Bluegrass meadows and some riparian areas, including portions of Beaver Creek and portions of Iron Creek; from the headwaters near Baldy Lake to the creek near Prospect Gulch have been areas of concern. Recent fencing, water developments, salting and riding have all been used and are improving distribution and utilization levels, although there are certain areas that receive heavier utilization such as Baldy Lake and Pettigrew Gulch. Water is a limiting factor in obtaining even distribution throughout the allotment. Generally, the use on riparian species such as *Carex* is not as prevalent as the bluegrass adjacent to these riparian areas.

Overall, this allotment has an upward trend and is meeting its desired condition with the exception of a few isolated locations. Changes in management are being implemented to correct these problems. The Beaver Creek riparian exclosure was rebuilt in 2003 to speed up the recovery of this site. Exclosures have been constructed in portions of Ladyfinger Gulch to protect sensitive species; more exclosures are scheduled to be constructed in 2008 in Pettigrew Gulch for

the same reasons. In 2004, stock tanks in Pettigrew Gulch were relocated outside of the riparian area and exclosures expanded in order to minimize impacts from livestock. Improvements have been observed in the Baldy Lake area including increased willow recruitment. Drought has had an effect on the allotment over the past few years, but overall utilization levels have been within the allowable use guidelines and livestock removed from the allotment early when utilization has reached these limits.

Upper Elk Allotment

The Upper Elk Allotment consists of approximately 8,813 acres of NFS land on the Northern Hills Ranger District of the Black Hills National Forest in South Dakota. Elevation ranges from roughly 5,200 feet to 6,400 feet. It is located approximately 3 miles South of Lead. The allotment is bounded on the north by the Lead/Deadwood Exemption area, to the west by the Wildcat and Buskala Allotments, to the south by the Buskala, Dumont and Custer Peak Allotments and to the east by the Custer Peak and Bear Butte Allotments (details on grazing history of this allotment can be found in Range Specialist Report).

Currently, there are three permittees on the Upper Elk Allotment that graze 111 cow/calf pair under Term grazing permits and 38 cow/calf pairs under Private Land permits for a season varying from June 7 to September 30 for a total of 481 AUMs (Term and private). The Upper Elk Allotment operates under a season long grazing system. There are no distinct pastures within the allotment. Each permittee's cattle graze "their" portion of the allotment. In 1992 permitted livestock were 60 yearlings and 47 cow/calf pair with 5 pair under a term private land permit.

Currently, there are three permittees on the Upper Elk Allotment that graze 111 cow/calf pair under Term grazing permits and 38 cow/calf pairs under Private Land permits for a season varying from June 7 to September 30. The current stocking rate of 336 AUMs is based on the grazing of NFS lands (336 AUMs from Term Permits, 481 AUMs with Term and Private Land Permits). Two permittees remove 91 cow/calf pairs on September 1, with the remaining 58 leaving the allotment by September 30.

Vegetation transects were reread in 2006 and showed that the sites were dominated by smooth brome, Kentucky bluegrass, timothy, sedge and Oregon grape (details on past transect data can be found in Range Specialist Report). Several desirable native forbs and grasses have either persisted or become established since 1994 including Slender wheatgrass (*Elymus trachycaulus*), longspur violet, wild spiraea, American vetch, fuzzyspike wildrye (*Leymus innovatus*), rough-leaved ricegrass (*Oryzopsis asperifolia*), spurred gentian (*Halenia deflexa*) and cream-colored vetchling (*Lathyrus ochroleucus*). Bare ground averaged less than 5% on these transects in 2005.

The average resource value rating indicates that 60% of the vegetation rates as either high or moderate for livestock. 81% rates as high or moderate for deer as opposed to 75% at these levels for elk. 74% of the vegetation rate as high or moderate for watershed protection.

PFC assessments were conducted on two streams during the 2007 field season. Two small portions of Elk Creek flow through NFS lands with private land above and below each of these portions. Both sections were rated as Functioning at Risk. Utilization has been within allowable use, however, bank alteration is questionable and will require further monitoring. PFC was also conducted on Bear Butte Creek. This stream was also rated as Functioning at Risk with an upward trend. This stream was not rated as Functioning at Risk due to impacts from current

livestock grazing. The stream channel is unstable due to the down cutting that has occurred as a result of the breaching of historic beaver dams.

Overall, the Upper Elk Allotment has an upward trend and is moving towards desired condition. Areas that have received historic over utilization are now meeting utilization standards. Long term transects indicate that desirable native species are either persisting or becoming established. Elk Creek was rated as functional at risk with no apparent trend as described above. Bear Butte Creek has historically been described as being overused by livestock, and now shows little sign of livestock use and is recovering. Many of the reasons that Bear Butte Creek did not achieve a "PFC" rating were due to other causes besides livestock, including the loss of several beaver dams and isolated head cuts. Woodville Lakes has also historically been identified as an area of overuse, and now is receiving proper utilization due to better distribution of livestock.

Environmental Consequences

A list of design features that are common to all action alternatives and adaptive management strategies can be found in Chapter 2 of the EA.

Alternative A (Proposed Action)

A maximum of 9,259 AUMs would be authorized on a total of 92,664 acres. Maximum allowable forage utilization would range from 40-50% depending on the vegetation type and the current range conditions. One allotment could be grazed up to 70% utilization to reduce cheat grass infestation. Three miles of fence would be built to split two pastures. Four and one-half miles of pipeline, 6 stock tanks and 1 storage tank would be added to improve livestock distribution. One-half mile of fence would be relocated. One stock tank would be removed or relocated. Thirty-eight springs, ponds, or riparian areas would be protected with fences.

The proposal includes an adaptive management approach to livestock management that is 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 effect improvement in resource conditions (see Table 5).

The proposed action is designed to maintain or improve resource conditions in rangeland health, vegetation, watershed conditions, and in ecological sustainability relative to livestock grazing. Proposed adaptive management strategies include structural improvements. Construction of new improvements would be completed within five to ten years depending on funding and prioritization of improvements based on resource conditions. Standards and guidelines would continue to be met regardless of when the improvement is constructed.

The actual number of livestock and season of use would be determined each year prior to grazing and would be outlined in the Annual Operating Instructions. Factors such as drought, fire or other specific management objectives could all influence livestock number and season of use. The degree to which drought impairs the range's potential for future forage production depends on the intensity, frequency, and timing of grazing. Range-livestock managers can control each of these factors through their management practices (Howery, 1999).

Direct and Indirect Effects of Project Components

Change Grazing Systems

Altering the timing and intensity of livestock grazing may have beneficial impacts on the vegetation. One way to alter timing and intensity is to implement a different grazing system. This might include developing more pastures or changing from a season long system to a deferred rotation system. This will also alter the distribution of the livestock by concentrating them in a smaller area for a shorter duration. Utilization may increase in areas that currently receive little or no use. Vegetation will only be grazed during one portion of the year and then have the opportunity for regrowth and/or reproduction. Most rotational grazing systems are designed so that the vegetation in one pasture is not grazed at the same time each year.

Use Water to Control Livestock Distribution

In a pasture with multiple water sources, if one area is approaching allowable use while other areas are under utilized water sources can be turned on or off to alter distribution. Cattle would be forced to go elsewhere for water. Hauling water to temporary tanks can influence livestock distribution and obtain use in areas that normally receive light to no use (location of tanks are moved around allotment). When there is adequate water to meet other resource needs (such as riparian ecosystems and wildlife habitat) and livestock distribution is in need of improvement to alleviate other resource concerns, new water developments (dugouts/ponds, wells, pipelines, springs, etc.) can be constructed. Removing existing water development can influence livestock distribution and/or sensitive resources.

Water is a useful tool to control or manipulate the time livestock spend in an area. Water is often a limiting factor in achieving desirable distribution away from riparian areas or other areas of concern. Providing water away from riparian areas has been shown to reduce impacts by livestock to riparian areas by reducing the amount time that livestock spend in these areas (Miner, et al., 1992 and Godwin and Miner, 1996, Wyoming DEQ, 1997). The areas immediately adjacent to tanks may receive heavier use.

Fencing (temporary or permanent)

Fencing can be a useful tool in controlling livestock access to areas where grazing or other impacts from livestock are not desirable (Wyoming DEQ, 1997). The exclusion of livestock from these areas may alter the normal distribution of livestock, which in turn could have negative impacts to other portions of the allotment. Occasionally, trailing may occur along a fence line and may cause livestock to concentrate along fences. Fencing requires a financial commitment in both the long and short term. If proper maintenance is not conducted, livestock can actually be fenced into an area and cause undesirable effects.

Alter Period of Use/Non-Use

Resting a pasture from grazing can give vegetation the opportunity to restore carbohydrate reserves and recover from any over-utilization that occurred in the past. This will most likely result in a reduction in AUMs while the pasture is being rested if these livestock can not graze elsewhere during this period. The time of use in an area can be altered to meet resource objectives. This may include delaying entry date for livestock into a certain pasture or area, removing livestock from an area during critical time periods, etc. This may require a temporary reduction in AUMs, construction of temporary or permanent fencing, or some other measure to control livestock use. Livestock numbers and season can also be altered to meet resource

objectives, which may or may not result in a reduction in AUMs. Numbers or season can be reduced or increased, more livestock can be run for a shorter time period, or fewer numbers for a longer time period to meet resource objectives. Utilization standards have been developed based on scientific research on common rangeland species (Clary and Webster 1989), (Clary 1995), (Clary and Leininger 2000), (Vallentine 1990). They are based on ecological principals, management concerns, and averages for representative floristic lifeforms (grasses, grasslikes, and shrubs). Measurement of utilization is based on the annual production of above-ground biomass of plants and is stratified by management type, rangeland ecosystem conditions, and by broad groups including upland, riparian, browse. When developing utilization standards, proper use considers the physiological requirements for maintaining plant health and vigor as well as management considerations such as streambank stability, ground cover, soil compaction, wildlife habitat, fish habitat, etc. More stringent allowable use standards could cause livestock to be removed from the allotment prior to the planned off date.

Use of Range Riders

Herding is another tool that can be used to improve livestock distribution and control or manage the time they spend on riparian areas or other areas of concern. Use of a rider increases the intensity of management of livestock and associated range improvements. Use of range riders on the Black Hills has improved pasture integrity, reduced conflicts with other users of the Forest, improved distribution, and unauthorized use. Herding on a somewhat daily basis has been successful in limiting the number of livestock that visit stream bottoms and improving utilization of upland areas (Kauffman and Krueger, 1984, page 435).

Change Class of Livestock

Yearlings are known to travel further and in more rugged country than cows or cow/calf pairs, this provides for better distribution and less time spent in riparian areas. However yearlings may require a higher degree of fencing and/or fence maintenance. Natural barriers may not be as effective for controlling yearlings. Cows become habituated to grazing certain areas, while yearlings require more intensive management.

Change in Stocking Rate

Stocking rates may be reduced through fewer animals or through fewer days of grazing. Grazing may also be eliminated. Grazing of riparian areas at proper use levels can result in stable riparian herbaceous vegetation, generally in a late seral stage. Late seral plant communities have strong root systems that help hold the soil in place and resist erosion. The most recent research indicates that proper use on riparian areas should be 4 inches of stubble height on key hydric species on the green line at the end of the growing season for riparian areas in mid to late seral stages and 6 inches of stubble height for riparian areas in very early and early seral stages. In addition livestock must be removed from a pasture when heavily used portions of the riparian area (away from the green line) reach a 2 inch stubble height; or when 20 percent of the green line shows bank sloughing, animal tracks, dislodged stones and/or trampling from livestock; or when adjacent uplands show heavy use in excess of proper use utilization standards; or if proper use of woody species is exceeded. If these proper use guides are followed, riparian areas will improve.

Lacey and VanPoolen (1981) compared 11 studies throughout the west and found that protected areas produced an average of 68% more herbage than comparable areas grazed at a "moderate" rate. However, permanent removal of grazing will not guarantee maximum herbaceous plant

production. Volland (1978) found that a protected Kentucky bluegrass meadow reached peak production in 6 years and then declined until production was similar to the adjacent area grazed season-long. Clary and Webster (1989) report that the accumulation of litter over a period of years seems to retard herbage production in wet meadow areas. Thus, some grazing of riparian areas could have beneficial effects.

While there is abundant documentation of positive changes when removing livestock from deteriorated rangelands, a review of research literature indicates that there may be little difference in the effects of no grazing and grazing at proper use (rather than over-grazing). Bryant (1985) states that total exclusion of all human activities from riparian areas, is unlikely to return those areas to pristine conditions. Hall (1985) offers the same conclusion with regard to effects on wildlife: "Even if livestock grazing were excluded from public lands in the Great Basin, the resulting circumstances would not provide optimum habitat conditions". Permanent removal of grazing will not guarantee maximum herbaceous plant production. The accumulation of litter over a period of years seems to retard herbage production in wet meadow areas. Thus, some grazing of riparian areas could have beneficial effects (Clary and Webster 1989).

Direct Effects Common to all Allotments

If this Alternative A is selected, the implementation of adaptive management strategies would have certain direct and indirect effects common to all of the allotments in this analysis. There would also be direct and indirect effects that are specific to each of the allotments.

Monitoring benchmarks and key areas provides insurance to all other areas of the pasture and is a key part of this alternative. If a permittee does a good job of pasture management, the effect is more even distribution and use across the pasture. This would also mean that utilization levels can be kept within the allowable use guidelines leading to healthier rangelands. Promoting even use means that previously ungrazed plants would have more chance of being grazed (stimulating growth) and that individually grazed plants would be grazed fewer times, providing recovery as discussed above. Achieving more even pasture use means that livestock might be able to stay longer in a particular pasture as opposed to moving quickly through pastures if cattle are allowed to congregate, especially in key areas. This system encourages responsible management as it rewards the permittee for good management and penalizes poor performance.

Under this alternative, revised allotment management plans would contain objectives that are designed to meet defined conditions for rangelands. The condition and trend of the rangelands are expected to improve in areas that are not currently at the desired condition and be maintained in areas that are at desired condition since allowable use levels are set to provide for maintenance or improvement of each specific plant community type and condition. Changes in management practices would improve grazing efficiency and reduce adverse effects on soil, riparian areas, and upland vegetation within the allotments that have specific areas that are not meeting desired conditions.

Overall, the direct effects of implementing the proposed alternative of livestock grazing using adaptive management would help in maintaining, achieving or moving toward desired conditions for all vegetation types.

Indirect Effects Common to all Allotments

Adaptive management helps to increase residual vegetation in areas where it is less than desirable, lessen amounts of bare ground in areas where it is currently too prevalent, and increase the vigor of individual plants through proper utilization levels and better distribution of livestock across allotments. Increasing litter ensures that plenty of material is available for preventing erosion and trapping sediment in runoff and overland flow events (Molinar, Galt, Holechek 2001). Additionally, this material insulates plant crowns and over-wintering buds, protects and covers soil, holds moisture in the ground and allows the plant to continue photosynthesis for carbohydrate production and storage. Greater carbohydrate storage results in more roots being produced by each plant. This increases the erosion defensibility and moisture-holding capacity of soils. It also provides a buffer to plants in times of stress such as drought. Less bare ground means more plants holding the soil in place while lessening the likelihood of invasion by noxious weeds.

If any of the proposed adaptive management actions result in the reduction of AUMs due to the concerns about rangeland resources, 36 CFR 222.4(a)(8) requires the authorized officer to provide the permittee with one years advance notice prior to implementation of the decision.

Direct and Indirect Effects Specific to Individual Allotments

Black Haw Allotment

The current management is authorized under an On/Off permit for a total of 90 cow/calf pair from 6/10 to 10/15 for a total of 379 AUMs under a season long grazing system. Maximum allowable use is 45%. Under the proposed action, the allotment would be managed under a single pasture system with a total of 379 AUMs authorized each season. The actual number of livestock and season of use would be determined each year prior to grazing and would be outlined in the Annual Operating Instructions (AOIs). The earliest on date for grazing would be 6/1 and the latest off date 10/30. AUMs would not exceed 38 on NFS lands or a total of 379 AUMs on the entire permit. The proposed action includes the relocation or removal of the existing stock tank at Black Haw Spring.

Adaptive Management Options are part of the proposed action and include adjusting the season of use between 6/1 and 10/30 not to exceed a total of 379 AUMs, fencing the riparian area and/or reducing the AUMs. Adjusting the season of use would provide further flexibility for timing and duration. A shorter season would provide more time for recovery from impacts. Fencing the riparian area would have the direct effect of removing livestock from the area and allowing their use of water to the existing tank only.

This alternative would have direct effects specific to this allotment: This alternative would continue a single pasture system. Overall the allotment is meeting desired conditions with the exception of a ½ acre riparian area associated with Black Haw Spring. This riparian area is not meeting desired conditions. Although specially designed grazing systems that control degrees and timing of use in the riparian area can be highly beneficial, experience in riparian areas has generally failed to show an advantage to any specific grazing system (Clary and Webster 1989, Clary 1995). They maintain that as long as good management is practiced (managerial control of time, place, and degree of forage utilization coupled with adequate fencing, good distribution of water and salt, and adequate riding to ensure uniform distribution) the specific grazing system employed may not be significant. Van Poolen and Lacey (1979) as well as Clary and Lieninger

(2000) suggest that managers should place more emphasis on proper stocking and intensity and less time on grazing system implementation.

Relocation of the tank away from the riparian area would draw livestock away from the riparian area. This is expected to reduce the direct impacts to the stream such as trampling and the removal of vegetation. Providing water away from riparian areas has been shown to reduce impacts by livestock to riparian areas by reducing the amount time that livestock spend in these areas (Miner et al. 1992 and Godwin and Miner 1996, Wyoming DEQ 1997). Complete removal of the tank could increase the time livestock spend on the riparian and direct impacts such as trampling and soil compaction may increase in severity..

Indirectly, the removal of the tank would affect the permittee who is also the adjacent landowner. The spring has historically been a reliable source of water for the ranch during the grazing season. The two springs on the private land are not reliable and produce water for only part of the year.

Fencing would indirectly affect the riparian area by promoting stable stream banks, increased riparian vegetation and overall health of the system. Through reduction of bare ground and reduction of trampling by livestock the extent of the riparian would increase over time.

Grand Canyon Allotment

The current management consists of grazing a total of 505 (76 private) cow/calf pair from 6/11 to 9/30 for a total of 1,882 AUMs under a three pasture rest rotation grazing system. Use of the third pasture is allowed if utilization has been met in the other two prior to the off date. Maximum allowable use is 45-55% depending on the key area. 55% is allowed for rest rotations. Under the proposed action, the Grand Canyon Allotment would be managed under a three pasture deferred rotation grazing system. Maximum allowable use would be 55% if the third pasture is rested. The proposed action also includes exclusion of livestock from the following springs and associated riparian habitat: South, Silver, Bear, West Ike, Twin, Dugout, Big Mud, Billie, Crowley, Paige, Upper Williams, Smith, Meadow, Gooseberry, and the seep in Smith Draw (Note: Bear and Gooseberry have existing exclosures that would be expanded). High priority springs (Twin and Dugout) would be fenced first. Existing spring developments would be reconstructed. And no new springs developments are proposed at this time. Future proposals for spring developments would be evaluated by an interdisciplinary team prior to approval.

Adaptive Management Options are part of the proposed action and include: any appropriate adaptive management option listed on Table 5 may be used, adjust grazing season between 6/1 and 10/3 not to exceed 1,882 AUMs, or reduce AUMs.

This alternative would have direct effects specific to this allotment: Cattle would no longer have access to the small riparian areas associated with springs on this allotment eliminating impacts from livestock such as trampling and grazing and/or browsing of riparian vegetation. Continuing livestock management in a three pasture rest or partial rest rotation is expected to move more of the rangelands towards desired condition. Currently trend is static in the Minturn and Grand Canyon pastures with an upward trend in the Riflepit pasture. Over utilization has been an issue the last couple of years. This may be a result of resting one pasture completely each year rather than allowing partial use in the third pasture as the current Allotment Management Plan states.

Plant communities in upland meadows that receive higher use by livestock would be allowed to complete their growth cycle without repeated grazing by livestock in these areas. A build up of litter on the timothy and Kentucky bluegrass dominated meadows is concern of the permittee.

Species composition in these areas is not expected to change. Litter provides soil protection and helps trap and keep moisture. If not periodically grazed the buildup of resulting litter may inhibit the growth of vegetation (Knapp et al. 1986). Under this alternative the meadows in this allotment would maintain or move towards desired conditions.

Indirectly exclusion of livestock from the springs would result in a more rapid recovery of the associated riparian areas and a trend towards desired condition is expected. Indirect effects from these actions would increase riparian vegetation, reduce soil compaction, and stabilize stream banks, promoting riparian health overall. There would be no direct or indirect effects relative to available forage for wildlife and livestock by fencing springs and their associated riparian areas.

Huett Springs Allotment

This allotment has two separate grazing units, each with individual management plans. They will be discussed separately for the purpose of this analysis.

Huett Unit: A total of 150 cow/calf pairs (42 "On" NFS) are permitted from 5/10 to 9/30 under a term on/off grazing permit on the Huett Unit. It is managed as a three to four pasture deferred rotation system. Under the proposed action the Huett Unit would be managed under a four pasture grazing system with a total of 710 AUMs authorized each season. The actual number of livestock and season of use would be determined each year prior to grazing and would be outlined in the AOI. Factors such as drought, fire or other specific management objectives could all influence livestock numbers and season of use. Maximum allowable use would be 60% on annual brome.

Graham Unit: Livestock grazing on the Graham Unit is permitted under a term grazing permit for 25 yearlings from 6/16 to 7/15. This is a single pasture system. Under the proposed action the Graham Unit would be managed under a four pasture grazing system with a total of 26 AUMS authorized each season. The actual number of livestock and season of use would be determined each year prior to grazing and would be outlined in the AOI. Factors such as drought, fire or other specific management objectives could all influence livestock numbers and season of use. Maximum allowable use would be 45% unless a need was determined to manage for annual brome in this unit as well.

Adaptive Management Options are part of the proposed action and include: Allow 70% utilization on annual bromes, allow grazing to begin as early as 4/15, or allow up to 70% utilization on annual brome from 9/15 to 10/31 during years that annual brome is actively growing, and/or use herbicides to reduce annual brome and plant native species. Adaptive management options would be implemented if monitoring indicates a need. Prescribing a desired percentage or amount of reduction in annual bromes as a trigger point for monitoring would be arbitrary at best. Annual brome, especially cheatgrass are very adaptable and fluctuate freely with climatic conditions (Bradford and Lauenroth 2006) (Haferkamp et al. 1992) (Haferkamp et al. 2001) (Mosley et al. 1999). Monitoring would be focused on the existing native plant community, specifically perennial grass and grass-like species. Blue grama (Bouteloua gracilis) and threadleaf sedge (Carex filifolia) are two native species that increase dramatically with overgrazing (NRCS Tech Guide, 2005). Blue grama should not exceed 15% of the total composition and threadleaf sedge should not exceed 10%. These percentages were derived from the historic plant community described for this ecological site in the NRCS Tech Guide. If these two species stay with 5-10% and 0-5% of the total plant composition respectively the plant

community is probably stable and management of livestock is not having a negative impact on the native species.

This alternative would have direct effects specific to this allotment: Grazing, the use of herbicides, and/or reseeding are three ways to treat annual brome.

Grazing could occur very early in the season prior to some of the native species greening up. This should result in livestock utilizing annual brome as forage. Heavy grazing or intensive clipping reduces above and below ground biomass and seed production (Haferkamp and Karl, 1999). Haferkamp and Karl also state that defoliation early in the growing season is critical for controlling annual bromes. Grazing should begin in early spring when cheatgrass has grown tall enough to become accessible and palatable to livestock (Mosley et al. 1999). Both species are usable by livestock only in the fall after germinating or in early spring prior to flowering (Larsen and Johnson 1999).

In a study on the effects of simulated fall and early spring grazing on cheatgrass and perennial grasses in Nevada, Robin et al. (1992) stated that late spring clipping in the early boot stage consistently had the largest impact on both total foliage biomass and density of cheatgrass and also had a slightly less negative impact on perennial grasses. In comparison fall clipping reduced the ability of perennial plants to compete with cheatgrass the next spring.

The indirect effects of intensively grazing annual brome early in the spring might also reduce the presence of desirable cool-season grasses (Harmoney 2007) (Haferkamp et al. 1998). This is expected in the short-term; however (Haferkamp et al. 1992) says that Japanese brome appears to have reduced production of western wheatgrass only when the supply of moisture was insufficient to meet the demands of both species.

Cheatgrass is very persistent whenever it becomes established, thus eradication is not a reasonable goal in most situations. Effective control of Japanese brome and more so with cheatgrass is very difficult; it fluctuates with moisture levels, the seed holds over from year to year, and it is unlikely that all plants would be grazed or controlled by herbicides, thus providing additional seed (Haferkamp et al. 1992) (Haferkamp and Karl 1999) (Mosley et al. 1999) (Harmoney, 2007). Unlike some perennial grass and forbs species annual bromes reproduce very well in high amounts of litter and mulch (Whisenant 1990) (Haferkamp et al. 1992) (Haferkamp and Karl 1999)

Perpetuation of Japanese brome on rangelands requires completion of the plant's life cycle beginning with seed germination, continuing through seedling emergence and establishment, and terminating with plant maturation and seed dissemination. Determining how environmental conditions affect the life cycle of Japanese brome plants and their interactions with other plant species is critical for development of grazing management strategies to both reduce the prevalence and efficiently use brome-infested rangelands (Haferkamp et al. 1992).

The key is to minimize disturbances that could give annual brome a competitive edge or the opportunity to spread. Under favorable growing conditions competition from native herbaceous species reduces cheatgrass biomass and seed numbers (Chambers et al. 2007). This indicates that for climatic zones favorable for cheatgrass, invasion and dominance is best limited by maintaining these communities in good condition with relatively high density and cover of perennial herbaceous species (Roundy et al. 2007). Frequent disturbance increases cheatgrass

(Bradford and Lauenroth, 2006). Overgrazing can also result in a disturbance that may increase annual bromes.

Chemical control can be used effectively when desired perennial plants are still abundant in the plant community (Mosley et al. 1999) which is the case in the Huett Springs Allotment. Chemicals such as atrizine, Paraquat, and glyphosate have been proven to work on annual brome; however, they are non-selective and will kill desirable perennial grasses. This would require the additional cost of reseeding that could provide enough disturbance that annual bromes increase rather than decrease. Control without replacement by desirable perennials will only result in the reestablishment of cheatgrass and Japanese brome or some other undesirable species. Like grazing chemical control requires more than one year of application, Mosley et al. 1999 suggests two to five years consecutively.

Silver Creek Allotment

This allotment has three separate grazing units with separate management; therefore they will be discussed separately for the purpose of this analysis.

North Unit (Meisner Unit): Under the proposed action, the North Unit would be managed under a single pasture, season long grazing system with a total of 92 AUMs authorized each season. The actual number of livestock and season of use would be determined each year prior to grazing and would be outlined in the Annual Operating Instructions. Factors such as drought, fire or other specific management objectives could all influence livestock number and season of use. Maximum allowable use would be 45%. Adaptive management options may include adjusting the season of use between 6/1 and 10/30 or reducing AUMs.

Boardinghouse Unit (Vore Unit): The current management in this unit consists of grazing a total of 64 cow/calf pair (29 waived private) from 6/11 to 10/25 for a total of 288 AUMs. Under the proposed action, the Boardinghouse Unit would be managed under a two pasture grazing system for with up to a total of 288 AUMs authorized each season. The actual number of livestock and season of use would be determined each year prior to grazing and would be outlined in the Annual Operating Instructions. Factors such as drought, fire or other specific management objectives could all influence livestock number and season of use. Numbers and season of use could be adjusted between 6/1 and 10/30. Maximum allowable use would be 50%.

Duling Unit (Smith Unit): The current management in this unit consists of grazing a total of 106 cow/calf pair (5 private) from 6/11 to 10/15 for a total of 443 AUMs. Under the proposed action, the Duling Unit would be managed under a two pasture grazing system with up to a total of 443 AUMs authorized each season. The actual number of livestock and season of use would be determined each year prior to grazing and would be outlined in the Annual Operating Instructions. Factors such as drought, fire, or other specific management objectives could all influence livestock numbers and season of use. Numbers and season could be adjusted between 6/1 and 10/30. Maximum allowable use would be 50%.

Livestock would be excluded from Pete's Spring and its associated riparian habitat.

Adaptive management options include: adjusting the season of use between 6/1 and 10/30, shorten the season between those dates not to exceed total AUMs allocated, or reducing AUMs. Further protection for springs and associated riparian areas will be evaluated based on monitoring. Any appropriate adaptive management option listed on table 5 may be used. Any additional protection will be designed by an interdisciplinary team and the permittee.

Moskee Unit: An application is pending for the following unassigned numbers and season (formerly authorized under permit on the Duling Unit): 15 cow/calf pair ("On" NFS) and 22 cow/calf pair (private) for the season of 6/11 or 10/15 or the equivalent of those numbers. Under the proposed action, the Moskee Unit would be managed under a single pasture grazing system with a total 150 AUMs authorized each season. The actual number of livestock and season of use would be determined each year prior to grazing and would be outlined in the Annual Operating Instructions. Factors such as drought, fire, or other specific management objectives could all influence livestock numbers and season of use. Numbers and season could be adjusted between 6/1 and 10/30. Maximum allowable use would be 45%.

All of the units in this allotment are currently meeting desired conditions. It is anticipated that this trend would continue under Alternative A. If monitoring indicates a need for change in management any of the adaptive management options listed above and/or listed in Table 5 could be implemented. Adjusting the numbers and season of use between 6/1 and 10/30 allows management flexibility to respond to changing conditions as well as permittee needs. Changes and season and numbers may occur from year to year based on resource conditions and needs, however the allocated AUMs would not be exceeded. Regardless of season and/or number allowable use guidelines would be followed.

Livestock are removed from the allotment when allowable use standards are reached; therefore it is not necessary to convert or change the current grazing system to a system that requires more intensive management. Van Poolen and Lacey (1979) as well as Clary and Lieninger (2000) suggest that managers should place more emphasis on proper stocking and intensity and less time on grazing system implementation. They were discussing grazing management on riparian areas; however, the same could be said for uplands as well. This seems to hold true for this allotment where the grazing systems are different for each unit and desired conditions are being met.

Pete's Spring in the Duling Unit would be excluded from livestock to protect the spring source and associated riparian area. This area would continue to improve and expand. The soils are very saturated and would be protected from direct hoof action.

Indirect effects of Alternative A at Pete's Spring would be to continue improving providing for stable streambanks, regeneration of willows and other riparian plant species. Plant communities overall would be maintained under this alternative.

Stearns Park/Willow Springs Allotments

Current management consists of grazing a total of 357 pairs (68 private) are permitted from 6/16 to 10/5 and a total of 369 pair (60 private) from 6/16 to 9/30 under a seven pasture deferred rotation system. An eighth pasture is grazed season-long by yearling heifers. There is also some private land (not within the allotments) that is used during the season. The private land numbers are often converted to yearlings. Maximum allowable use is 50%. Under the proposed action, the Stearns Park/Willow Springs Allotments would be managed under an eight pasture deferred rotation grazing system with a total of up to 2,768 AUMs authorized each season. The Calvert/Sackett pasture would be converted from season-long grazing and incorporated as an eighth pasture into the deferred rotation grazing system. The actual number of livestock and season of use would be determined each year prior to grazing and would be outlined in the Annual Operating Instructions. Factors such as drought, fire or other specific management objectives could all influence livestock number and season of use. The proposed action also includes exclusion of livestock from the following springs and associated riparian habitat: Three

Willow, WY Stateline, Hillside, Andy, No Name, Sandpit, SD Stateline, Wagon Canyon, Corwood, Lost, Two-way, Julius, and East Riflepit. Fences at Simmons, Balm of Gilead, Anderson and Deer would be reconstructed. Existing spring developments would be reconstructed. No new springs developments are proposed at this time, three were considered but were not approved at this time due to resource concerns. There are very few undeveloped springs and the ID team determined that they and the associated habitat around them should not be disturbed. Future proposals for spring developments would be evaluated by an interdisciplinary team prior to approval.

Adaptive management options include: adjusting the season of use between 6/1 and 10/30 or reducing AUMs. If monitoring shows unacceptable impacts, any appropriate adaptive management option listed on Table 4 may be used. The following proposed improvements are possible options as well: use of a 0.75 mile temporary or permanent fence to split the East pasture, 0.5 mile temporary or permanent fence to split the Plato pasture, 1 mile of fence to relocate the east boundary fence between the West and Plato pastures, extend the Rattlesnake pipeline 0.5 mile into the Calvert/Sackett pasture, extend the Miller pipeline up to 2 miles into the East pasture, and extend the Wagon Canyon pipeline up to 2 miles. Stock tanks and at least one storage tank would be placed along the pipelines to improve livestock distribution.

Adaptive management options specific to the Guidinger and FSR 105 riparian areas include modifying timing and duration of grazing, installing a permanent or temporary fence or reducing AUMs. This alternative would continue improvement of willow regeneration and stream bank alteration by limiting livestock use at Guidinger Spring until banks are stable and revegetated. Once this occurs the determination will be made as to whether or not livestock grazing should continue and if so at what level. Although specially designed grazing systems that control degrees and timing of use in the riparian area can be highly beneficial, experience in riparian areas has generally failed to show an advantage to any specific grazing system (Clary and Webster, 1989, Clary 1995). They maintain that as long as good management is practiced (managerial control of time, place, and degree of forage utilization coupled with adequate fencing, good distribution of water and salt, and adequate riding to ensure uniform distribution) the specific grazing system employed may not be significant. Van Poolen and Lacey (1979) as well as Clary and Lieninger (2000) suggest that managers should place more emphasis on proper stocking and intensity and less time on grazing system implementation.

An extension of the existing pipelines would increase cattle distribution across the allotments further promoting the health and vigor of the plant communities. Providing water away from riparian areas has been shown to reduce impacts by livestock to riparian areas by reducing the amount time that livestock spend in these areas (Miner, et al., 1992 and Godwin and Miner, 1996).

Fencing would provide more effective control over livestock movement and reduce the amount of time they use areas such as Guidinger, promoting more recovery time for plants, a reduction in bare ground, promoting a healthy and vigorous plant community. The cross fence proposed in the Plato pasture would create two smaller pastures providing more control over timing and duration on Guidinger and have the added benefit of not reducing use of forage on the rest of the Plato pasture (at its current size) because utilization has been met at Guidinger Spring. Simply put the livestock could stay longer on the west side of the Plato pasture than they do now because of the riparian on the east side.

The new fence, pipelines, and tanks would be funded cooperatively between the permittees and the Forest Service. The maintenance responsibility would belong to the permittees.

East Rapid Allotment

The current management consists of grazing 101 cow/calf pair from 6/1 to 10/15 for a total of 455 AUMs under a two pasture deferred rotation grazing system. Maximum allowable use is 50% in the uplands. Under the proposed action, the East Rapid Allotment would be managed under a two pasture deferred rotation grazing system with a total of up to 455 AUMs authorized each season. The actual number of livestock and season of use would be determined each year prior to grazing and would be outlined in the Annual Operating Instructions. Factors such as drought, fire or other specific management objectives could all influence livestock number and season of use.

This alternative would have direct effects specific to this allotment: This alternative will continue with the two pasture deferred rotation grazing system. Overall the allotment is meeting desired conditions and it is anticipated that with the grazing system and adaptive management options in place that this trend will continue. This alternative will also implement the following improvement projects.

Range improvement projects will include building electric fence on Gimlet Creek downstream from the pond for the purpose of expediting the rate of streambank stabilization and to increase the amount of deep rooted riparian vegetation by limiting livestock access to the creek. After the stream has had sufficient time for recovery, the temporary exclosure will be removed and livestock will be allowed to access the steam. If monitoring indicates we are not maintaining the desired streambank stability and riparian vegetation, permanent exclosures can be constructed or other changes in livestock management can be implemented.

Range improvement projects will also include the exclusion of livestock from the spring and associated riparian area of Keloran Spring to prevent further impacts from livestock. Existing spring development will be reconstructed and the tank located outside of the riparian area.

Indirect effects from these actions will help to promote greater overall riparian health by stabilizing stream banks, promoting a defined channel and maintaining adequate vegetative cover for overall riparian health.

Griffith Allotment

The current management consists of grazing 118 cow/calf pair and 60 yearlings from June 16 to October 15 under a term grazing permit for a total of 641 AUMs and an additional 22 cow/calf pair under a Term Private Land Permit for a total of 88 AUMs. These livestock are grazed under a 5 pasture deferred rotation grazing system. Maximum allowable use is 50% in the uplands. Under the proposed action, the Griffith Allotment would be managed under a 5 pasture deferred rotation grazing system with a total of 729 AUMs authorized each season under the Term Grazing Permit and Private Land Permit. The actual number of livestock and season of use would be determined each year prior to grazing and would be outlined in the Annual Operating Instructions. Factors such as drought, fire or other specific management objectives could all influence livestock number and season of use.

This alternative would have direct effects specific to this allotment: This alternative will continue with the five pasture deferred rotation grazing system. Overall the allotment is meeting desired conditions (refer to table) and it is anticipated that with the grazing system and adaptive

management options in place that this trend will continue. This alternative will also implement the following improvement projects.

Range improvement projects include the extension of existing exclosures at both Lander Spring and the Clayton Draw Riparian Exclosure. The Lander Spring exclosure will be expanded from its current location down to the edge of the tree line/beginning of the meadow to protect the spring source and associated riparian area. Maintenance will continue to be the responsibility of the permittee. The Clayton Draw Riparian Exclosure will be expanded downstream to protect existing willows and promote their expansion. This exclosure will continue to be maintained by the Forest Service.

Indirect effects from these actions will help to promote greater overall riparian health by stabilizing stream banks, maintaining adequate vegetative cover for overall riparian health.

Pettigrew Allotment

Current management consists of grazing 324 cow/calf pair from 6/16 to 9/20 for a total of 1,034 AUMs under a two pasture deferred rotation grazing system. Under the proposed action, the Pettigrew Allotment would continue with the two pasture deferred rotation grazing system with a total of 1,034 AUMs authorized each season. Maximum allowable use is 50% in the uplands. The actual number of livestock and season of use would be determined each year prior to grazing and would be outlined in the Annual Operating Instructions. Factors such as drought, fire or other specific management objectives could all influence livestock number and season of use.

This alternative would have direct effects specific to this allotment: This alternative will continue with the two pasture deferred rotation grazing system. Overall the allotment is meeting desired conditions (refer to table) and it is anticipated that with the grazing system and adaptive management options in place that this trend will continue. Currently, two areas that contain sensitive plant species are not meeting desired condition because of livestock trampling. The effects of livestock to these species are not known. However, the Forest Plan requires that portions of these populations be protected from livestock use. Therefore, this alternative will also implement the following improvement projects.

Currently, areas along Ladyfinger Gulch that livestock are accessing for water are receiving higher levels of trampling than desired. Forage utilization in this area is within the guidelines. This area contains a population of *Carex alopecoidea* (R2 sensitive). The majority of the population was excluded through fencing during 2007. Livestock use and access to both *Carex alopecoidea* locations and areas receiving excessive trampling will be limited through strategic felling of trees as necessary, therefore improving the resource condition. The reconstruction of Ladyfinger Seep will provide an improved water source which is expected to reduce livestock use of the riparian area. If monitoring indicates that streambank trampling and stability are still not meeting desired conditions, fences may be constructed or other adaptive management options implemented to achieve desired conditions.

An exclosure was constructed during the 2008 grazing season to restrict livestock access to the majority of *Carex alopecoidea* located in Pettigrew Gulch. If monitoring indicates that livestock are having unacceptable impacts to *Carex alopecoidea* outside of the exclosure, the exclosure may be expanded. Conversely, if it is determined that the exclusion of livestock is having a negative impact on the species, the exclosure may be removed.

Exclosures will also be constructed around the springs and riparian areas above Baldy Lake that are receiving undesirable impacts from livestock and wildlife. Construction of these exclosures will move the area towards Desired Condition by promoting regeneration of willows and eliminating any negative impacts from livestock, such as trampling of saturated soils. If monitoring indicates that further protection is required, additional adaptive management options will be implemented.

Due to trampling and hummocking, current conditions are not acceptable at the following locations. The current exclosure at Pettigrew Spring #3 will be expanded to better protect the spring source and if necessary, the stock tank will be relocated to further reduce impacts. The spring sources for Pettigrew Spring #1 and Prospect Spring will be protected to prevent further impacts from livestock. The exclosure around Ladyfinger Seep will also be reconstructed to prevent livestock access. As stated previously, construction of these exclosures will move the area towards Desired Condition by eliminating any negative impacts from livestock, such as trampling of saturated soils. If monitoring indicates that further protection is required, additional adaptive management options will be implemented.

Indirect effects from this alternative: The construction of the *Carex alopecoidea* exclosure in Pettigrew Gulch will cause livestock to congregate on the portions of Pettigrew Gulch between the proposed exclosure and the Pettigrew Spring #2 exclosure and these areas will receive higher levels of use than are currently being observed. Construction of exclosures around Pettigrew Spring #1 and Prospect Spring will restrict livestock access to these water sources, thus requiring livestock to find water elsewhere. This in turn may increase use at other locations.

Upper Elk Allotment

Currently, there are three permittees on the Upper Elk Allotment that graze 111 cow/calf pair under Term grazing permits and 38 cow/calf pairs under Private Land permits for a season varying from June 7 to September 30 for a total of 481 AUMs (Term and private). The Upper Elk Allotment operates under a season long grazing system. Under the proposed action, the Upper Elk Allotment would continue with the season long grazing system with a total of 481 AUMs authorized each season. Maximum allowable use is 45% in the uplands. The actual number of livestock and season of use would be determined each year prior to grazing and would be outlined in the Annual Operating Instructions. Factors such as drought, fire or other specific management objectives could all influence livestock number and season of use.

This alternative will continue with the season long grazing of this allotment. Overall the allotment is meeting desired conditions (refer to table) and it is anticipated that with the grazing system and adaptive management options in place that this trend will continue.

In the past two to three years, water from an abandoned municipal pipeline has extended downstream outside of the original exclosure. Due to the lack of maintenance by the previous owners, the exclosure will be re-built and extended downstream to eliminate further trampling from livestock. The exclosure is expected to improve the area by preventing further trampling of saturated soils.

If monitoring indicates that livestock access to SOLC needs to be restricted, measures previously described will be implemented. Indirect effects will vary depending on the method used. Fencing may cause livestock to trail in areas where there are currently minimal impacts from livestock. If large exclosures are required, up to two cattle guards will have to be installed due to

the proximity of roads. Felling of trees can also restrict livestock access to the specific plant location. This process is cost effective, requires minimal maintenance and won't promote livestock trailing. Other measures such as herding and salting may also be effective in reducing the amount of time that livestock spend in the area, but some level of use will still occur.

Overall, the Upper Elk Allotment is meeting or moving towards both upland and riparian area desired conditions. However, both Forest Plan Guideline 2502 and Watershed Conservation Practices Handbook Design Criteria, encourage the establishment of more intensive management than that of season long use. Upland and riparian guidelines are in place to limit the time, intensity and frequency of livestock use in order to improve or maintain upland/riparian health. When developing utilization standards proper use considers the physiological requirement for maintaining plant health and vigor as well as management considerations such as stream bank stability, ground cover, soil compaction, wildlife habitat, fish habitat etc. Livestock are removed from the allotment when allowable use standards are reached; therefore it is not necessary to convert or change the current grazing system to a system that requires more intensive management. Although specially designed grazing systems that control degrees and timing of use in the riparian area can be highly beneficial, experience in riparian areas has generally failed to show an advantage to any specific grazing system (Clary and Webster, 1989, Clary 1995). They maintain that as long as good management is practiced (managerial control of time, place, and degree of forage utilization coupled with adequate fencing, good distribution of water and salt, and adequate riding to ensure uniform distribution) the specific grazing system employed may not be significant. Van Poolen and Lacey (1979) as well as Clary and Lieninger (2000) suggest that managers should place more emphasis on proper stocking and intensity and less time on grazing system implementation. Furthermore, livestock currently disperse throughout the allotment which limits the intensity of use in the riparian areas.

(Note: If a rotational grazing system were implemented, it is probable that managing the livestock as one herd and concentrating the cattle in specific grazing pastures would alter distribution patterns and concentrate livestock in a manner that would have negative impacts to areas that are currently meeting resource objectives. Portions of Highways 85, 385 and Rochford road are not adequately fenced. Currently livestock are not accessing these areas. The creation of specific pastures for the purpose of rotational grazing would place livestock in these areas not currently used; which could create traffic hazards if livestock access these highways. Livestock use around and in private property could also increase in intensity, however for a shorter amount of time.)

Alternative B – No Grazing (No Action)

The No Grazing (No Action) alternative would no longer authorize domestic livestock grazing of these allotments.

Direct Effects Common to All Allotments

This alternative would require the cancellation of all grazing permits upon implementation of the decision and resolution of any appeals. When grazing permits are cancelled to devote National Forest System Lands to another public purpose that precludes grazing, Forest Service Handbook 2209.13, Section 16.6, requires that the permit could not be terminated until two years after the notification of each affected permittee (36 CFR 222.4(a)(1)).

If livestock were removed from these grazing allotments, there would no longer be direct effects to the soils or vegetation from livestock grazing or trailing. Effects of livestock on riparian ecosystems would be eliminated as well, including any trampling or sloughing of streambanks in areas that are currently accessible to cattle. There would no longer be browsing of riparian shrubs by livestock. If this alternative is selected, there would be no need to implement any of the adaptive management options previously discussed.

Most range improvements are the responsibility of the grazing permittee to maintain. If the Term Grazing Permits were canceled, the improvements would be abandoned and subsequent decisions would have to be made as to which improvements would remain and which ones would be removed. For the improvements that were to remain, funding for the maintenance of them would have to be secured. Permittees would need to be reimbursed for their amortized share of cooperative range improvements where they participated in the development (FSH 2209.13, Chapter 70).

Indirect Effects Common to All Allotments

Overall, removing livestock from the grazing allotments would be beneficial to rangeland condition initially, and then will have either neutral or detrimental effects afterwards. Wildlife use would still occur, but in the absence of livestock grazing utilization levels would be significantly lower than what currently occurs. This would lead to an accumulation of dead plant material that would initially be beneficial by providing additional protection to the soil from erosion as well as leading to an increase in the organic matter in the soil. Grasses evolved with periodic removal of vegetation from various causes (including fire, wild ungulates, insects, etc). After a certain point is reached, the buildup of litter will begin to inhibit the growth of vegetation (Knapp et al., 1986). This could cause a decrease in the productivity, palatability and overall plant health, especially to many of the non-native species that dominate these sites. Many wildlife species depend upon productive grasslands. Lacey and VanPoolen (1981) compared 11 studies throughout the west and found that protected areas produced an average of 68% more herbage than comparable areas grazed at a "moderate" rate. However, permanent removal of grazing will not guarantee maximum herbaceous plant production. Volland (1978) found that a protected Kentucky bluegrass meadow reached peak production in 6 years and then declined until production was similar to the adjacent area grazed season-long. Clary and Webster (1989) report that the accumulation of litter over a period of years seems to retard herbage production in wet meadow areas. Thus, some grazing of riparian areas could have beneficial effects.

While there is abundant documentation of positive changes when removing livestock from deteriorated rangelands, a review of research literature indicates that there may be little difference in the effects of no grazing and grazing at proper use (rather than over-grazing). Bryant (1985) states that total exclusion of all human activities from riparian areas, is unlikely to return those areas to pristine conditions. Hall (1985) offers the same conclusion with regard to effects on wildlife: "Even if livestock grazing were excluded from public lands in the Great Basin, the resulting circumstances would not provide optimum habitat conditions". Permanent removal of grazing will not guarantee maximum herbaceous plant production. The accumulation of litter over a period of years seems to retard herbage production in wet meadow areas. Thus, some grazing of riparian areas could have beneficial effects (Clary and Webster 1989). In addition to the loss of plant vigor and decrease in rangeland health, the accumulation of litter allows fine fuels to accumulate, which increases susceptibility to fire. Annual bromes (see Huett Springs

Allotment) can take advantage of high levels of litter and mulch and actually increase in abundance. A dense litter cover reduces evaporation of soil water and this provides an optimum environment for germination and seedling emergence (Haferkamp and Karl 1999). Data from long term exclosures on the Northern Hills Ranger District indicate that removal of livestock for 40 years or more has not resulted in a measurable recovery of native grass species (USDA Forest Service 2006a).

Removal of livestock from these allotments could lead to an increase in the level of wildlife use on adjacent lands. Recent research indicates that the selection of foraging sites by elk is influenced by differences in forage quantity and quality created by dispersed cattle grazing in rangeland landscapes (Crane et al. 2001) Results indicate that in the fall, winter and spring elk avoided areas that were not grazed by cattle the previous summer. The results also show that prescriptive cattle grazing can influence where elk graze. The removal of livestock from these allotments could cause a shift in elk foraging areas, leading to increased grazing pressure on the adjacent allotments as well as private lands.

Removal of livestock would also allow for riparian areas that might not be in desired condition due to livestock damage to recover. Riparian species would be expected to increase in cover and frequency. Riparian zones could possibly expand beyond their current location as streambanks stabilize and riparian graminoids and shrubs become established on previously unvegetated or unstable sites. This would probably continue until another disturbance changes the function of the stream system.

Cumulative Effects

Cumulative effects were analyzed for the project area consisting of the East Rapid, Pettigrew, Griffith, Upper Elk, Black Haw, Grand Canyon, Huett Springs, Silver Creek, Stearns Park, and Willow Springs Allotments. Private lands within allotment boundaries were also considered.

Adjacent private lands have occasionally been developed into ranchettes. Some property owners graze livestock (primarily horses) on their property. 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. Also, some of these private lands used to be unfenced and livestock from adjacent allotments had access to the water supplies and forage on the private lands. The fencing of these lands has had minimal impacts to the overall management of the allotments.

Recreation can have adverse effects on range conditions and livestock grazing. Population growth in and around the project area has led to greater numbers of forest users. OHV and motorcycle use already impacts livestock distribution and environmental conditions in many riparian areas. There are also developed trail systems used by equestrians, hikers, and mountain bikers in the Pettigrew, East Rapid, and Upper Elk allotments. When added to livestock grazing, these uses may have an overall negative effect on the integrity of rangeland and riparian ecosystems by weakening the vegetation and creating ruts, cuts and unvegetated areas across portions of upland, transition and riparian zones. Some recreationists also leave gates open on all allotments. Livestock wander into pastures where they have already grazed or into pastures that should be rested until later in the season. This causes additional use in excess of utilization standards already met or consumes forage that should be available later in the season.

The exclusion of wildfire has a negative effect on all rangelands within the project area affecting the quality and health by allowing forest canopies to close and reducing understory vegetation. This in turn reduces the amount of forage available for both wildlife and livestock.

High intensity wildfire can adversely affect soil conditions and provide sites for colonization of noxious weeds.

The use of prescribed burning can provide some of the beneficial effects of wildfire with a reduced risk of adverse effects. Prescribed fires can benefit rangeland health by opening up forest canopies and not only increasing understory vegetation, but also removing decedent vegetation thus promoting an increase in new growth that is relished by wildlife and livestock. Prescribed fires can help maintain or restore upland grasslands and meadows from pine encroachment while increasing available forage. The Rubicon, Tincan, Scott, O'Brian, and Moskee timber sales will consider using prescribed fire on a landscape scale, which includes portions of the Grand Canyon, Stearns Park, and Willow Springs allotments, in order to meet specific management objectives.

Prescribed fire can have a direct short-term impact on permittees and livestock grazing. Pasture rotations, season of use, or livestock numbers may need adjusted in order to allow sufficient recovery time in burned areas according to the forest plan. Forest Plan Standard 4107 states that prescribed fire burned areas will be deferred from livestock grazing for a portion or all of the following growing season to ensure regrowth of forage species. Both wildfire and prescribed fire are expected to have short-term adverse effects on range conditions and livestock grazing but over the long-term effects are expected to be beneficial wherever they occur.

The following current or proposed timber sales occur within the project boundary: Rochford, Bearcat, Mineral, Bear Town, Power Pole, Geranium, Pit, Rifle, Tincan, Scott, Hardy, O'Brian, and Moskee. The following vegetation management planning areas are currently under analysis: Citadel, West Rim, and Telegraph.

Past and future timber harvest and prescribed fire may have created and are expected to create transitory range, increasing livestock distribution and available forage. Transitory range is an area that temporarily produces an increase in rangeland vegetation (Vallentine 1990). These areas occur when the tree and sometimes shrub overstory are removed allowing the grass/forb component to take full advantage of available sunlight and moisture. This can improve the quality and quantity of the forage available to wildlife and livestock. Wildlife and livestock distribution throughout the project area may increase as treatment areas are opened up and roads are improved or new ones are built. The impacts to the primary range usually located in meadows, upland grasslands and riparian areas may lessen as cattle distribute throughout the transitory range. Increased ground cover protects soil resources from erosion and high temperatures. Increased herbaceous vegetation has a positive effect on riparian and water conditions creating favorable habitats for all types of terrestrial and aquatic life. These changes are expected to aid in maintaining or moving these communities towards desired condition.

Road construction due to timber sales has a direct impact by removing vegetation. Roads indirectly impact vegetation by providing access to livestock, improving their distribution pattern throughout an allotment. The closing of roads or obliteration of roads is beneficial from a resource standpoint. It limits vehicle traffic and OHV use, reduces the spread of noxious weeds and allows roads to revegetate.

Noxious weed infestations of rangelands are proliferated due to ground disturbing activities from timber harvests and road construction. Noxious weeds are currently being treated throughout the project area. Ground disturbance due to livestock grazing practices occurs at salt grounds and watering facilities. Livestock can transport weed seeds from one area of infestation to these areas of disturbed soil. Weed infestations at these sites are incidental because the infestations are small, easy to identify, control and eradicate as opposed to infestations from timber sales and road construction. It is likely that with continued treatment of noxious weeds, the infestations will not increase in size and may even eliminate some infestations.

High numbers of big game animals, especially elk and deer, can have a significant effect on herbaceous vegetation. The dietary overlap between elk and livestock is similar (Zimmerman 2004) (Beck and Peek 2005). Grazing management of forage by the Forest Service takes wildlife grazing use into consideration. Allowable use standards are designed to provide adequate forage and habitat needs for various wildlife species. If allowable use standards are reached due to the combined utilization of forage by livestock and wildlife, livestock are moved to the next grazing unit or removed from the allotment. Management of elk numbers is under the control of South Dakota Game, Fish and Parks and Wyoming Game and Fish Department.

There is a proposed land exchange that could affect the Silver Creek, Grand Canyon, Stearns Park and Willow Springs Allotments. The proposed exchange includes several of the large open meadows found in most of these allotments as well as all of the NFS lands within the Moskee Unit of the Silver Creek Allotment. If the exchange occurs there will be no change in management of these allotments except the Moskee Unit. The numbers currently unallocated in that unit would no longer exist. The rest of the allotments would not change because these areas are currently leased to the existing Forest Service grazing permittees and are considered waived private land under Term Private Land Permits.

Wildlife and Wildlife Habitat

Affected Environment

Pre-field Review

A pre-field review of Region 2 sensitive species and Federally threatened, endangered, and proposed species was completed using District wildlife observation data, Wyoming Natural Diversity Database records (WYNDD 2007), South Dakota Natural Heritage Program (2006), Atlas of birds, mammals, reptiles and amphibians in Wyoming (Cerovski et al. 2004), literature reviews, communication with District personnel, and the BA/BE completed for the Phase II Amendment to the Black Hills National Forest Land and Resource Management Plan Revision (USDA 2005).

Wildlife Surveys

Surveys were conducted for the allotments area during the summers of 2006 and 2007. Surveys involved ground reconnaissance by hiking and on horseback. The allotments contained a variety of wildlife species. Known wildlife species within the allotments include sensitive species such as bald eagles, goshawks, northern leopard frogs, Black Hills redbelly snakes, and Cooper's Rocky Mountainsnail. Some wildlife species common in the area determined from either the District wildlife databases or found on surveys include: elk, white-tailed deer, mule deer, bobcat, coyote, raccoon, porcupine, cottontail rabbit, red squirrel, least chipmunk, Merriam's turkey, ruffed

grouse, kingfisher, great blue heron, mallard duck, red-breasted and white-breasted nuthatch, brown creeper, red crossbill, ovenbird, black-capped chickadee, American robin, Gray jay, red-naped sapsucker, hairy woodpecker, white-winged junco, pine siskin, tiger salamander and various species of fritillary and crescent butterfly species. Rare species also inhabit the allotments such as mountain lion, and Cooper's hawk.

Allotment-specific Wildlife Habitat Conditions

In general, habitat conditions across most allotments are good. For specific habitat information on each allotment see Stefanich (2008a). Most upland and riparian habitats were in good condition. However, there are also areas on all allotments where over utilization of riparian meadows were noted. There were also areas of riparian degradation, hummocking and bank alteration, and on some allotments, lack of willow and riparian shrub age-class diversity (Stefanich 2008a).

Threatened and Endangered Species Considered

In Wyoming, only the black-footed ferret is on the current list of endangered, threatened, candidate and proposed species to be considered in this analysis. In South Dakota, the whooping crane in Lawrence County is listed, and the least tern, whooping crane and black-footed ferret are listed in Pennington County. These species do not occur, nor does critical habitat exist within the allotments considered in this analysis.

Consultation with US Fish and Wildlife Service

Since there are no threatened, endangered or candidate species that occur within the allotment area, nor does critical habitat exist, no consultation with the U.S. Fish and Wildlife Service pursuant to the Endangered Species Act is required.

R2 sensitive Species Considered and Evaluated

The Wildlife Biological Evaluation (Stefanich 2008c) includes Region 2 sensitive species likely to occur on the Black Hills. Species not occurring within the allotments and/or not impacted from grazing activities were dropped from further analysis. These species included: black-tailed prairie dog (*Cynomys ludovicianus*), American peregrine falcon (*Falco peregrinus anatum*), northern harrier (*Circus cyaneus*), burrowing owl (*Athene cunicularia*), Lewis' woodpecker (*Melanerpes lewis*), grasshopper sparrow (*Ammodramus savannarum*), and regal fritillary (*Speyeria idalia*). Risk assessments are provided for sensitive species known to occur or with habitat occurring in the allotments which may be impacted by grazing activities.

Management Indicator Species (MIS) Considered and Evaluated

The Wildlife Specialist report for this project (Stefanich 2008b) includes a list of MIS and their habitats for the Black Hills NF. There are currently eight terrestrial wildlife MIS (and one fish MIS) listed in the Forest Plan. Species not occurring within the allotments and/or not having habitat impacted from grazing activities were dropped from further analysis including golden-crowned kinglet *(Regulus satrapa),* grasshopper sparrow (*Ammodramus savannarum*), black-backed woodpecker (*Picoides arcticus*), and brown creeper (*Certhia americana*). Risk assessments are provided for species that occur, or their habitat is represented in the project area, and those that could be impacted by the proposed grazing project.

Species of Local Concern (SOLC) Considered and Evaluated

Region 2 defines SOLC as species documented or suspected to be at risk at a local scale within Region 2, but do not meet the criteria for regional Sensitive Species designation. There are currently twenty-one terrestrial wildlife SOLC listed in the Forest Plan. The Wildlife Specialist report for this project (Stefanich 2008b) includes a list of SOLC and their habitats for the Black Hills NF. Species not occurring within the allotments and/or not potentially impacted from grazing activities were dropped from further analysis including Pygmy nuthatch *(Sitta pygmaea*), Mountain goat (*Oreamnos americanus*), and Bighorn sheep (*Ovis Canadensis*).

Environmental Consequences

R2 Sensitive species

Bald Eagle

All Alternatives

No direct or indirect effects are anticipated. Since bald eagles and livestock would not occupy the analysis area at the same time there will be no direct effects due to species interactions. Livestock (or their absence) will not directly alter currently available roost locations or carrion availability. There will be no direct impacts to this species under any alternative.

The presence or absence of livestock in the area will not affect the future availability of carrion for wintering bald eagles. Livestock will not alter the availability of roost locations for wintering bald eagles. There will be no indirect impacts to this species under any alternative.

Cumulative Effects for All Alternatives

Because there are no direct or indirect impacts to bald eagles under all alternatives no cumulative impacts are anticipated.

Effects Determination

Since there will be no direct or indirect impacts to bald eagles under any of the above alternatives implementation of any of the alternatives will have no impact on this species.

American Marten, Northern Goshawk, Flammulated Owl, and Loggerhead Shrike

Although not directly impacted from livestock grazing, these predators are grouped because grazing may indirectly influence the abundance and availability of prey species and their habitat (particularly small mammals, birds and fish).

Alternative A-Adaptive Management

There are no direct effects expected to marten, shrike and flammulated owl from livestock grazing. Potential direct effects to northern goshawks come from nest disturbance and possible abandonment associated with fence maintenance activities. Constructing range improvements and/or maintaining fences could have a negative impact to this species if conducted during the nesting period. Adherence to Forest Plan Standard 3111 will eliminate potential nest disturbance. Indirect effects include the potential to remove 50% of annual herbaceous growth, which may reduce prey availability (decreased prey productivity and survival) within riparian areas (foraging habitat) and meadows (goshawk and owl foraging habitat) (Belsky et al. 1999, Giuliano and Homyack 2004), but adherence to current utilization standards should provide adequate cover for prey species persistence. Adaptive management includes protection of springs and sensitive

riparian habitats in areas identified as not meeting desired conditions. This will enhance prey species habitat and prey productivity and survival, and thus provide more foraging opportunities to the predator species discussed here. Any other adaptive management technique proposed will be considered where a specific area is not meeting its desired condition. All techniques considered and implemented are designed to lessen cattle impacts on a specific area. Although impacts are site specific, they will enhance prey populations and habitat.

Alternative B-No Grazing

The removal of livestock from these allotments will have no direct effects to marten, flammulated owl, loggerhead shrike and goshawk. Potential direct effects to northern goshawks from nest disturbance and possible abandonment associated with fence maintenance activities are reduced, although adjacent allotments will still maintain the allotment boundary fences. Potential indirect effects of removing 50% of annual herbaceous growth is eliminated, which will likely increase prey availability (increased prey productivity and survival) within riparian areas and meadows. Prey species will likely be harder to detect, due to increased cover. The overall available foraging habitat for predatory species will not change substantially if livestock grazing is no longer allowed on these allotments. However, foraging habitat will be enhanced and prey abundance will be increased.

Effects Determination

Alternative A 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. Alternative B would have beneficial impacts.

Fringed Myotis, Townsend's Big-eared Bat, Black-backed Woopecker, American Three-toed Woodpecker

Although not directly impacted from livestock grazing, these insectivores are grouped because grazing may indirectly influence the abundance and availability of insect prey species and their habitat.

Alternative A-Adaptive Management

There are no direct effects expected to these insectivorous species from cattle and livestock grazing. Hibernacula, day roosts, maternity roosts or snags would not likely be affected by the presence of cattle grazing. Indirect effects include the potential to remove 50% of annual herbaceous growth, which may reduce some insect prey availability within riparian areas and meadows. Alteration of riparian habitat due to livestock grazing may decrease foraging habitat. 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. However, often these species can switch from one source of insect prey to another as these sources become available. Additionally, this should not create a detectable decrease in prey because Phase II standards will be met, limiting vegetation utilization and providing residual levels (Standards 2502-2506) for insect prey. Adaptive management includes protection of

springs and sensitive riparian habitats in areas identified as not meeting desired conditions. This will enhance insect habitat, productivity and survival, and thus provide more foraging opportunities to the insectivore species discussed here. Any other adaptive management technique proposed will be considered where a specific area is not meeting its desired condition. All techniques considered and implemented are designed to lessen cattle impacts on a specific area. Although impacts are site specific, they will enhance insect populations and habitat.

Alternative B-No Grazing

There are no direct or indirect effects expected under this alternative. The overall available habitat for these species will not change substantially if livestock grazing is no longer allowed on these allotments. No grazing may decrease Lepidoptera insect prey species over time as grasses expand and forbs, needed for larval hostplants, decrease. However, these insectivores can switch from one source of insect prey to another as these sources become less available.

Effects Determination

Alternative A 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. Alternative B would have no impact.

Western Yellow-billed Cuckoo, Northern Leopard Frog, and Black Hills Redbelly Snake

These species are analyzed together in this section because they are dependent on aquatic and/or riparian habitat/vegetation.

Alternative A-Adaptive Management

Direct effects include potential mortality to leopard frogs, tadpoles and frog egg masses, redbelly snakes, and yellow-billed cuckoo (eggs or nestlings) from livestock trampling and travel through wetlands and riparian shrubs. Indirect effects include loss of suitable aquatic, riparian shrubland and wetland habitat and prey species habitat for leopard frogs (Smith 2003), and redbelly snakes due to streambank trampling and soil compaction in areas, lowering of the water table, decreased water quality, altered water chemistry and increased water temperature (Belsky 1999, Jellison et al. 2007, Kauffman et al 1983, Kauffman and Krueger 1984, Isaak et al. 2003). Livestock grazing may have a positive effect on the mountain sucker if food is a strongly limiting factor (Isaak et al. 2003). Because mountain suckers consume simple aquatic plants, food resources may increase when livestock waste enters the stream network or by the removal of riparian vegetation that stimulates the growth of organic matter in the stream due to increased sunlight. Livestock grazing can have a negative effect on mountain sucker habitat (Isaak et al. 2003, USDA Forest Service 2005, Belica and Nibbelink 2006). The collapse of stream banks and removal of riparian vegetation by livestock can increase the amount of sediment in streams. An increased sediment load into streams may reduce spawning habitat and decrease the volume of pool habitats. Stream bank collapse can also affect parameters such as temperature and dissolved oxygen. Grazing, near streams, can be expected to have negative effects on the growth of willows, aspen and cottonwood, and by extension beaver and thus other riparian species. Grazing in riparian and meadow habitat can potentially reduce residual ground cover and increase predation on redbelly snakes, leopard frogs and yellow-billed cuckoo and associated prey species. Adherence to utilization standards should provide adequate cover for persistence. Adaptive management includes protection of springs and sensitive riparian habitats in areas identified as not meeting desired conditions. Protective fencing will maintain and increase habitat quantity and quality available to all riparian species. Populations of riparian wildlife species will likely increase within

protected areas. Any other adaptive management technique proposed will be considered where a specific area is not meeting its desired condition. All techniques considered and implemented are designed to lessen cattle impacts on a specific area. Although impacts are site specific, they will enhance riparian wildlife populations and habitat.

Alternative B-No grazing

There are no direct effects expected under this alternative, because the possibility of mortality due to livestock is eliminated. Indirect effects include raising the water table, increased water quality, decreased water temperature and increased suitable habitat and hiding cover. This alternative would provide the quickest improvement to riparian/aquatic habitat conditions that might indirectly benefit all riparian species. The overall quantity and quality of available habitat for all riparian species would improve if livestock grazing is no longer allowed on these allotments. Populations of riparian wildlife species would increase in the absence of grazing.

Effects Determination

Alternative A 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. Alternative B would have beneficial impacts.

Cooper's Rocky Mountainsnail

Alternative A-Adaptive Management

Direct effects include potential mortality to snails from livestock trampling through colonies. Cattle grazing may have indirect effects to snails that are dependent on streamside habitat or hardwood stands by reducing riparian vegetation or impeding succession on aspen stands through grazing, trampling vegetation, removing required cover, widening stream channels, aggrading channels, and lowering the water table leading to reduced riparian habitat (Belsky et al. 1999, Jellison et al. 2007). Livestock grazing reduces understory and midstory vegetation, allowing more sunlight and wind to reach and dry out required, moist habitat, altering litter/duff regeneration and the microclimate created by this vegetation (Frest and Johannes 2002). Removal of vegetation adjacent to snail colonies may also make snails more vulnerable to predation. Most snail colonies are found on steeper northerly aspects that are not, or rarely, traversed by livestock. Thus most of the area comprising a particular colony is not impacted. For colonies adjacent to riparian habitats, adherence to utilization standards should provide adequate cover for persistence. Adaptive management includes protection of springs and sensitive riparian habitats in areas identified as not meeting desired conditions. Protective fencing will maintain and increase the quantity and quality of habitat available to snails. Populations of snail species will likely increase within protected areas. Any other adaptive management technique proposed will be considered where a specific area is not meeting its desired condition. All techniques considered and implemented are designed to lessen cattle impacts on a specific area. Although impacts are site specific, they will enhance snail populations and habitat.

Alternative B-No grazing

There are no direct effects expected under this alternative, possibility of mortality due to livestock is eliminated. Indirect effects include overall available habitat for snails will improve if livestock grazing is no longer allowed on these allotments.

Effects Determination

Implementation of Alternative A may adversely impact individuals, but are not likely to result in a loss of viability in the Planning Area, nor cause a trend toward federal listing. Alternative B would provide beneficial impacts to this most fantastic snail.

Cumulative Effects for R2 Sensitive Species

The trend of forest succession and fire suppression has decreased available water to riparian and mesic hardwood habitats and thus negatively impacted riparian habitat. In other areas, overstory spruce and pine cover have maintained the mesic microclimate benefiting snail colonies. Trapping of beaver, mining activities, homesteader conversion of riparian shrub vegetation to hay meadows and purposely destroying beaver complexes have diminished and degraded riparian and mesic hardwood habitat. Pine expansion has decreased meadow, hardwood and riparian habitat. The current (10 year) drought exasperates this situation.

Conversely, beneficial impacts to water yield, and hardwood and riparian habitat have resulted from past and current removal of pine trees and oak brush and prescribed burns. These treatments have also negatively impacted snail habitat through eliminating the overstory resulting in drying out of wet sites used by snails. Riparian hardwood and grassland habitats have been enhanced by removing pine trees as long as riparian and mesic areas are adequately protected. Past timber sales that contribute cumulatively (<20 years old) to both the beneficial and negative impacts described above include (within the Bearlodge allotments); the Adams, Baldman, Bluett, Calvert, Carnegie, Coyote, Crowley, Dugout, Geranium, Grand, Haw, Kirley, Moonshine, Plato, Rattlesnake, Riflepit, Samurai Salvage, Scott, Smith, Silver Creek, Wagon, and Wish timber sales, and (within the Northern Hills allotments) the Rimrock, Salt, Breakneck, Power Pole, Brahma, Pond, Power, Hanna, Aspin, Dano, Peak, Lost Park, Rochford, Angle, Flannagan, Crooked, and Minnex timber sales. Future removal of pine through timber sales is expected. Wildlife have mostly benefited from fires due to this increase in plant species diversity and habitats. Fires have both enhanced and diversified some predator foraging habitat, but made other habitats too open for species like marten to utilize. Future prescribed burns and wildfires are expected to have mostly beneficial impacts. However, negative impacts to all predatory species may be realized from large, catastrophic wildfires.

Past fuel reduction projects include (on the Bearlodge allotments); the Adams, Baldman and Carnegie prescribed burns and there have been no prescribed burns on the Northern Hills allotments. Wildfires on the Bearlodge included Cement, Grand, and Moskee wildfires, and on the Northern Hills allotments the Iron Creek (1890), Iron Creek (1899), Thein #2, Grizzly Gulch, Rochford and Bloody Gulch wildfires. Impacts to habitat are site specific. Fires have had both positive (increased water yield, diversified vegetation, maintained open habitats) and negative impacts (increased erosion and sedimentation, dried out mesic habitat).

Overgrazing from around 1880 through the 1940's resulted in degraded riparian habitat and changed plant species composition from native to exotic plants. Some riparian snail habitat has been and is currently negatively impacted due to utilization by livestock, bank and stream trampling, removing plants and cover, compacting soils, changing soil chemistry through manure and urine, squashing individual snails and water consumption (Frest and Johannes 2000). Some riparian habitat is currently negatively impacted due to over utilization by livestock, bank and stream trampling and water consumption. Wildlife grazing and browsing has periodically

impacted vegetation as well. Future conditions could be affected by drought, conifer encroachment in riparian areas, livestock and wildlife browsing and grazing, increases in canopy overstory and noxious weed infestation.

Motorized traffic has negatively impacted some aquatic habitat, riparian vegetation, water quality, and stream morphology. Past and current off-road motorized traffic has negatively impacted some snail habitat (primarily in riparian areas) through removing plants and cover, compacting soil and squashing snails and colonies. Future off-road motorized traffic may negatively impact snails and snail habitat. Motorized traffic may also cause nest disturbance and possible abandonment for goshawk.

There are on-going impacts from livestock grazing. However, no additional cumulative impacts are expected to riparian habitat, upland habitat, or prey species beyond those currently occurring. Both alternatives are expected to reduce cumulative impacts from livestock grazing below current levels.

MIS species

Song sparrow and Beaver

These species are analyzed together in this section because they are dependent on aquatic and/or riparian habitat/vegetation.

Alternative A-Adaptive Management

Direct impacts may include potential mortality from crushing song sparrow eggs or chicks, kicking eggs or chicks out of nests, or covering nests with manure piles. Direct impacts to beaver are not anticipated. Cattle grazing may indirectly impact riparian species that utilize understory to mid-story vegetation for cover, feeding or building nests or dams by trampling streambanks and vegetation, removing required cover, widening channels, aggrading channels, increasing temperatures and lowering the water table leading to reduced riparian shrubland habitat (Belsky et al. 1999, Jellison et al. 2007, Kauffman et al 1983, Kauffman and Krueger 1984, Isaak et al. 2003). For beaver, the largest threats include activities that degrade the structure and quality of willow shrub riparian systems and reduce available sapling willow and aspen along streams. Livestock grazing has potential to accelerate the breakdown of beaver ponds and trample springs and the potential to over-utilize riparian vegetation (i.e., willows, aspen and other hardwood components), hence reducing habitat suitability for beaver (NatureServe 2006). For ground nesting birds, such as the song sparrow, removal of vegetation adjacent to a nest can increase the risk of predation on eggs or chicks by predators (Ammon and Stacey 1997). Adherence to utilization standards should provide adequate cover for persistence. Adaptive management includes protection of springs and sensitive riparian habitats in areas identified as not meeting desired conditions. Protective fencing will maintain and increase habitat quantity and quality available to all riparian species. Populations of riparian wildlife species will likely increase within protected areas. Any other adaptive management technique proposed will be considered where a specific area is not meeting its desired condition. All techniques considered and implemented are designed to lessen cattle impacts on a specific area. Although impacts are site-specific, these measures will enhance riparian wildlife populations and habitat.

Alternative B-No Grazing

There are no direct impacts expected under this alternative, the possibility of egg or nestling sparrow mortality due to livestock trampling is eliminated. Indirect impacts include raising the

water table, increased water quality, decreased water temperature and increased herbaceous vegetation for nesting and concealment cover. There will also be increases in riparian shrubs such as willow and aspen. The overall available habitat for these species will improve if livestock grazing is no longer allowed on these allotments. Populations of riparian wildlife species would increase in the absence of grazing. Song sparrows have been found to increase significantly in areas where livestock grazing was discontinued (Krueper 1992).

Determination

Assuming Forest Plan standards are met, Forest-wide song sparrow and beaver populations will likely remain stable, and allow for the attainment of Forest Plan Objective 238. Riparian species would benefit from Alternative B. Riparian habitat is expected to be maintained or enhanced if Forest-wide standards and guidelines are followed.

Beaver and song sparrow were not chosen as MIS because of concerns regarding their population viability, but because of their link to particular features of the forest. The project area is not the appropriate scale at which to evaluate population viability because it is too small of an area. Population viability was evaluated in the Phase II Forest Plan Amendment FEIS (USDA Forest Service 2005). The Phase II Amendment FEIS determined that there would be adequate habitat for maintaining viable population if standards and guidelines are followed, and if conditions move towards riparian restoration objectives. Alternatives A and B follow Forest Plan standards and guidelines and contribute to riparian stability or improvement.

Ruffed Grouse

Alternative A-Adaptive Management

Direct impacts may include potential mortality from crushing grouse eggs or chicks, kicking eggs or chicks out of nests, or covering nests with manure piles. Indirect impacts include the potential for aspen stands to have succession impeded by livestock grazing disturbance, and removal of vegetation adjacent to a nest can increase the risk of predation on nests by predators (Ammon and Stacey 1997). Potential riparian impacts include degradation of the structure and quality of willow shrub riparian systems and reduce available sapling aspen along streams. Livestock grazing has potential to accelerate the breakdown of beaver ponds and trample springs and the potential to over-utilize riparian vegetation (i.e., willows, aspen and other hardwood components), reducing habitat suitability for grouse. Insect prey availability for broods may decrease in hardwood and riparian habitats. Thus grazing livestock can influence birds by changing vegetation structure and food supplies. Livestock tend to concentrate at watering sites, which increases grazing pressure and human disturbance in those areas. However, livestock browsing on most aspen (outside of riparian areas) is minimal and well within Forest Plan Standards and Guidelines. The ID Team identified no concern specific to livestock grazing and aspen regeneration within these allotments. Adaptive management includes protection of springs and sensitive riparian habitats in areas identified as not meeting desired conditions. Protective fencing will maintain and increase habitat quantity and quality available to all riparian species. Riparian hardwood stands of aspen would benefit from this protection, increasing and enhancing grouse habitat. Any other adaptive management technique proposed will be considered where a specific area is not meeting its desired condition. All techniques considered and implemented are designed to lessen cattle impacts on a specific area. Although impacts are site-specific, these measures will enhance grouse habitat.

Alternative B-No Grazing

There are no direct impacts expected under this alternative, possibility of mortality due to livestock is eliminated. Indirect impacts include raising the water table, increased water quality and increases in riparian shrubs such as aspen. The overall available habitat for these species will improve if livestock grazing is no longer allowed on these allotments. Riparian aspen habitat and ruffed grouse would benefit from this alternative.

White-tailed Deer

Alternative A-Adaptive Management

Direct impacts are not anticipated. Indirect impacts include potential habitat loss in riparian areas, meadows and aspen stands due to cattle grazing and browsing. The greatest potential for impacts between deer and livestock would likely occur within hardwood stands and riparian zones, this is due in-part to the limited number of riparian and hardwood acres on the Forest, the fact that these areas satisfy deer requirements for cover, food, water and plant species diversity, and because of their extensive use during fawning periods. The possibility of competition exists between deer and livestock (SAIC 2003). Both species utilize many of the same grasses, forbs and shrubs. However, there is no indication that these resources are limiting. White-tailed deer populations in South Dakota and Wyoming are above State game objectives (USDA Forest Service 2007, Sandrini 2008). Current livestock browsing in aspen stands is minimal and well within Forest Plan Standards and Guidelines. The ID Team identified no concern specific to livestock grazing and aspen regeneration within these allotments, but did identify riparian areas of concern. Adaptive management includes protection of springs and sensitive riparian habitats in areas identified as not meeting desired conditions. Protective fencing will maintain and increase habitat quantity and quality available deer. Any other adaptive management technique proposed will be considered where a specific area is not meeting its desired condition. All techniques considered and implemented are designed to lessen cattle impacts on a specific area. Although impacts are site-specific, these measures will enhance riparian deer habitat.

Alternative B-No Grazing

There are no direct impacts expected under this alternative. Indirect impacts include raising the water table, increased water quality and increases in riparian grasses, shrubs and trees such as aspen (forage and cover). The overall available riparian and hardwood habitat for deer will improve if livestock grazing is no longer allowed on these allotments. However, light to moderate grazing can have a beneficial effect on forage quality by removing the rough or dried seedheads and stems, while leaving the more palatable leaves for deer or elk to graze later in the season (Anderson and Scherzinger 1975, Clark et al. 2000). Therefore, potential exists that under no grazing, forage quality and production could decline for ungulate species (deer and elk). However, during periods of little or no vegetation growth such as in winter or during droughty summers, vegetation removal by livestock can be detrimental to deer habitat quality and result in potential competition between deer and livestock. Overall, habitat would likely improve in the absence of grazing.

Cumulative Effects for MIS

Cumulative effects for the ruffed grouse are expected to be similar to those described previously for R2 sensitive species because of the similarity in habitat and home range size.

White-tailed deer are migratory and move between distinct summer and winter ranges. They are therefore impacted cumulatively by activities occurring within the NZR08 allotments, along their migratory routes and on lower elevation winter ranges. Winter ranges are primarily privately owned ranches. Cattle grazing under Alternative A could reduce deer habitat in riparian areas, hardwood stands and meadows. Habitat loss or degradation adds cumulatively to other impacts influencing white-tailed deer in the allotments. In addition to livestock grazing, fire suppression and forest succession have increased the amount of pine across the landscape and decreased meadows, riparian areas, and hardwood stands over the last 100 years. Wildlife grazing and browsing has periodically impacted vegetation as well. Mining has reduced and degraded riparian habitat. Loss of summer habitat has occurred from residential development within or adjacent to the allotments. Roads within the allotments are used for multiple uses (e.g. ranchers, allotment monitoring, weed control, recreational use, logging, etc.). Disturbance and potential road kills from vehicular traffic may occur on system roads. Hunting directly impacts white-tailed deer. Deer are hunted within the allotments, along traditional migratory routes and on winter ranges. Indirect human disturbance due to hunting also reduces habitat security for deer. Loss of winter range is occurring due to commercial and residential development. Drought conditions over the last 10 years has reduced suitable habitat and made deer more prone to disease as they have had to concentrate at limited watering areas. Deer succumbing to epizootic hemorrhagic disease have been noted every year during this drought. Under Alternative B cattle grazing is not permitted; therefore there would be no cumulative impacts from grazing. However, loss of grazing on NFS lands could mean that the ranchers would go out of business and their private property converted to other uses (i.e. developed) resulting in loss of winter range habitat for deer on private lands.

Logging, thinning, prescribed burns and wildfires have resulted in a general increase in preferred habitat over time. These activities have opened up the pine overstory creating openings, enhancing and expanding hardwood understories and riparian areas. Cattle have no effect on forest succession so there would be no cumulative impacts from changes in structural stage, or patch size. Adherence to current utilization standards should provide adequate protection to riparian habitat. Under all of the grazing alternatives, long-term hardwood ecosystem health and ecological function are provided for by not allowing actions that would be detrimental to riparian-ecosystem condition, hardwoods and shrubs, or fish and wildlife resources. If standards are met, these alternatives would limit impacts to hardwood habitat/vegetation, allowing for continued hardwood habitat improvements.

Determinations for MIS

Habitat for deer and ruffed grouse are expected to be maintained similar to current conditions. Assuming Forest Plan standards are met, all alternatives would allow the Forest-wide white-tailed deer and ruffed grouse populations to remain stable, and would allow for the attainment of Forest plan Objectives 217 and 238.

White-tailed deer and ruffed grouse were not chosen as MIS because of concerns regarding population viability, but because of their link to particular features of the forest. The project area is not the appropriate scale at which to evaluate population viability because it is too small of an area. Population viability was evaluated in the Phase II Forest Plan Amendment FEIS (USDA Forest Service 2005). The Phase II Amendment FEIS determined that there would be adequate habitat for maintaining viable population if standards and guidelines are followed, if conditions move towards riparian restoration objectives, if activities move conditions towards the structural

stage objectives, and if conditions move towards hardwood restoration objectives. All action alternatives in this project follow Forest Plan standards and guidelines. This project is not expected to limit hardwood restoration (Objective 201) and contribute to riparian restoration. This project is not expected to affect ponderosa pine structural stages. Under all alternatives, there will be adequate habitat for maintaining viable populations of white-tailed deer and ruffed grouse on the Forest.

Species of Local Concern

Broad-Winged Hawk, Cooper's Hawk, Northern Saw-Whet Owl And Sharp-Shinned Hawk

These species all prey upon small mammals or birds that are dependent on the lower vegetative strata and are analyzed together in this section.

Alternative A-Adaptive management

There are no direct impacts expected to northern saw-whet owl from livestock grazing. Potential direct impacts to broad-winged, Cooper's and sharp-shinned hawks come from nest disturbance and possible abandonment associated with fence maintenance activities. Constructing and/or maintaining fences, could have a negative impact to this species if conducted during the nesting period. Indirect impacts include the potential to remove 50% of annual herbaceous growth, which may reduce prey availability within riparian areas and meadows (Belsky et al. 1999, Giuliano and Homyack 2004), but adherence to current utilization standards should provide adequate cover for prey species persistence. Adaptive management includes protection of springs and sensitive riparian habitats in areas identified as not meeting desired conditions. This will enhance prey species habitat and prey productivity and survival, and thus provide more foraging opportunities to the predator species discussed here. Any other adaptive management technique proposed will be considered where a specific area is not meeting its desired condition. All techniques considered and implemented are designed to lessen cattle impacts on a specific area. Although impacts are site-specific, these measures will enhance prey populations and habitat.

Alternative B-No grazing

The removal of livestock from these allotments will have no direct impacts to predatory species. Potential direct impacts to hawks from nest disturbance and possible abandonment associated with fence maintenance activities are eliminated. Potential indirect impacts of removing 50% of annual herbaceous growth is eliminated, which will likely increase prey availability (increased prey productivity and survival) within riparian areas and meadows. Prey species may be harder to detect, due to increased cover. The overall available foraging habitat for predatory species will not change substantially if livestock grazing is no longer allowed on these allotments. However, foraging habitat will be enhanced and prey abundance will be increased.

Pygmy Nuthatch, Long-Eared Myotis, Long-Legged Myotis, Northern Myotis, and Small-Footed Myotis

These species are primarily insectivorous and are analyzed together in this section.

Alternative A-Adaptive management

There are no direct effects expected to these insectivorous species from cattle and livestock grazing. Hibernacula, day roosts, maternity roosts or snags would not likely be affected by the presence of cattle grazing. Indirect effects include the potential to remove 50% of annual

herbaceous growth, which may reduce some insect prey availability within riparian areas and meadows. Alteration of riparian habitat due to livestock grazing may decrease foraging habitat. 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. However, often these species can switch from one source of insect prey to another as these sources become available. Additionally, this should not create a detectable decrease in prey because Phase II standards will be met, limiting vegetation utilization and providing residual levels (Standards 2502-2506) for insect prey. Adaptive management includes protection of springs and sensitive riparian habitats in areas identified as not meeting desired conditions. This will enhance insect habitat, productivity and survival, and thus provide more foraging opportunities to the insectivore species discussed here. Any other adaptive management technique proposed will be considered where a specific area is not meeting its desired condition. All techniques considered and implemented are designed to lessen cattle impacts on a specific area. Although impacts are site-specific, these measures will enhance prey populations and habitat.

Alternative B-No grazing

There are no direct or indirect impacts expected under this alternative. The overall available habitat for these species will 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 hostplants, decrease. However, often these species will switch from one source of insect prey to another as these sources become available.

Black-And-White Warbler, Meadow Jumping Mouse, Atlantis Fritillary Butterfly, Tawny Crescent Butterfly, and American Dipper

Alternative A-Adaptive management

Direct impacts from livestock grazing include potential mortality of adult jumping mice and offspring due to trampling nests and burrows, crushing warbler and dipper eggs or chicks, butterfly larvae or cocoons, kicking eggs or young out of nests or beds, or covering larvae, eggs, chicks or young with manure piles. Grazing has been shown to decrease small mammals in riparian areas (Belsky et al. 1999, Giuliano and Homyack 2004). Schulz and Leininger (1991) documented that the meadow jumping mice dominated ungrazed sites whilst the deer mouse dominated grazed sites. Cattle grazing may indirectly impact riparian species that utilize understory to mid-story vegetation for cover, feeding or building nests or dams by consuming vegetation and trampling the streambank and vegetation, compacting soil, removing required cover, widening channels, aggrading channels, increasing temperatures, reducing water quality and lowering the water table leading to reduced riparian shrubland habitat (Belsky 1999, Bock et al. 1992, Kauffman et al. 1983, Kauffman and Krueger 1984, Isaak et al. 2003). For ground nesting birds, such as the black-and-white warbler and dippers, removal of vegetation adjacent to a nest can increase the risk of predation on eggs or chicks by predators (Ammon and Stacey 1997, Backlund 2001). Decreased water quality will decrease aquatic invertebrate prey for the dipper. Adaptive management includes protection of springs and sensitive riparian habitats in areas identified as not meeting desired conditions. Protective fencing will maintain and increase habitat quantity and quality available to all riparian species. Populations of riparian wildlife species will likely increase within protected areas. Any other adaptive management technique proposed will

be considered where a specific area is not meeting its desired condition. All techniques considered and implemented are designed to lessen cattle impacts on a specific area. Although impacts are site-specific, these measures will enhance prey populations and habitat.

Alternative B-No grazing

There are no direct impacts expected under this alternative, possibility of mortality due to livestock is eliminated. Indirect impacts include raising the water table, increased water quality, decreased water temperature and increased hiding cover. Understory grass and forbs will increase. There may be increases in riparian shrubs such as willow. The overall available habitat for riparian species will improve if livestock grazing is no longer allowed on these allotments. However, larval hostplants (i.e. violets and asters) for butterfly species may decline in the absence of grazing. Increased water quality would increase aquatic invertebrate prey for the dipper.

Land Snails

Alternative A-Adaptive management

Direct effects include potential mortality to snails from livestock trampling through colonies. Cattle grazing may have indirect effects to snails that are dependent on streamside habitat or hardwood stands by reducing riparian vegetation or impeding succession on aspen stands through grazing, trampling vegetation, removing required cover, widening stream channels, aggrading channels, and lowering the water table leading to reduced riparian habitat (Belsky et al. 1999, Jellison et al. 2007). Livestock grazing reduces understory and midstory vegetation, allowing more sunlight and wind to reach and dry out required, moist habitat, altering litter/duff regeneration and the microclimate created by this vegetation (Frest and Johannes 2002). Removal of vegetation adjacent to snail colonies may also make snails more vulnerable to predation. Most snail colonies are found on steeper northerly aspects that are not, or rarely, traversed by livestock. Thus most of the area comprising a particular colony is not impacted. For colonies adjacent to riparian habitats, adherence to utilization standards should provide adequate cover for persistence. Adaptive management includes protection of springs and sensitive riparian habitats in areas identified as not meeting desired conditions. Protective fencing will maintain and increase the quantity and quality of habitat available to snails. Populations of snail species will likely increase within protected areas. Any other adaptive management technique proposed will be considered where a specific area is not meeting its desired condition. All techniques considered and implemented are designed to lessen cattle impacts on a specific area. Although impacts are site-specific, these measures will enhance prey populations and habitat.

Alternative B-No grazing

There are no direct effects expected under this alternative, possibility of mortality due to livestock is eliminated. Indirect effects include overall available habitat for snails will improve if livestock grazing is no longer allowed on these allotments.

Northern Flying Squirrel

Alternative A-Adaptive Management

Direct impacts include potential mortality to squirrels from barbed wire fences used to control livestock distribution. Stock watering tanks can also cause drowning mortalities. Flying squirrels, gliding from one location to another, can be killed if they get wrapped around barbed wires in flight or land in stock tanks. Any new barbed wire fences and water developments proposed can

potentially kill squirrels. No direct impacts would be anticipated from cattle grazing because of the mobility of this species. Cattle grazing may potentially have indirect impacts to foraging habitat, due to reducing lower vegetative structure, potentially affecting availability of alternative food sources. Overall, livestock will not affect flying squirrel habitat because grazing does not normally alter tree stand structure, patch size or impact availability and condition of snags; and current utilization standards will not permit overgrazing of the lower vegetative structure in forested areas. Adaptive management includes protection of springs and sensitive riparian habitats in areas identified as not meeting desired conditions. Protective fencing will maintain and increase habitat quantity and quality available to this squirrel.

Population viability is appropriately evaluated at the Forest scale because the project area is too small for a meaningful analysis. The Phase II Amendment FEIS (USDA Forest Service 2005) determined that the species is likely to persist on the Forest over the next 50 years if standards and guidelines are followed, and if conditions Forest-wide move towards structural stage objectives. All alternatives follow Forest Plan standards and guidelines. Tree stand structure is not expected to change as a result of grazing. Therefore, this species is likely to continue to persist on the Forest.

Alternative B-No Grazing

Direct impacts include potential mortality to squirrels from barbed wire fences used to control livestock distribution. Stock watering tanks can also cause drowning mortalities. Flying squirrels, while gliding, can be killed if they get wrapped around barbed wires in flight or land in stock tanks. Fences and stock tanks may still exist with the potential for mortality if these are not removed. Indirect impacts to foraging habitat would be eliminated. The overall available foraging habitat for this cute, fuzzy, little squirrel will improve when pastures are not grazed on these allotments. Concealment cover would also be enhanced.

Cumulative Effects for Species of Local Concern

Cumulative effects are expected to be similar to those described previously for R2 sensitive and MIS because these species occupy similar habitats on these allotments.

Fisheries

Affected Environment

Pre-field Review

This section of the EA addresses fisheries resources in the North Zone Range 08 Project area. 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).

Fish species occurrence in the analysis area is based upon the best available information including Stewart and Thilenius (1964), Ford (1988), the Belle Fourche River Basin Plan (WDFD 1996), Patton (1997), the Wyoming Game and Fish Department's Streams and Lakes Database (WGFD 2000), Isaak et al. (2003), the South Dakota Department of Game, Fish and Parks (SDGFP) Stream Fisheries Database (2005a) and Belica and Nibbelink (2006).

Threatened or Endangered Fish Species Considered and Evaluated

There are no federally threatened or endangered fish species known to occur or likely to be affected by management activities in Crook, Weston, Lawrence or Pennington counties nor any designated critical habitat (U.S. Fish and Wildlife Service 2008 and Kelly 2007). Subsequently, no additional consultation is needed for fish species pursuant to the federal Endangered Species Act.

R2 Sensitive Fish Species and MIS Considered and Evaluated

The finescale dace (*Phoxinus neogaeus*) occurs in the Redwater River Drainage. This species has not been documented on the South Dakota portion of the BHNF (Isaak et al. 2003). The Black Haw Allotment in Wyoming is in the Redwater River drainage but no suitable aquatic habitat occurs in this allotment. The lake chub's (*Couesius plumbeous*) current distribution on the Forest is limited to Deerfield Reservoir (Isaak et al. 2003), which is outside of this analysis area. Subsequently, there will be no impact to either the finescale dace or lake chub.

The mountain sucker (*Catostomus platyrhynchus)* occurs in the analysis area and livestock grazing has the potential to affect this species and/or its habitat. Therefore, it has been identified for project-level analysis.

The status of the mountain sucker in the Rocky Mountain Region and the Black Hills was assessed by Belica and Nibbelink (2006) and Isaak et al. (2003), respectively. Recent surveys suggest mountain suckers occur in many of its historic drainages throughout the Black Hills (Isaak et al. 2003), but localized population reductions or absence at selected sites has occurred (USDA Forest Service 2006). It occurs most often in cool, clear mountain streams with moderate water velocities. Stream substrate associated with mountain sucker habitat varies widely and ranges from mud/sand to gravel/boulders, although cobbles are most common. This species is found on the stream bottom and is closely associated with cover (exposed roots, undercut banks, log jams and boulders). Mountain suckers are benthic feeders and their diet is primarily diatoms and green algae. Spawning occurs in the spring, but the exact timing varies by elevation and water temperature. In the Black Hills, the spawning period for mountain suckers is probably June and maybe early July (Shearer pers.comm. 2006). Spawning occurs in riffles and eggs are probably broadcast over the substrate where they settle on the streambed.

The main threats to the mountain sucker generally result from anthropogenic (human-caused) activities (Belica and Nibbelink 2006). Habitat loss due to stream impoundment and habitat degradation from increased sedimentation has contributed to population declines. Instream structures, such as dams and culverts, which impede fish passage may result in population and habitat fragmentation leaving populations vulnerable to extirpation. Although less well understood, the introduction of non-native fishes also appears to threaten mountain sucker populations, primarily through increased predation, but also via increased competition.

Fish Habitat Conditions

There are no natural lakes in the Black Hills (Stewart and Thilenius 1964). Several impoundments exist within the analysis area that provide recreational fishing opportunities. Iron Creek Lake (26 acres) is on Iron Creek adjacent to the Pettigrew Allotment. Management has been as a stocked rainbow trout fishery (SDGFP 2006c). Iron Creek Lake is fully meeting its assigned beneficial uses of coldwater permanent fish life propagation and fish and wildlife propagation, recreation, and stock watering waters (SD DENR 2006, SD DENR 2008). Strawberry Hill Pond (0.2 acre) is

a developed recreation site providing fishing opportunities on an unnamed tributary to Bear Butte Creek adjacent to Highway 385 near the eastern boundary of the Upper Elk Allotment. Both impoundments are managed by SDGFP as put-and-take-rainbow trout fisheries. Other small ponds exist in the allotments, but none have been stocked nor do they support a viable fishery.

Suitable fish habitat, as defined by perennial streams/lakes and assigned beneficial uses, includes Beaver, Bear Butte, Elk, Gimlet and East/West Gimlet, Iron Creek (North), Rapid, Pettigrew Gulch, Silver, Spearfish/Little Spearfish, West Strawberry and Whitewood creeks. Suitable fish habitat is not present in the Black Haw, Grand Canyon, Griffith, Huett Springs, Silver Creek or Willow Springs allotments.

Black Hills stream flows are influenced by precipitation, geology and other watershed characteristics. Current stream habitat conditions reflect the eighth or ninth year of ongoing drought. Private inholdings typically result in fragmented landownership along Black Hills streams. Only Gimlet Creek and its upper tributaries and Pettigrew Gulch are entirely on National Forest System (NFS) lands. The majority of Rapid Creek within the allotment flows through NFS lands. Other streams, such as Elk or Bear Butte creeks, have only short, disjunct stream reaches affected by livestock grazing on NFS lands within the allotments.

All streams in South Dakota are assigned the beneficial uses of irrigation and fish and wildlife propagation, recreation, and stock watering (South Dakota Administrative Rule 74:51:03:01). Several streams in the North Zone Range 08 analysis area have additional fish-specific beneficial uses assigned (Hirtzel 2008) including Bear Butte Creek, Elk Creek, West Strawberry Creek, Whitewood Creek, Gimlet Creek, Silver Creek, Rapid Creek, Iron Creek, Beaver Creek, Spearfish Creek and Little Spearfish Creek.

The 2008 South Dakota Integrated Report for Surface Water Quality Assessment (SD DENR 2008) provides the best available information on the attainment of assigned beneficial uses. Streams fully supporting their assigned fisheries beneficial uses included Spearfish, Little Spearfish and Rapid creeks. The headwaters of Bear Butte Creek are not meeting the coldwater permanent fish life use due to high water temperatures from a natural source. West Strawberry Creek is not meeting it coldwater permanent fish life propagation use due to high water temperatures. Elk Creek was not attaining its coldwater permanent fish life use due to high water temperature. The following reaches within the analysis area were unassessed: Beaver Creek, Gimlet (East & West), Iron Creek, Pettigrew Gulch, Silver Creek and the headwaters of Whitewood Creek.

Recreational fishing opportunities are provided by non-native gamefish species, primarily brook, brown or rainbow trout. Brook and brown trout fisheries are sustained almost entirely by natural reproduction, whereas rainbow trout are routinely stocked for high-use “put and take” fisheries. The principal stream fishing opportunities exist along Spearfish, Little Spearfish and Rapid creeks. There is a designated Walk-In Fishery on Little Spearfish Creek, upstream of the Timon Campground, which is outside of, but adjacent to the Stearns Park Allotment.

Field Surveys

Limited fisheries surveys have been completed in the analysis area due to the limited amount of suitable fish habitat. The mountain sucker has been documented in Rapid Creek within the East Rapid Allotment and in Bear Butte and Elk creeks adjacent to or downstream of the Upper Elk Allotment.

The interdisciplinary team (IDT) reviewed the project area in summer of 2007 including the Griffith Allotment (7/19/07), Upper Elk Allotment (7/25/07), East Rapid Allotment (7/26/07) and Pettigrew Allotment (7/31/07). These site visits were to compare existing conditions to desired conditions, with an emphasis on aquatic/riparian areas, including springs and seeps. The "Walk-in Fishery" on Little Spearfish Creek was also reviewed (4/25/2007).

Stream health may be less than seventy-four percent of reference conditions at localized sites along Ladyfinger Gulch (Pettigrew), the headwaters of Iron Creek (Pettigrew), a headwater tributary to Elk Creek (Upper Elk) and upper Gimlet Creek (East Rapid). The stream channel width/depth ratio, the condition of riparian vegetation, and the extent of bank stability, was visually assessed based on the Multiple Indicators Monitoring (Hirtzel 2008). Bank stability along Rapid Creek may be less than seventy-four percent of reference condition due to bank erosion resulting from floodplain encroachment from the old railroad prism, now the Mickelson Trail. The Rapid Creek floodplain is well-vegetated with willows and this appears to impede livestock access and use in this area. Subsequently, livestock use does not appear to be impeding an upward trend in bank stability. Additional information on the physical/chemical aspects of aquatic resources and watershed conditions can be found in the Watershed section of this EA.

There is a riparian exclosure on Beaver Creek (Pettigrew Allotment) that protects several hundred yards of the creek from livestock use. Bank stability and channel width/depth ratio are probably representative of reference conditions.

Environmental Consequences

Alternative A (Proposed Action)

Direct and Indirect Effects Specific to Individual Allotments - Fish Habitat

Black Haw, Huett Springs, Grand Canyon, Silver Creek, Willow Springs and Griffith Allotments

Implementation of the proposed action on these allotments would have no direct, indirect or cumulative effects to fisheries due to the lack of suitable fish habitat within these allotments.

East Rapid, Stearns Park, Pettigrew, and Upper Elk Allotments

There would be no effects to the lower reach of Iron Creek, Little Spearfish Creek, and Spearfish Creek in the Pettigrew and Stearns Park allotments. These stream reaches are within Management Area 4.2A (Spearfish Canyon) which is designated unsuitable to grazing and is closed to this use (FP Standard 4.2A-2501).

Direct effects (mortality/injury) to fish are expected to be minimal. This impact relates primarily to eggs and fry that are more vulnerable to livestock trampling because juvenile and adult fish are likely to swim away to avoid injury. Livestock grazing is not likely to have a direct effect on non-native trout spawning or redds because the livestock "off-date" occurs before the fall spawning period for brook or brown trout. Livestock grazing may directly impact native fish spawning and egg incubation because they overlap in time, but the magnitude of this effect is likely to be minor because livestock are not constantly watering in all suitable spawning habitat throughout the spawning season in the East Rapid, Pettigrew, Stearns Park and Upper Elk allotments.

Livestock grazing can have numerous negative effects on aquatic ecosystems including water quality degradation, loss of streambank vegetation and stability and subsequent detrimental

changes in channel morphology and increased sediment input (USDA Forest Service 2005a). Measures to maintain proper use or residual levels of vegetative cover should promote bank stability adjacent to aquatic habitats and maintain the filtering function of riparian areas adjacent to water (Guidelines 2505 and 2506). The design criteria which limits bank alteration to less than twenty-six percent on an annual basis is intended to maintain stream health. Additional effects analysis specific to the water resources can be found in the Watershed section of the EA.

Aquatic and riparian habitat at localized sites on Gimlet Creek, headwaters of Iron Creek, Ladyfinger Gulch, Pettigrew Gulch, Upper Elk Spring #2 and the unnamed stream in the Englewood Botanical Area that currently are not at the desired condition would be improved. This is anticipated to have a positive indirect benefit to fisheries through improved water quality and habitat conditions upon implementation of the proposed action and adaptive management.

The improvement to aquatic/riparian habitat conditions in the East Rapid, Pettigrew, Stearns Park and Upper Elk allotments under Alternative A is not likely to have a noticeable benefit to recreational fisheries because of the small, isolated areas that are currently not at the desired condition and the limited recreational fishery associated with these sites. Little Spearfish Walk-In Fishery is not directly or indirectly affected because livestock on the Stearns Park Allotment cannot access this stream reach and an adequate vegetative buffer exists along the allotment boundary to mitigate indirect effects to water quality. Forest Plan Objectives 217 and 219 would be met as well as the intent of Executive Order 12962 pertaining to recreational fisheries.

Cumulative Effects of Alternative A

There would be no cumulative effects to fisheries on the Black Haw, Grand Canyon, Griffith, Huett Springs, Silver Creek or Willow Springs allotments because of the lack of direct or indirect effects.

Improved riparian condition and reduced bank alteration would have a positive, but minor incremental impact to fisheries on the East Rapid, Pettigrew, Stearns Park and Upper Elk allotments, but to a lesser degree than eliminating livestock grazing under Alternative B. Given the localized area of these improvements, this incremental impact would not be of a magnitude or intensity to noticeably affect fish numbers or distribution when added to past, present or reasonably foreseeable actions. This incremental improvement in stream habitat conditions is not likely to change current State fisheries management so it is reasonable to assume that fishing pressure and trout stocking will continue at current levels at the same places. Other past, present or reasonably foreseeable actions will continue to affect fisheries, but some of these activities such as off highway vehicle (OHV) use on Gimlet Creek may be further restricted by other decisions.

Stream reaches that are not currently meeting fish-specific beneficial uses are likely to continue not meeting these uses because these stream reaches are impaired due to natural sources or the reaches within these allotments that are not at the desired condition are small enough that aquatic/riparian habitat improvement at these sites is not likely to have an influence on watershed level water quality parameters like temperature, or the impaired reach is at the desired condition within the allotment and no additional improvement due to the proposed action is predicted. Assigned beneficial uses related to fish life propagation that are currently being met are likely to continue to be attained.

This alternative would not have an additive incremental impact on stream connectivity, but existing instream barriers at dams or road-stream crossings that block fish movement are likely to persist.

Alternative B – No Grazing (No Action)

Direct and Indirect Effects Specific to Individual Allotments - Fish Habitat

Black Haw, Huett Springs, Grand Canyon, Silver Creek, Willow Springs and Griffith Allotments

This alternative would have no direct or indirect effects on fisheries resources on the Black Haw, Grand Canyon, Griffith, Huett Springs, Silver Creek or Willow Springs allotments because suitable fish habitat does not exist.

East Rapid, Stearns Park, Pettigrew, and Upper Elk Allotments

For the East Rapid, Pettigrew, Stearns Park and Upper Elk allotments that have suitable fish habitat, this alternative would provide the quickest and most permanent attainment of the desired condition, specific to riparian vegetation and aquatic conditions at a few localized sites (Gimlet Creek, Ladyfinger Gulch, unnamed tributaries to Elk and Whitewood creeks) where the desired condition is currently not being achieved. More detailed analysis of the effects to water resources is provided in the Hydrology Report. There is likely to be a 3-year transitional lag time before livestock are removed (Forest Service Handbook 2209.13), so some of the existing sites that are not at the desired condition would have a delayed response until livestock grazing stops.

Stream connectivity would not be affected because no new instream barriers would be constructed nor are any existing instream structures proposed for removal.

Cumulative Effects For Alternative B

Historic and ongoing mining, grazing, logging, recreational and road-related activities have influenced stream habitat conditions. Instream structures that block fish passage have fragmented the stream network. Barriers to fish passage, such as impassable culverts at road-stream crossings, likely exist in the project area. These fish passage barriers reduce the ability of fish to colonize or reoccupy suitable habitat without human intervention, which may limit a species' distribution and/or abundance.

Management emphasis on non-native game fish may have negative effects on native fish species. The introduction of non-native fish appears to threaten mountain sucker populations, primarily through increased predation (Isaak et al. 2003), but also via increased competition (Belica and Nibbelink 2006). As habitat is managed to be more suitable for trout, other fishes are crowded out (SDGFP 1993).

The SDGFP has and will likely continue to stock rainbow trout on an annual basis in Rapid Creek and Iron Creek Lake (SDGFP 2005b, 2006, 2007) to provide for recreational fishing opportunities. The size and number of trout stocked has varied over time to adjust to changing environmental conditions and management objectives.

Recent increases in off-highway vehicle (OHV) use has resulted in localized bank stability impacts on user-created trails where OHV's cross perennial streams or create connected disturbed

areas (CDAs) where sediment may enter the stream channel. These types of impacts were most noticeable along Gimlet Creek.

Cumulative Effects of Alternative B

There would be no cumulative effects to fisheries on the Black Haw, Grand Canyon, Griffith, Huett Springs, Silver Creek or Willow Springs allotments because of the lack of direct or indirect effects.

Improved riparian vegetation condition and reduced bank alteration would have a positive, but minor incremental impact to fisheries on the East Rapid, Pettigrew, Stearns Park and Upper Elk allotments. Given the localized area of these improvements, this incremental impact would not be of a magnitude or intensity to noticeably affect fish numbers or distribution when added to past, present or reasonably foreseeable actions. This incremental improvement in stream habitat conditions is not likely to change current State fisheries management so it is reasonable to assume that trout stocking will continue at current levels at the same places. Other past, present or reasonably foreseeable actions will continue to affect fisheries, but some of these activities such as off highway vehicle (OHV) use may be further restricted in the analysis area by other decisions.

Stream reaches that are not currently meeting fish-specific beneficial uses are likely to continue not meeting these uses because these stream reaches are impaired due to natural sources or the reaches within the allotments that are not at the desired condition are small enough that aquatic/riparian habitat improvement at these sites is not likely to have an influence on watershed level water quality parameters like temperature, or the impaired reach is at the desired condition within the allotment and no substantial improvement due to livestock removal is predicted. Assigned beneficial uses related to fish life propagation that are currently being met are likely to continue to be attained.

This alternative would not have an additive incremental impact on stream connectivity but existing instream barriers at dams or road-stream crossings that block fish movement are likely to persist.

Region 2 Sensitive Species - Fish

Direct and Indirect Effects

No direct, indirect or cumulative effects would occur to the mountain sucker on the Black Haw, Grand Canyon, Griffith, Huett Springs, Silver Creek or Willow Springs allotments under either Alternative because suitable habitat is lacking.

There would be no direct, indirect or cumulative effects to the mountain sucker in the Pettigrew or Stearns Park allotments under either Alternative because the only occurrence of mountain sucker in the Spearfish Creek watershed is in Annie Creek which is not in or affected by livestock grazing in these two allotments.

On the East Rapid and Upper Elk allotments, Alternative B would provide the quickest and most permanent improvement to riparian/aquatic habitat conditions that might indirectly benefit the mountain sucker.

Under Alternative A, livestock grazing may directly affect mountain sucker spawning and egg incubation in the East Rapid and Upper Elk allotments because both activities overlap in time, but given the lack of mention of this potential impact in recent species assessments (Isaak et al. 2003, Belica and Nibbelink 2006) and the limited occurrence of this species, this impact is probably negligible.

Livestock grazing can have a negative effect on mountain sucker habitat (Isaak et al. 2003, USDA Forest Service 2005, Belica and Nibblelink 2006). The collapse of stream banks and removal of riparian vegetation by livestock can increase the amount of sediment in streams and affect streamside cover. An increased sediment load into streams may reduce spawning habitat and decrease the volume of pool habitats. Stream bank collapse can also affect parameters such as temperature and dissolved oxygen. Guidelines 2505 and 2506 maintain proper use or residual levels of vegetative cover to promote bank stability adjacent to aquatic habitats and to maintain the filtering function of riparian areas adjacent to water. The design criteria limiting bank alteration to less than twenty-six percent on an annual basis is intended to maintain stream health.

Livestock grazing may have a positive effect on the mountain sucker if food is a strongly limiting factor (Isaak et al. 2003). Because mountain suckers consume simple aquatic plants, food resources may increase when livestock waste enters the stream network or by the removal of riparian vegetation that stimulates the growth of organic matter in the stream due to increased sunlight. The benefits of improved aquatic habitat conditions under Alternative B (no grazing) are probably greater than the limited benefit mentioned related to Alternative A (the proposed action).

Cumulative Effects

Aquatic and riparian habitat conditions at localized sites are likely to improve under both Alternatives, but more so under Alternative B (no grazing). This positive incremental impact will be minor at the watershed scale and probably will not be detectable in the context of increased mountain sucker abundance or distribution.

Stream connectivity would be maintained at the current level because no new instream barriers would be constructed and no instream barriers are proposed for removal. Existing barriers, such as dams and impassable culverts at road-stream crossings, are likely to persist.

Both alternatives result in minor aquatic habitat improvements. These improved conditions are not likely to noticeably change the non-native fish populations. Therefore, there will not be an additive incremental impact to the mountain sucker due to increased predation by or competition with non-native game fish.

Management Indicator Species – Fish

The mountain sucker is both an R2 sensitive species and a BHNF MIS. Effects to the mountain sucker are discussed above.

Long-term viability for this species was evaluated in the BE for the Forest Plan Phase II Amendment (USDA Forest Service 2005b). The Phase II BE determined that the mountain sucker was likely to persist for the next 50 years if land management activities are implemented consistent with the Forest Plan. Both Alternatives are consistent with Standard 1201 (WCPH Mgt Measure 5) and Guidelines 1205 and 3212 because no stream channel relocation is proposed and any rocks or wood in waterbodies would be left to maintain natural habitat complexity and

promote bank stability. Standard 1203 (WCP 4) would be met because no new instream structures are proposed that would block flows, debris or fish movement.

The Forest-wide population trend for mountain sucker is one of decline when comparing present occurrence to past distribution from surveys in the 1960s and mid-1980s (USDA Forest Service 2007). Both Alternatives will have a neutral effect on the Forest-wide population trend for the mountain sucker because of this species' limited occurrence in the analysis area and the minor extent at which stream conditions are currently not at the desired condition.

Stream quality and connectivity are maintained or improved under either alternative. No additional instream structures are proposed that would impede mountain sucker passage. Either alternative meets the intent of Objective 238d to maintain or enhance mountain sucker habitat quality and connectivity.

Botanical Resources

Affected Environment

Pre-field Review

A pre-field review of the NZ08 project area was conducted using many sources of information including aerial photographs, topographic maps, the Black Hills National Forest Plant Database, Black Hills National Forest GIS Library and communication with district personnel.

Botanical Surveys

Botanical survey data was collected on these allotments between 1989 and 2007. The focus of most surveys was on identifying and mapping community types and determining the probability of an area to support target[3] plant species in addition to locating and recording individual target plant species. Much of the survey conducted prior to the 2007 field season was for timber projects that overlap the North Zone Range 08 project area. These surveys often focused on forested habitats, but covered all or most high probability target plant habitat, including riparian and wetland areas. Areas to survey were stratified using a combination of hillshade[4], aerial photographs, topographic maps, local knowledge, and professional judgment during field reconnaissance. Less intensive limited surveys were also conducted in lower probability target plant habitat. Surveys specifically for the NZ08 project were conducted in the 2007 field season and focused on riparian areas, springs, capable rangeland (see project record), high probability target plant habitat, and areas that had no botany survey data in the BHNF plant database. However, due to time constraints and limited resources not all areas of all allotments in this analysis have been completely surveyed at this time.

Threatened and Endangered Species Considered

The U.S. Fish and Wildlife Service (USFWS) list of federally endangered, threatened, proposed, and candidate species was accessed via their internet site on April 22, 2008. No federally

[3] This term is used to collectively describe R2 sensitive plant species, species of local concern (SOLC), and other species that are unique and warrant consideration from a biodiversity standpoint, and may include South Dakota and Wyoming state-listed species of concern and Black Hills Species of Insufficient Information.

[4] Hillshade - Over the past several years, hillshade has been field verified and has proven to be very helpful in predicting high probability target plant habitat. Hillshade uses the length of time and intensity of the sun in relation to topography to predict shade.

endangered, threatened, proposed or candidate plant species are known to occur on the Black Hills National Forest (USDI 2007 & USDA 2008a).

Consultation with US Fish and Wildlife Service

Since there are no threatened, endangered or candidate species that occur within the allotment area, nor does critical habitat exist, no consultation with the U.S. Fish and Wildlife Service pursuant to the Endangered Species Act is required.

R2 sensitive Species Considered and Evaluated

There are 12 plant species on the Forest Service Region 2 sensitive species list that are known to occur on the Black Hills National Forest. All 12 species were considered in this analysis. Habitat exists in the NZ08 project area for ten R2 sensitive plant species known to occur within the Black Hills. The Botany Biological Evaluation (Mayer and Wheeler 2008a) for provides a brief habitat description for each R2 sensitive plant species that occurs on BHNF lands and summarizes R2 sensitive plant species known to occur or having suitable habitat in the project area and the rationale for including or excluding a species from further analysis. No further analysis is needed for: great-spurred violet (*Viola selkirkii*) and giant helleborine (*Epipactis gigantea*). These species are not known to occur in the project area and no suitable habitat is present.

Botrychium campestre (Iowa moonwort)

The single documented occurrence of *Botrychium campestre* in the project area is in the Smith pasture of the Silver Creek allotment in the Fish Canyon area (site BOCA5-8). The site is in a relatively open part of the drainage and is accessible to livestock. However no impacts from livestock were noted in 2007. Suitable habitat exists in other parts of the project area and has had limited survey for *B. campestre*, but thorough survey for this species is impractical and time consuming requiring crawling on hands and knees.

Since there are only 7 known occurrences of *B. campestre* on BHNF lands, maintaining these sites is a priority to help ensure viability on the forest.

Carex alopecoidea (foxtail sedge)

The two documented occurrences of *Carex alopecoidea* in the NZ08 project area are in the Pettigrew allotment in Pettigrew Gulch and Ladyfinger Gulch.

The Pettigrew Gulch site (CAAL8-20) occurs near the boundary of the Baldy and Red Lake pastures, and *C. alopecoidea* plants occur in both pastures. Effects from livestock to *C. alopecoidea* plants and habitat have been documented annually on forest-wide plant monitoring data forms from 2002 to 2007. Reported effects include direct trampling and grazing of plants, hummocking and alteration of streambanks, trampling around seeps and springs and browsing of willow species (USDA 2008a). As per Phase II direction (Forest Plan Standard 2505 f), cattle are to be excluded from all or part of this *C. alopecoidea* site (Pettigrew Gulch—CAAL8-20) (USDA Forest Service 1997). In 2008 a portion of this drainage was fenced to protect this plant population.

The Ladyfinger Gulch site (CAAL8-19/CAAL8-27) is in the western corner of the Baldy pasture. This is a mossy, spruce dominated drainage bottom with seeps and northerly facing spruce/twinflower slope above. Both the drainage bottom and the entire northerly facing spruce dominated hillside above are very high quality suitable plant habitat. Habitat impacts and riparian resource damage from livestock have been occurring consistently in this drainage for many years.

Impacts from livestock to *C. alopecoidea* plants and habitat have been documented on botany survey forms in 1994, 2002, 2003, 2006 and 2007. Reported impacts include direct grazing and trampling of individuals, streambank alteration, soil hummocking, trampling of wetland plant communities and cropping of riparian vegetation (USDA 2008a). The ID team visited the site on 7/30/2007, and recent trampling, hummocking, and bank alteration had occurred.

Per Forest Plan Standard 2505 f, cattle are to be excluded from all or part of this *C. alopecoidea* site (Ladyfinger Gulch—CAAL8-19) (USDA Forest Service 1997). In summer of 2007 a small exclosure, consisting partially of fence and partially of debris and felled trees, was constructed around a portion of *C. alopecoidea* individuals. While this initially meets Forest Plan direction, monitoring of this site and the associated riparian habitat should determine if there is a need for additional protection.

Cypripedium parviflorum (lesser yellow lady's slipper)

There are three documented occurrences of *Cypripedium parviflorum* in the project area. Two occurrences are in the Pettigrew allotment in the Spearfish Canyon management Area (4.2A)—in Roughlock Canyon (CYPA19-1) and along Iron Creek (CYPA19-27). As per Forest Plan Standard 4.2A-2501, the Spearfish Canyon Management Area is designated unsuitable to livestock grazing and is closed to this use (USDA 1997). In addition, neither of these sites occurs in or adjacent to capable rangeland and both are in areas that would be difficult for livestock to access (i.e. areas with down spruce, thick shrubs or limestone cliffs/rocks).

The third occurrence is in the Upper Elk allotment in the Englewood Springs Botanical Area (Management Area 3.1). This site is adjacent to capable rangeland (closest plants are ca. 80 meters from capable range) but is upslope and in an area with fairly thick spruce cover and scattered down trees making access by livestock limited/undesirable. Plants at this site occur on a northwest facing spruce slope in moist to saturated soils in a botanically rich spring-fed wetland community. As per Forest Plan Standard 3.1-2503, livestock are to be restricted to protect R2 sensitive plant occurrences in botanical areas (USDA 1997). Livestock currently have access to Englewood Springs Botanical Area and although impacts to *C. parviflorum* have not been documented.

Platanthera orbiculata (lesser round-leaved orchid)

The single documented occurrence of *Platanthera orbiculata* in the NZ08 project area is in the Pettigrew allotment (PLOR4-26) on a northerly-facing side drainage of Iron Creek. The site occurs in a mossy spruce and birch dominated drainage with a relatively thick shrub layer, making access by livestock difficult/undesirable.

Viburnum opulus var. americanum (highbush cranberry)

There are five documented occurrences of *Viburnum opulus* var. *americanum* in the NZ08 project area. One occurrence (VIOPA2-27) is in the northwest portion of the Upper Elk allotment along West Strawberry Creek adjacent to Hwy. 385. The site is in a lush, mossy, spruce dominated riparian area with seeps. This portion of the allotment is currently not grazed and is not expected to be grazed due to its close proximity to the highway. A second occurrence (980010), reported from the East Rapid allotment was documented during botany surveys in 1998 and searched for again in 2007 but not relocated (survey 07ER03). The suspected location of the occurrence is in a moist, very thickly vegetated, west facing side drainage of Gimlet Creek and is unlikely to be accessed by livestock due to thick shrubs and down trees. A third occurrence (VIOPA2-14) is

located near the east central border of the Black Haw allotment in an area with a very thick hazelnut shrub layer making access by livestock unlikely (USDA 2008a).

The remaining two occurrences are in the Pettigrew allotment—in Pettigrew Gulch (site VIOPA2-6) and near Boeson Spring (site VIOPA2-29). The Boeson Spring site occurs in capable rangeland in the northern part of the Baldy pasture, and impacts to the site from livestock were reported from 2005 (survey 05W0389) and 2007 botany surveys (survey 07PET3). Surveys document hummocking, trampling and streambank alteration in the vicinity of *V. opulus* var. *americanum* individuals and light to moderate browsing on plants (20-30% of current years leaders browsed). Wildlife use was also reported from the area, and it is unknown whether browsing was from livestock, wildlife or a combination. The Pettigrew Gulch site (VIOPA2-6) occurs in a narrow part of the drainage that livestock are trailed through. Livestock trails are adjacent to the plants and browsing on *V. opulus* var. *americanum* individuals was documented from the 2007 site visit. (It is unknown whether browsing was from livestock, wildlife or a combination. However the close proximity of livestock trails and cowpies to the plants indicates that livestock likely played a major role.) The two sites in the Pettigrew allotment are to be monitored annually as per the project monitoring plan. Analysis and determination for *V. opulus* var. *americanum* is based on these sites being monitored to assess impacts from livestock. If unacceptable impacts to plants or habitat occur, an adaptive management option will be implemented to protect the sites from further impacts.

Species of Local Concern (SOLC) Considered and Evaluated

Species of Local Concern are plant, fish and wildlife species (including subspecies or varieties) that do not meet the criteria for sensitive status. These could include species with declining trends in only a portion of Region 2, or those that are important components of diversity in a local area. The local area is defined as NFS lands within the Black Hills National Forest. To be eligible for designation as a Species of Local Concern, the species (or subspecies, variety or stock) must be recognized through an established scientific process, and must be known to occur on National Forest System lands within the Black Hills National Forest.

There are currently eleven plant SOLC listed in the Forest Plan. All 11 species were considered in this analysis. The botany specialist report for this project (Mayer and Wheeler 2008b) provides a brief habitat description for each plant SOLC and summarizes plant SOLC known to occur or having suitable habitat in the project area and the rationale for including or excluding a species from further analysis. There is habitat for seven of these species within these allotments. However, only three plant SOLC occur in the project area: *Listera convallarioides*, *Gentiana affinis*, and *Petasites sagittatus*.

Gentiana affinis (pleated gentian)

There are two known occurrences of *Gentiana affinis* in the NZ08 project area in the East Rapid and Stearns Park allotments. The East Rapid occurrence (GEAF-10) is in a lush willow dominated riparian area along Rapid Creek (ca. 1.5 miles east of Rochford) with plants often occurring in old stream channels, and on/near gravel bars. Plants of this occurrence are in or adjacent to capable rangeland, however access to the site by livestock is unlikely due to very thick shrub layer.

The Stearns Park occurrence (GEAF-2), in the Stearns Park area east of Wagon Canyon Spring, is in an open grass/sedge meadow near a spring. This site is in capable rangeland however the

entire occurrence is within an existing exclosure and currently not being grazed. The presence of this SOLC occurrence in the exclosure will be documented in the allotment management plan, and protection of this occurrence from impacts of livestock will be noted as an additional benefit of this exclosure. The exclosure will be maintained as per standards (described in the allotment management plan).

Listera convallarioides (broadlipped twayblade)

Three of the four known occurrences of *Listera convallarioides* on BHNF lands occur in the NZ08 project area in the Upper Elk allotment. Due to the rarity of this species on the forest (only four known occurrences known from a limited geographic range) maintaining all known occurrences is important in maintaining species viability on the forest. Annual monitoring through the forest-wide monitoring program is expected to continue at all three sites in the NZR 08 project area.

One occurrence (LICO5-1) is in a lush mossy spruce dominated drainage (West Strawberry Creek) adjacent to Hwy 385. Livestock do not currently access this drainage and are not expected to in the future due to its close proximity to the highway.

A second occurrence (LICO5-2) is in the Englewood Springs Botanical Area in moist to saturated soils adjacent to springs and associated riparian habitat in a botanically-rich spruce dominated wetland community. This site is adjacent to capable rangeland (see project record). In addition to the main site concentration area occurring upslope and east of FSR 228.1, individuals were also discovered in 2007 in the wet mossy area on the west side of 228.1 where the springs continue to flow below the road. Cattle have accessed this area during the 2007 season, and well established trampling and trailing indicate they have accessed the area regularly in previous years as well. It is a fragile, saturated, mossy area that could be easily impacted by even a small amount of livestock trampling. As noted in 2007 forest-wide plant monitoring of the site, at least one clump of *Listera convallarioides* plants had been trampled by cattle at the time of survey and adjacent suitable habitat had been impacted (trailing, trampling, hummocking, cowpies) (USDA 2008a).

As per Forest Plan Standard 3.1-2503, livestock are to be restricted to protect R2 sensitive and plant SOLC occurrences in botanical areas (USDA Forest Service 1997). This area is not meeting the above forest plan standard, since livestock currently have access to Englewood Springs Botanical Area and impacts from livestock to known SOLC plant occurrences and suitable habitat have been recorded.

A third occurrence (LICO5-3) is associated with seeps on a lower spruce dominated slope in the vicinity of the headwaters of Bear Butte Creek. This site is currently accessible to livestock; however no livestock impacts to the site were documented in 2007.

Petasites sagittatus (arrowleaf sweet coltsfoot)

Suitable habitat for Petasites sagittatus in the East Rapid allotment includes riparian areas (Rapid Creek, Gimlet Creek, East Gimlet Creek, and Tunnel Gulch) and seeps. There are two known occurrences of *P. sagittatus* in the NZ08 project area in the East Rapid and Stearns Park allotments. The East Rapid occurrence (PESA5-2) is near the east boundary of the allotment along Rapid Creek. Most of this occurrence is in the Wolff allotment to the west, but some plants have also been reported in the East Rapid allotment. Plants at this site have been documented growing in the open and under willow cover, on streambanks, mudflats, and near old beaver dams. Plants at this site that are in the East Rapid allotment are not in or adjacent to capable

rangeland, however plants in the Wolff allotment are documented from capable rangeland. (Effects of grazing to this species in the Wolff allotment have been addressed in the North Zone Range 05 EIS.) Since most of this occurrence is not in the project area and the suitable habitat along Rapid Creek is generally not heavily utilized by livestock due to limited access (i.e. thick shrub layer), risks from livestock grazing to this site are low.

The Stearns Park occurrence (02R340) is in the central portion of the allotment in the Wagon Canyon pasture in the Buffalo Park area. This site was reported in 2002 and attempts to relocate it in 2007 were unsuccessful (inaccurate GPS coordinates). Only one unhealthy plant was reported from a saturated area under willow cover. This site is in capable rangeland, however impacts to the site from grazing are unknown. Due to relocation difficulties, this site has not been included in the project monitoring plan. However if in the future the site is relocated and unacceptable impacts from livestock grazing are occurring, appropriate adaptive management to protect the site will take place.

MA 3.1 Botanical Areas

Englewood Springs Botanical Area in the Upper Elk allotment is the single botanical area within these allotments. Notable botanical values in the Englewood Springs Botanical Area include a mosaic of the following rare community types as designated in the Black Hills Community Inventory: Black Hills Streamside Vegetation, White Spruce Alluvial Black Hills Forest, White Spruce Twinflower Forest, Paper Birch/Hazel Forest (Marriott et al. 1999). Other notable botanical values include hillside seeps/springs that support an uncommon assemblage of wetland plant communities and moss species including many target plant species. Target plant species known to occur in the Englewood Springs Botanical Area include *Cypripedium parviflorum* (R2 sensitive), *Listera convallarioides* (SOLC), *Orobanche uniflora* (BHNF species of insufficient information), *Corallorhiza trifida* (BHNF species of insufficient information).

Maintaining existing R2 sensitive and SOLC plant occurrences and suitable habitat in Englewood Springs Botanical Area is a Forest Plan objective. Livestock currently have access to this botanical area and have negatively impacted known SOLC *Listera convallarioides* site LICO5-2 and associated suitable plant habitat. This is a fragile, saturated area that is easily impacted. *L. convallarioides* plants and adjacent suitable habitat had been trampled by livestock in 2007 and 2008 and it appears they have accessed the area regularly in previous years as well (trailing, trampling, hummocking, cowpies) (USDA Forest Service 2008a). Livestock have also caused negative impacts to plant habitat along the east side of FSR 228 where flow from springs meets the road. Livestock are known to water and linger in this area and have widened the channel, and trampled vegetation—with the trampled area and fresh trails pushing farther up slope into mossy, botanically-rich areas.

Environmental Consequences

R2 Sensitive Species

Direct and Indirect Effects Common to all R2 Sensitive Species and Habitats

Botrychium campestre, Botrychium lineare, Carex alopecoidea, Cypripedium parviflorum, Lycopodium complanatum, Platanthera orbiculata, Salix candida, Salix serissima, Sanguinaria canadensis, Viburnum opulus var. americanum

Alternative A - Adaptive Management

Direct effects of the Alternative A on the above R2 sensitive plant species include herbivory of individuals and trampling of plants and root zone by livestock (resulting in a range of impacts from additional stress to death). Limited cropping, browsing or trampling of individuals of these species by livestock would likely not have a negative impact on occurrences in the project area, however regular and repeated cropping, browsing or trampling could have negative impacts on persistence of occurrences. The degree that the above discussed effects are realized depends on the degree and intensity of actual grazing, trampling, trailing, water structure access, and accessibility to R2 plant occurrences. Alternative A was designed to limit impacts to these species through fencing and monitoring. Monitoring plans for occurrences near key grazing areas are included in Appendix B.

Possible indirect effects of livestock grazing to R2 sensitive plant species include altered site hydrology, accelerated erosion in an occurrence, soil compaction due to trampling/hummocking, altered site composition or canopy cover (particularly of grasses and shrubs), increased competition from non-native species, altered soil microbial/mycorrhizal activity and nutrient availability, degraded water quality in plant sites and spread of noxious weed seeds to occurrence locations.

Species with a habitat preference of wetlands, riparian areas and seeps (*Carex alopecoidea, Cypripedium parviflorum, Salix candida, Salix serissima*, and *Viburnum opulus* var. *americanum*) are more likely to be impacted by changes in hydrology and water quality. However impacts to all species analyzed are possible. Grazing in and around wetland plant sites can cause increased erosion, which can modify streambank geometry and cause an increase in overland flow. Increases in overland flow will have the net effect of maximizing runoff and minimizing infiltration. While the increased runoff results in overall greater water yield, the storm water is delivered relatively quickly through surface processes rather than through sustained subsurface flows, which are often critical to wetland hydrology (Moore et al. 2006). Changing normal wetland hydrology (e.g. decreasing site moisture) could negatively impact plants by reducing water available for necessary biological functions. Degradation in water quality (e.g. increased nitrates) from livestock waste infiltrating surface and ground water may also affect R2 sensitive plant species by altering normal available nutrients. Livestock waste also locally changes the natural soil balance (chemical make-up, nutrients, microbes, etc.) which can impact plants in the area. Trampling by livestock can lead to soil compaction, especially in areas with moist to saturated soils. Soil compaction can negatively impact plant occurrences by changing the regular water infiltration through the soil and decreasing oxygen available to plant roots and other essential soil organisms. Non-native and invasive species, including noxious weeds, have the ability to out-compete or shade out desired plants and spray from herbicides, used to help control weeds, can also have negative effects on R2 sensitive plants. Adherence to standards and guidelines present in the Forest Plan for noxious weeds will help reduce indirect and cumulative effects of weed encroachment.

Implementing certain design criteria in Alternative A will likely have positive effects on some R2 sensitive plant occurrences and habitat. This includes fencing springs and constructing riparian exclosures, both of which would reduce the negative impacts of livestock trampling in R2 sensitive plant habitat, and implementing a monitoring plan to track and evaluate impacts and guide management accordingly.

Alternative B - No Grazing

In the No Grazing Alternative current livestock grazing management would continue for at least one (up to three years) after which time livestock grazing in the project area would be discontinued. During the transition period when grazing was still allowed, the same general effects from livestock grazing discussed above for Alternative A would apply. Discontinuing livestock grazing would decrease trampling of R2 sensitive plants and habitat and decrease direct herbivory on R2 sensitive plants. Decreasing direct herbivory and trampling is expected to have positive effects on most R2 plant species analyzed. The majority of species analyzed are best described as boreal disjuncts, or species that were isolated in the cooler, moister forests of the Black Hills as the glaciers retreated and the Great Plains environment became established. These species occur in forested habitats that did not evolve with regular, large-animal herbivory (Froiland 1990). *Carex alopecoidea, Botrychium campestre* and *Botrychium lineare* are not boreal disjuncts and effects from decreased herbivory and trampling to plants and habitat of these species may be positive or negative.

Discontinuing grazing would also eliminate the indirect effects discussed above (i.e. altered site hydrology, accelerated erosion, increased soil compaction, degraded water quality, spread of noxious weeds, etc.) and likely be beneficial to all species analyzed. The quality of habitat for riparian or wetland dependent R2 sensitive plant species is expected to improve with the removal of livestock. The improvement of habitats degraded by livestock grazing could thereby increase the extent of suitable R2 sensitive plant habitat across the project area.

Direct and Indirect Effects to R2 Sensitive Species Occurrences

Botrychium campestre (Iowa moonwort)

(Due to similarities in biology and habitat, effects to *Botrychium* lineare are also discussed in this section. *B. lineare* is not documented from the project area however suitable habitat exists in the project area.)

Alternative A - Adaptive Management

Historically, bison and elk moved in large herds in Region 2 and elsewhere, grazing areas intensively for a short time, but not revisiting sites for long periods. Current cattle grazing practices involve much more protracted and intensive use (Anderson, Cariveau 2003). Based on what is known of *Botrychium* species biology (Farrar 2006), it is likely that intensive grazing by cattle would not be beneficial. However, research has not been done to determine what levels of grazing would be neutral, beneficial, or negative to *B. campestre* or *B. lineare*.

The repeated removal of *Botrychium* aboveground leaf tissue may have little effect on viability, however if grazing were to repeatedly occur prior to the maturation and release of spores, the capacity for successful reproduction over the long-term could be reduced. However, *Botrychium* species are more likely to be damaged by incidental trampling than by grazing, because of their small size (Beatty et. al. 2003).

Livestock activity can cause direct and indirect changes in plant composition, abundance, and structure; alter litter dynamics and microclimate; affect soil microbial activity and nutrient availability; alter soil mycorrhizal communities essential to most *Botrychium* species; increase soil compaction and decrease water infiltration; and increase soil erosion and create bare spots. These habitat changes could be beneficial if they reduced competition from other plant species,

opened up suitable microsites for colonization, reduced shrubby encroachment onto suitable grassland habitat, reduced heavy litter build up, or aided in the dispersal of spores. These habitat changes could be detrimental if they repeatedly caused spore loss, caused soil compaction or soil erosion, reduced thatch to a level that decreased soil moisture, altered community dynamics to favor an unsuitable community type, facilitated weed invasion, or caused trampling of individuals and disturbance of belowground structures (Beatty et. al. 2003).

The positive or negative effects of livestock grazing (Adaptive Management Alternative) to *Botrychium campestre* or *Botrychium lineare* populations and habitat quality presumably depend on timing of grazing (e.g., season), grazing intensity (e.g., stocking density), habitat type (e.g., meadow or forest), site conditions (e.g., topography, moisture, invasive plants) and accessibility of known sites and habitat to livestock (Beatty et al. 2003).

Alternative B - No Grazing

Discontinuing grazing (No Action/No Grazing Alternative) could have positive and/or negative effects on *B. campestre* or *B. lineare* occurrences in the project area. (See above discussion.) After weighing potential positive and negative effects, the overall risk of implementing the No Action/No Grazing Alternative to *B. campestre* or *B. lineare* is determined to be low.

Carex alopecoidea (foxtail sedge)

Alternative A - Adapative Management

The proposed action for Ladyfinger Gulch as described in Table 5 is to maintain existing exclosure (described above), annually monitor area and remove livestock from the affected area if trigger points have been reached (see monitoring plan in Appendix B). Several adaptive management options to remove livestock from the affected area include the following:

- Limit use of riparian areas through fencing,
- Reconstruct water source at Ladyfinger Seep,
- Eliminate livestock grazing from entire area by connecting existing fences,
- Limit livestock use through felling of some spruce trees to limit livestock access to localized areas.

Limiting livestock access to the Ladyfinger Gulch riparian area through fencing would be an effective method of minimizing negative impacts to suitable plant habitat and the overall riparian area. The direct effects of installing fencing (permanent or temporary) along this drainage to *C. alopecoidea* plants and associated suitable habitat are expected to be negligible. If the fences are installed an adequate distance above the riparian floodplain, the likelihood of disturbing plants and habitat is low. The indirect effect of installing fencing would be beneficial to *C. alopecoidea* and associated suitable habitat since it would decrease livestock access to the area thereby eliminating the negative effects of trampling and herbivory.

Livestock currently have access to water in a slightly dugout area at the Ladyfinger Seep spring source. The existing buck and rail fence surrounds the seep, but it is no longer effective at excluding livestock. Hummocking and trampling of wetland vegetation and browsing of willows (> 50% of current year's leaders browsed) have been documented. There is a non-functional tank about 60 meters below the seep. Reconstructing the water source at Ladyfinger Seep would be much better than having cattle in the spring and the saturated channel area. Reconstruction of the

Ladyfinger Seep water source would likely be beneficial to suitable plant habitat in the vicinity of Ladyfinger Seep, but the reconstruction may not act to decrease livestock impacts to *C. alopecoidea* plants and suitable plant habitat in Ladyfinger Gulch. This area will be monitored annually as part of the monitoring plan and adaptive management to reduce negative impacts will take place if trigger points are reached (see Appendix B).

Eliminating livestock grazing from the entire Ladyfinger Gulch by connecting existing fences would be the most effective way to move Ladyfinger Gulch and associated plant habitat (including *C. alopecoidea* site CAAL8-20) to the desired condition. The proposed exclosure would contain about 30 acres of capable rangeland which is approximately 1% of the capable rangeland in this allotment (USDA 2005a). The direct effects of connecting and maintaining these existing fences to *C. alopecoidea* and suitable plant habitat are expected to be negligible since fence construction and maintenance would not take place directly in or adjacent to suitable habitat. The indirect effect of connecting these fences would be beneficial to *C. alopecoidea* and associated suitable habitat since it would decrease livestock access to the area thereby eliminating the effects of trampling and herbivory.

Limiting livestock use through felling of some spruce trees to limit livestock access to localized areas is not expected to be as effective a method of minimizing negative impacts to suitable plant habitat and the overall riparian area. Density of trees is highest on the slope south of the drainage and in the drainage bottom. The area north of the drainage (where livestock access) is much flatter with considerably less canopy cover. In order to adequately limit livestock from suitable plant habitat, it is expected that a large number of trees within suitable habitat would need to be felled. Removing trees can open the microsite canopy cover. Spruce trees are the "backbone" of this community type (White Spruce Alluvial Black Hills Forest), designated as a rare community type in the 1999 Black Hills Community Inventory Report (Marriott et. al 1999). Felling spruce trees would increase light in this drainage which could cause negative effects by altering soil moisture, potentially drying out mosses and other wetland species that contribute to the character of this high quality suitable plant habitat. Additionally, trees decompose and branches break making a less effective barricade over time. To maintain the blockade additional trees would need to be felled which would further change the habitat. The degree of these negative effects would be related to the number of trees felled and to the distance of the felled trees from suitable habitat. (Suitable habitat in the area includes Ladyfinger Gulch and the northerly facing spruce slope above.) If it were feasible to effectively limit access by felling only a very small number of trees the magnitude of effects would be less than if it required felling many trees. Additionally, if it were feasible to effectively limit livestock access to Ladyfinger Gulch by felling trees in the pine dominated area farther away from suitable habitat then effects to plant habitat in Ladyfinger Gulch would be less even if a greater number of trees needed to be felled in order to achieve this. However, based on site reconnaissance, this in not expected to be a feasible option.

Analysis and determination for *C. alopecoidea* is based on the two known occurrences (CAAL8-19 and CAAL8-20) being monitored to assess impacts from livestock. Annual monitoring of these sites through the forest-wide monitoring program is expected to continue, however forest monitoring for this species usually takes place late in the season (September) after plants have produced seed. If project monitoring for *C. alopecoidea* does not take place until late season it is possible that unacceptable impacts will have already incurred. In order to accurately assess impacts and implement effective adaptive management, monitoring should take place earlier in

the grazing season. If unacceptable impacts to *C. alopecoidea* occur, adaptive management will be implemented to protect the sites from further impacts.

Livestock grazing may impact *C. alopecoidea* individuals through trampling, seed loss, and leaf damage (Moore et. al. 2006). Plants may benefit or tolerate some cropping due to the location of its growing point at or near the ground surface. However, in Black Hills occurrences, habitat degradation due to trampling by livestock (i.e. streambank alteration, direct trampling of plants, and alteration of site hydrology) appears to be a greater risk to the species than herbivory. There has been no research to determine what levels of cropping and trampling would cause negative effects to the species. The fact that it is persistent to the present day is some indication that livestock grazing on BHNF has not been devastating to it. However, it is not possible to know how occurrences may have been changed or lost before the BHNF forest-wide plant monitoring program was initiated in 2000. Further monitoring efforts in sites that partially exclude livestock should take place to better understand effects of grazing on this species in the Black Hills.

After weighing known livestock impacts against protection measures (fencing), project monitoring, and adaptive management, the overall risk of implementing Alternative A to *C. alopecoidea* is low to moderate.

Alternative B - No Grazing

Discontinuing grazing in the project area would eliminate livestock access to *C. alopecoidea*. This may be beneficial or detrimental to *C. alopecoidea*. There has been no known research to compare the effects of grazing vs. no grazing on this species. However, eliminating trampling of *C. alopecoidea* plants and habitat by livestock would likely improve overall habitat quality (e.g. increase streambank stability, allow recovery of degraded riparian/wetland communities) and is expected to be beneficial to the species.

Cypripedium parviflorum (lesser yellow lady's slipper)

Alternative A - Adaptive Management

In general, grazing can be viewed as having negative or positive impacts on *C. parviflorum*, depending on what is being grazed. If surrounding vegetation is grazed, then *C. parviflorum* may benefit because competition for resources is reduced. However, individual plants may be killed or damaged by direct grazing or associated trampling and soil compaction, which could be detrimental to *C. parviflorum* occurrences. Through herbivory, trampling, and elimination of waste, large herbivores can disturb *C. parviflorum* occurrences to such an extent that neither the plants, their pollinators, nor their associated mycorrhizae may be able to survive (Mergen 2006). Indirect impacts could be positive or negative and include creating microsites for seed germination and establishment (for both *C. parviflorum* and competing weeds), removing competing vegetation, altering nearby hydrology or nearby canopy cover to an extent that *C. parviflorum* could be harmed, and changing soil mycorrhizal communities essential to this species. Given the small area and low number of individual plants within a typical occurrence, excess livestock grazing could decimate a local population quickly. In general, management activities or natural disturbances that affect habitats (negatively or positively) will likely have similar effects on individuals (Mergen 2006).

Due to limited access of livestock to know occurrences, protections from Forest Plan standards, and the relative security of *C. parviflorum* on BHNF lands (over 4000 individuals known from 20 6th level watersheds), risks from the effects of livestock grazing to this species in the project

area are low. However, if circumstances change to increase livestock access to known occurrences and suitable habitat (e.g. logging, changes in grazing patterns, etc.), risks could also increase and could result in loss of occurrences. Suitable habitat includes moist to saturated often mossy forested microsites that could be easily impacted (hummocking, trampling of vegetation) by even a small amount of livestock trampling.

Alternative B - No Grazing

Discontinuing grazing in the project area would eliminate potential livestock access to *C. parviflorum* occurrences and suitable habitat and is expected to be beneficial to this species.

Platanthera orbiculata (lesser round-leaved orchid)

Alternative A - Adaptive Management

Livestock use could negatively affect *P. orbiculata* where grazing or trampling of its single pair of leaves results in the loss of energy producing tissues, impairs the function of underground structures, decreases the viability or vigor of individuals or degrades soils thereby altering microclimate. Due to its growth habit, trampling of plants and habitat is probably a greater risk to the species than herbivory (Hornbeck et. al. 2003).

Due to the limited access from livestock to the known occurrence in the project area and the relative security of *P. orbiculata* on BHNF lands (greater than 30 occurrences distributed in three geographically separated regions), risks from the effects of livestock grazing to this species in the project area are low. However, if circumstances change to increase livestock access to known occurrences and suitable habitat (e.g. logging, changes in grazing patterns, etc.), risks could also increase and could result in loss of occurrences. Suitable habitat includes moist often mossy forested microsites that could be easily impacted (hummocking, trampling of vegetation) by even a small amount of livestock trampling.

Alternative B - No Grazing

Discontinuing grazing in the project area would eliminate potential livestock access to *P. orbiculata* occurrences and suitable habitat and is expected to be beneficial to this species.

Viburnum opulus var. americanum (highbush cranberry)

Alternative A - Adaptive Management

Possible impacts to *V. opulus* var. *americanum* from livestock grazing include browsing of plants and trampling of young plants and habitat. Although cattle generally avoid woody materials and there is some evidence that livestock would not substantially impact the species through direct plant consumption, levels of browsing on woody species such as *V. opulus* var. *americanum* likely depend on total available forage. Livestock are more likely to impact the species, through trampling of plants and riparian and wetland substrates, and this has been identified as an item of concern in Region 2. Compared to native wildlife, livestock, especially cattle, may spend an inordinate amount of time around a water source; this can result in more trampling impacts than might occur otherwise. Trampling and associated soil erosion, topsoil loss, and nutrient loss could have a detrimental impact on the local environmental conditions required by seedlings of *V. opulus* (Nellessen 2006).

After weighing known livestock impacts against limited livestock access (at sites VIOPA2-27 & 980010), required project monitoring and adaptive management (at sites VIOPA2-6 & VIOPA2-29), and the relative security of *V. opulus* var. *americanum* on BHNF lands (large number of occurrences distributed over a relatively wide area of the northern Black Hills), risks from the effects of livestock grazing to this species in the NZ08 project area are low to moderate. However, depending on the timing and frequency of annual monitoring unacceptable levels of impacts could potentially have already taken place by the time monitoring occurs. Furthermore, if circumstances change to increase livestock access to known occurrences and suitable habitat (e.g. logging, changes in grazing patterns, etc.), risks could also increase and could result in loss of occurrences. Suitable habitat includes moist to saturated riparian/wetland habitats and moist forested sites that could be easily impacted (hummocking, trampling of vegetation) by even a small amount of livestock trampling.

Alternative B -No Grazing

Discontinuing grazing in the project area would eliminate potential livestock access to *V. opulus* var. *americanum* occurrences and suitable habitat and is expected to be beneficial to this species.

Cumulative Effects for R2 Sensitive Species

The cumulative effects area for R2 sensitive plant species is suitable habitat within the project area. Suitable habitat varies by species and is summarized in the "Distribution and Habitat" column of Table 2 above. For the majority of species analyzed, suitable habitat can be summarized as moist forested and/or riparian communities. For two species, *Botrychium campestre* and *Botrychium lineare*, suitable habitat can be generalized as grasslands, openings in forested areas and old (15-25 years) disturbances. The indirect and cumulative effects analysis for species persistence is bounded in time as the next 50 years, as described in the 2005 Phase II Final Environmental Impact Statement (FEIS) associated with the amendment to the Revised Forest Plan. This temporal scale is based on: a) the planning horizon (usually 50 years for a Forest plan); b) the biology of the species (e.g., generation time, response time to changed conditions, recolonization capability); and c) the time needed for the overall ecosystem to respond to proposed management (USDA 2005b). Cumulative effects to all R2 sensitive plant species analyzed are discussed here.

Past present and reasonably foreseeable actions in the project area include mining, grazing, timber sales, wildfires, prescribed fires, fire suppression, noxious weed treatment, water diversion, land exchanges, road building and recreation as described previously in this document. Actions specific to botanical resources in the project area include: forest-wide R2 sensitive and plant SOLC monitoring (initiated in 2000 and expected to continue in the future), construction and maintenance of *Carex alopecoidea* exclosure in Pettigrew Gulch (site CAAL8-20) (expected to be completed in 2008), forest-wide monitoring of botanical areas (including Englewood Springs Botanical Area) (initiated in 2007 and expected to continue), treatment of noxious weeds in sensitive and plant SOLC occurrences and habitat, future development of botanical area management plans (including Englewood Springs Botanical Area).

Soil disturbance, introduction of invasive species, increased fuel loading, competition from non-native species, and changes in micro site moisture and hydrologic regimes can negatively affect sensitive plant habitat. Historical management in the Black Hills has created changes in suitable plant habitat from livestock grazing, road building, recreation, fire suppression, mining activities,

water diversion, and near-extirpation of beaver, all of which have decreased suitability of many areas as habitat for sensitive plant species.

Alternative A - Cumulative Effects

The direct and indirect effects of livestock grazing to R2 sensitive plant species in the NZ08 project area could add to effects from other management activities (e.g. timber management, recreation, etc.), through further soil disturbance, changes in microsite moisture and hydrology regimes, introduction of invasive species, and other changes in vegetation quality (including increased competition from non-native species). Timely monitoring and implementation of appropriate adaptive management methods when unacceptable impacts are discovered is essential in order to keep these negative effects to a minimum. The cumulative effects of ongoing livestock grazing would continue under Alternative A, but with implementation of adaptive management (e.g. fencing springs and riparian areas, implementing a monitoring plan) may decrease the intensity in these areas. However, if monitoring takes place late in the grazing season well after the trigger points for adaptive management have been reached, additional cumulative impacts will have incurred.

Alternative B - Cumulative Effects

Under the No Grazing Alternative current livestock grazing management would continue for at least one year (up to 3 years) after which time livestock grazing in the project area would be discontinued. During the transition period when grazing was still allowed, the same general cumulative effects from livestock grazing discussed above (regarding the Adaptive Management Alternative) would apply. Discontinuing grazing would result in locally increased litter/thatch which may facilitate the spread of wildfire. However current prescribed burning and timber management are expected to continue and increased risks to sensitive plants from catastrophic wildfire are not expected under the No Grazing Alternative. It is likely that cessation of grazing would be beneficial to suitable habitat and known occurrences of R2 sensitive plant species NZ08 project area. If this is the case, cumulative impacts would also be beneficial. Since there is no known research to document the benefits of no grazing, the conservative conclusion that there would be little or no direct or indirect effects from cessation of livestock grazing would mean that cumulative effects would also be negligible.

Determinations for R2 Sensitive Plant Species

Based on implementation of monitoring and appropriate adaptive management options, a determination of "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" is made for *Botrychium campestre, Botrychium lineare, Carex alopecoidea, Cypripedium parviflorum, Lycopodium complanatum, Platanthera orbiculata, Salix candida, Salix serissima, Sanguinaria canadensis* and *Viburnum opulus* var. *americanum* under either Alternative A or Alternative B.

Species of Local Concern

Direct and Indirect Effects

Gentiana affinis (pleated gentian)

Alternative A - Adaptive Management

Livestock grazing (Adaptive Management Alternative) resulting in direct herbivory or trampling of *G. affinis* individuals is expected to negatively affect the species. Furthermore, *G. affinis* is considered to be a decreaser species with grazing (USDA 2005b).

Due to the limited access from livestock to the known occurrences in the project area and the relative security of *G. affinis* on NFS lands (greater than 30 occurrences distributed in a relatively wide geographic range), risks from the effects of livestock grazing to this species in the NZR 08 project area are low. However, if circumstances change to increase livestock access to known occurrences and suitable habitat (e.g. changes in grazing patterns, unmaintained fences), risks could also increase, potentially resulting in loss of occurrences. Suitable habitat includes moist meadows and riparian areas that could be easily impacted (hummocking, trampling of vegetation) by even a small amount of livestock trampling.

Alternative B - No Grazing

Discontinuing grazing in the project area would eliminate potential livestock access to *G. affinis* occurrences and suitable habitat and is expected to be beneficial to this species.

Listera convallarioides (broadlipped twayblade)

Alternative A - Adaptive Management

Negative direct and indirect impacts to *L. convallarioides* from livestock grazing include herbivory or trampling of plants and habitat by livestock, invasion by noxious weeds or other non-native invasive plant species from seed dispersal and ground disturbance, loss/degradation of riparian habitat or alteration of hydrologic function from livestock trampling (USDA 2005b). Alternative A includes several adaptive management options that may be implemented including fencing all or a portion of the Botanical Area including one of more populations of *L. convallarioides,* constructing an alternate water source for livestock, or simply removing livestock from the allotment once the monitoring trigger point has been reached.

Considering known livestock impacts, accessibility of sites to livestock, the overall rarity of *L. convallarioides* on the forest, proposed project monitoring, and adaptive management risks from the effects of livestock grazing to *L. convallarioides* in the project area are as follows:

- If livestock continue to have access to site LICO5-2 (Englewood Springs Botanical Area) and monitoring takes place only once per year then the risks are high. (With only one monitoring visit, it is more likely that trigger points will have been met without timely implementation of adaptive management.)
- If livestock continue to have access to site LICO5-2 (Englewood Springs Botanical Area) and monitoring takes place frequently throughout the grazing season, then the risks are

moderate to high. (There is still opportunity for impacts to the entire site, but if adaptive management is implemented in a timely manner after trigger points are reached, then the impacts to the most accessible area will be further limited.)

- If livestock are excluded from the portion of site LICO5-2 (Englewood Springs Botanical Area) west of FSR 228.1 and the site is monitored annually then the risks are moderate. (Livestock will still have access to the rest of the site upslope and to site LICO5-3 although accessibility to these areas is limited.)
- If livestock are excluded from the entire Englewood Springs Botanical Area, including all of site LICO5-2, then the risks are low to moderate. (Livestock will still have access to site LICO5-3, but monitoring and timely adaptive management will limit risks.)

If circumstances change to increase livestock access to known occurrences and suitable habitat (e.g. logging, changes in grazing patterns, etc.) or if project monitoring does not take place in a timely manner, risks could also increase and could result in loss of occurrences. Suitable habitat includes moist to saturated soils near springs/seeps that could be easily impacted (hummocking, trampling of vegetation) by even a small amount of livestock trampling.

Alternative B - No Grazing

Discontinuing grazing in the project area would eliminate potential livestock access to *L. convallarioides* occurrences and suitable habitat and is expected to be beneficial to this species.

Petasites sagittatus (arrowleaf sweet coltsfoot)

Alternative A - Adaptive Management

Although *P. sagittatus* does not appear to be especially palatable to cattle, livestock grazing (Adaptive Management Alternative) can have both direct and indirect negative effects on the species. Direct physical disturbance and transport of noxious weed propagules by livestock may pose an additional risk to *P. sagittatus* habitat. Livestock may further degrade streamside communities (i.e. suitable habitat for *P. sagittatus*) through the effects of their grazing, trampling, resting, and trailing (Glisson 2003)

Due to the limited access from livestock to much of the *P. sagittatus* suitable habitat (i.e. Rapid Creek) and riparian project monitoring to guide management in other areas of suitable habitat, risks from the effects of livestock grazing to this species in the NZ08 project area are low. However, if circumstances change to increase livestock access to known occurrences and suitable habitat (e.g. logging, changes in grazing patterns, etc.), risks may also increase and could result in loss of SOLC plant occurrences. Suitable habitat includes moist to saturated soils in riparian areas and near seeps that could be easily impacted (hummocking, trampling of vegetation) by even a small amount of livestock trampling.

Alternative B- No Grazing

Discontinuing grazing in the project area would eliminate potential livestock access to *P. sagittatus* occurrences and suitable habitat and is expected to be beneficial to this species.

Cumulative Effects to SOLC

The primary habitat for the three plant SOLC with known occurrences and the four SOLC with suitable habitat in the project area overlaps with suitable habitat for Region 2 sensitive plant species and can generally be categorized as moist forested and/or riparian communities. Therefore cumulative effects discussed previously for R2 sensitive species also applies to these plant SOLC.

MA 3.1 Botanical Areas

Alternative A (Proposed Action)

Direct and Indirect Effects

Since livestock will continue to have access to Englewood Springs Botanical Area under Alternative A, it is expected that some of the above described impacts will continue, but effects are expected to decrease from the current condition through monitoring and timely implementation of adaptive management alternatives.

Cumulative Effects

Weed infestations are also a concern in the Englewood Springs Botanical Area. Monitoring and survey forms have reported several species of noxious weeds, some co-occurring with R2 sensitive and SOLC plant species. Weed species documented in the botanical area include: *Cirsium arvense* (Canada thistle), *Cirsium vulgare* (bull thistle), *Cynoglossum officinale* (houndstounge), and *Leucanthemum vulgare* (oxeye daisy). Hand-pulling of Canada thistle directly adjacent to the SOLC *Listera convallarioides* occurrence has taken place in the past by Black Hills State University volunteers and hand-pulling efforts by BHNF employees continue to take place.

The greatest risks to the Englewood Springs Botanical Area (as noted in 1983 field reports) are changes in the aquifer that would cause the drying of springs which support this wetland community. Changes in the aquifer could be caused by drilling wells, diverting water or local/regional climate conditions (USDA Forest Service 1996b).

Alternative B – No Grazing (No Action)

Direct and Indirect Effects

Discontinuing grazing in the project area would eliminate livestock access to Englewood Springs Botanical Area and eliminate negative effects of livestock grazing to the area. It is expected that the cessation of any cropping or trampling of wetland and boreal plant communities, springs, and rare plants by livestock in the Englewood Springs Botanical Area would be beneficial to the botanical area (MA 3.1) and the botanical values for which it was designated.

Cumulative Effects

Weed infestations are also a concern in the Englewood Springs Botanical Area. Monitoring and survey forms have reported several species of noxious weeds, some co-occurring with R2 sensitive and SOLC plant species. Weed species documented in the botanical area include: *Cirsium arvense* (Canada thistle), *Cirsium vulgare* (bull thistle), *Cynoglossum officinale* (houndstounge), and *Leucanthemum vulgare* (oxeye daisy). Hand-pulling of Canada thistle directly adjacent to the SOLC *Listera convallarioides* occurrence has taken place in the past by Black Hills State University volunteers and hand-pulling efforts by BHNF employees continue to take place.

The greatest risks to the Englewood Springs Botanical Area (as noted in 1983 field reports) are changes in the aquifer that would cause the drying of springs which support this wetland community. Changes in the aquifer could be caused by drilling wells, diverting water or local/regional climate conditions.

Heritage Resources

Affected Environment

Historically the allotment areas have seen many and varied uses: livestock grazing, timber harvest, road construction, homesteading, and mining to name a few. Prehistoric uses of the areas are especially evident in all allotments, primarily in the form of large base camps, small lithic scatters and large lithic procurement areas. Historic properties in the allotments are primarily associated with mining and homesteading.

Field Surveys

Heritage resource inventories for the Grand Canyon, Stearns Park, Willow Springs, Silver Creek, Black Haw and Huett Springs allotments on the Bearlodge Ranger District were completed between 1999 and 2006. Heritage resource inventories for the Pettigrew, Upper Elk, East Rapid and Griffith allotments on the Northern Hills Ranger District were accomplished between 1997 and 2007. Heritage resource inventories for all of the FY 08 North Zone Range Allotments, in both Wyoming and South Dakota, were accomplished between 1997 and 2007. Both Level I files searches and Level III field inventories were used to identify heritage properties that could be affected by grazing activities.

Areas identified for survey in each of the allotments were those areas where a high likelihood of finding heritage properties overlapped with primary grazing areas, as identified by District range data.

Previously recorded NRHP eligible sites were monitored for effect in all allotments. Livestock grazing was not found have a significant impact on any NRHP eligible heritage property in any of the allotments. The purpose of the inventories was to identify, and inspect all of the National Register of Historic Places (NRHP) eligible and unevaluated heritage resource properties for effects from livestock and in advance of proposed range management activities.

A total of 255 sites are located within the boundaries of the ten allotments: 44 in Grand Canyon, 57 in Silver Creek, 7 in Black Haw, 5 in Huett Springs, 30 in Pettigrew, 38 in Upper Elk, 60 in East Rapid, and 14 in Griffith.

Environmental Consequences

Alternative A - Proposed Action

This is the preferred action alternative and includes adaptive options for management.

Direct and Indirect Effects

The most current information available indicates that no effects from grazing or grazing activities were noted on any National Register of Historic Places eligible heritage resource properties in any of the allotments under study for this analysis.

Direct and Indirect Effects Specific to Individual Allotments

Black Haw Allotment

Under this alternative, the stock tank in Haw Gulch would be removed in order to restore the flow of the natural spring. This action will have no effect on known NRHP eligible heritage resource properties in the allotment.

Huett Spring Allotment

No NRHP eligible properties have been identified in this allotment. None of the proposed actions will have effects on heritage resource properties.

Grand Canyon Allotment

Under this alternative, new fences to exclude livestock are proposed for a number of springs.

Site 39LA305/642 is an NRHP eligible site with an intact buried component at Paige Spring. Fence building in this location may have adverse effects to the site. One of the management options in this proposal calls for an ID team, along with the permittee, to design additional protection measures as needed. This team may be able to determine what measures can be undertaken to protect the site without causing adverse effects to the site. If it is determined that effects to the site can not be avoided, it will be necessary to develop a plan to mitigate effects to this site per the 36 CFR 800 regulations. There are no known NRHP eligible properties at any of the other listed springs.

Silver Creek Allotment

This alternative proposes to exclude livestock from Pete Spring. The project will consist of moving the existing stock tank at Pete Spring to a new location out of the swampy riparian area and down the drainage to the floodplain below. Ground leveling will not be necessary, but posts will be sunk to hold the tank in place. Post holes will be approximately 6 inches in diameter and approximately 2 feet deep. A pipeline from the spring to the new tank location will be placed above ground. No pipeline excavation will take place.

In 2006, a Level III Heritage Resources inventory report was prepared for this tank relocation project, FS #R2006020300314. One previously recorded NRHP eligible site, 48CK1762, is

located approximately 160m (0.10 miles) west of the proposed new tank location. This site is outside the project's Area of Potential Effect and will not be affected by the planned project activities.

Stearns Park and Willow Springs Allotments

Under this alternative, extensions for three existing pipelines are proposed. The area around these proposed extensions have previously been inventoried for heritage resources and no properties have been identified. There are also proposals for new fencing at a number of springs in these allotments. No NRHP eligible sites are located at these springs and effects to sites are unlikely.

Pettigrew Allotment

Several exclosures are planned for this allotment. All of the proposed exclosure areas have received adequate Level III heritage inventory and no NRHP eligible sites will be affected.

In Ladyfinger Gulch, the proposal identifies a need to limit livestock use through felling of some spruce trees to limit access to localized areas and riparian areas. There is an unevaluated ditch running along the east side of a portion of Ladyfinger Gulch that historically transported water for mining in the area. Felling of trees by hand to divert livestock away from this site will have no effect to the ditch feature. Future fencing and water source reconstruction projects will need to be planned in consultation with the Heritage Department to ensure the site is completely avoided by disturbances.

Upper Elk Creek Allotment

This alternative proposes to restrict livestock use in and near several springs with exclosures or fences.

At Upper Elk Spring # 2, there is a segment of the NRHP eligible Little Elk Creek aqueduct site located adjacent to an exclosure. Livestock have the potential to effect the spring source but are not presently effecting the aqueduct pipeline. When maintaining or extending the existing exclosure, care must be taken not to move equipment or cause any ground disturbance up slope to the aqueduct site. There will be no effect to historic properties provided the historic pipeline is avoided.

Another segment of the Little Elk Creek aqueduct site is located near the Englewood Spring Botanical Area. This Alternative calls for restricting livestock access to the botanical area by fencing or other means. If an exclosure is built or other means are planned to restrict livestock from this area care must be taken to avoid the aqueduct pipeline. There will be no effect to historic properties provided the historic pipeline is avoided.

East Rapid Allotment

Temporary or permanent fencing to exclude livestock and reduce impacts on riparian vegetation is proposed for Gimlet Creek. This entire area has been covered by Level III adequate heritage resource inventories. There are no known cultural resource sites in this area; therefore, planned fencing will have no effect to historic properties.

This Alternative proposes to reconstruct the existing spring and stock tank, and exclude livestock from the Keloran Spring riparian area. There are two NRHP eligible sites located near this spring, stock tank, and riparian area. One is a historic spring development with a hand hewn log trough. The other is a buried prehistoric camp site.

Plans for excluding livestock from the riparian area must avoid the prehistoric site and the spring development site. The historic spring development should be incorporated into the exclosure to keep livestock from impacting it in the future. All plans for the stock tank, spring, and exclosure must be done in consultation with the Heritage Department to ensure these significant sites are avoided.

There will be no effect to historic properties provided these two NRHP eligible sites are avoided.

Griffith Allotment

Under this Alternative, there are proposals to extend livestock exclosures at Lander Spring and Clayton Draw.

A non-eligible prehistoric site exists at Lander Spring. The site has been heavily disturbed in the past. No further work or protection is recommended for this historic property.

There is a NRHP eligible site south of the current exclosure in Clayton Draw. This site contains dense buried deposits and must be avoided. All planned work for expanding the exclosure fence must be done in consultation with the Northern Hills Heritage Department to ensure this site is avoided. There will be no effect to historic properties provided this NRHP eligible site is avoided.

Cumulative Effects

Cumulative effects analysis for heritage resources considered all lands that fall within the allotment boundaries.

Past, future, and foreseeable activities within the 2008 allotment include timber harvest, recreation, road construction, range, and associated improvement projects. All of these activities may have a cumulative effect to heritage resources in the form of increased soil erosion, increased visitor use and traffic, and vandalism. These impacts are difficult to quantify, but can be avoided or minimized through the implementation of appropriate site-specific mitigation measures through consultation with the State Historic Preservation Officer (SHPO) and the Advisory Council on Historic Preservation.

It is recognized that heritage resources may be present in the subsurface with no surface manifestation. Therefore, if additional heritage resources are discovered during range or range improvement activities, all operations will cease within a 100-meter radius of the site location and a forest archeologist notified immediately. Any heritage resources located during project implementation would be protected based on the recommendations of the District Archeologist and the SHPO. All sites would be evaluated under the terms specified in 36 CFR 60.4 and 36 CFR 800 and applicable Forest guidelines (FP Guidelines 4102, 6101, 6106).

Projects that do not have specific plans in this EA will require further consultation when specific information is available. The effects related to these undertakings and mitigations necessary to avoid an adverse effect will be addressed in a new cultural resource compliance report. Consultation with all appropriate historic preservation offices and consulting parties will be entered into pursuant to Section 106 of the National Historic Preservation Act. If additional site elements or new discoveries are found during project actions (inadvertent discoveries), the new elements or discoveries must be assessed according to the guidelines established in 36 CFR 800.

Alternative B – No Grazing

Direct and Indirect Effects Common to All Allotments

This alternative will not cause any direct effects to heritage resources by livestock grazing activities.

Cumulative Effects

The cumulative effects from not grazing the vegetation cover may lead to more intense burning in the event of a wild land fire. Intense wild land fire can affect both historic and prehistoric properties.

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CONSULTATION AND COORDINATION

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

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TRIBES:

A total of thirty letters were sent to Native American tribal contacts regarding this analysis. A copy of the mailing list can be found in the project file.

OTHERS:

A total of 41 letters were sent to individuals, groups, and other agencies, asking for input concerning this analysis. A copy of the mailing list can be obtained from the project file.

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APPENDIX A - Maps

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APPENDIX B - Monitoring Plans

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Black Haw Allotment Monitoring Plan					
Monitoring Site	**Desired Conditions**	**Method**	**Frequency**	**Trigger Point**	**Change Needed**
Key Upland Grazing Areas	≤45% utilization	Ocular Utilization	Every year; Periodically throughout the grazing season	45% utilization	Remove livestock from affected area
Key Riparian Grazing Areas	4-6” stubble height (WCP 3h)	Stubble height	Every year; Periodically throughout the grazing season	4-6” stubble height	Remove livestock from affected area
Key Riparian Grazing Areas	Maintain at least 74% stable stream banks (WCP 3k)	Stream bank alteration; Photo-point	Every year; Periodically throughout the grazing season	>26% stream bank alteration	Remove livestock from affected area
Key Riparian Grazing Areas	Maintain 74% stable stream banks (WCP 3k)	Stream bank stability	Every 3-5 years	<74% stable stream banks	Implement adaptive management option
Black Haw Gulch	Maintain diverse riparian plant community (WCP 3h), achieve and maintain 74% stable stream banks (WCP 3k)	Cover-Frequency Streambank stability; Photo-point	Every 5-10 years	Loss of species diversity*, or >74% stable stream banks	Implement adaptive management option

* - Loss of species diversity means a reduction in the number of desirable native plant species or a reduction in the frequency of any one desirable native plant species.

Grand Canyon Allotment Monitoring Plan					
Monitoring Site	**Desired Conditions**	**Method**	**Frequency**	**Trigger Point**	**Change Needed**
Key Upland Grazing Areas	≤50% utilization	Ocular Utilization	Every year; Periodically throughout the grazing season	50% utilization	Remove livestock from affected area
Key Riparian Grazing Areas	4-6" stubble height (WCP 3h)	Stubble height	Every year; Periodically throughout the grazing season	4-6" stubble height	Remove livestock from affected area
Key Riparian Grazing Areas	Maintain 74% stable stream banks (WCP 3k)	Stream bank alteration	Every year; Periodically throughout the grazing season	>26% stream bank alteration	Remove livestock from affected area
Key Riparian Grazing Areas	Maintain 74% stable stream banks (WCP 3k)	Stream bank stability	Every 3-5 years	<74% stable stream banks	Implement adaptive management option
South Spring	Maintain diverse riparian plant community (WCP 3h), achieve and maintain <5% bare ground (WCP 2a)	Photo point	Every 5-10 years	>5% bare ground	Implement adaptive management option
Rifle Pit	Maintain plant diversity, <5% bare soil (WCP 2a)	Cover-Frequency	Every 5-10 years	Loss of species diversity*, or >5% bare ground	Implement adaptive management option

Grand Canyon Allotment Monitoring Plan					
Monitoring Site	**Desired Conditions**	**Method**	**Frequency**	**Trigger Point**	**Change Needed**
Smith Draw	Maintain plant diversity, <5% bare soil (WCP 2a)	Cover-Frequency	Every 5-10 years	Loss of species diversity*, or >5% bare ground	Implement adaptive management option

* - Loss of species diversity means a reduction in the number of desirable native plant species or a reduction in the frequency of any one desirable native plant species.

Huett Springs Allotment Monitoring Plan					
Monitoring Site	**Desired Conditions**	**Method**	**Frequency**	**Trigger Point**	**Change Needed**
Key Upland Grazing Areas	≤50% utilization	Ocular Utilization	Every year; Periodically throughout the grazing season	50% utilization	Remove livestock from affected area
Key Riparian Grazing Areas	4-6" stubble height (WCP 3h)	Stubble height	Every year; Periodically throughout the grazing season	4-6" stubble height	Remove livestock from affected area
Key Riparian Grazing Areas	Maintain 74% stable stream banks (WCP 3k)	Stream bank alteration	Every year; Periodically throughout the grazing season	>26% stream bank alteration	Remove livestock from affected area
Key Riparian Grazing Areas	Maintain 74% stable stream banks (WCP 3k)	Stream bank stability	Every 3-5 years	<74% stable stream banks	Implement adaptive management option
Lake Divide	Maintain plant diversity, increase frequency of native plants, 15-25% bare soil (WCP 2a)	Cover-Frequency	Every 5-10 years	Loss of species diversity*, or >15-25% bare ground	Implement adaptive management option
Kudlock	Maintain plant diversity, increase frequency of native plants, 15-25% bare soil (WCP 2a)	Cover-Frequency	Every 5-10 years	Loss of species diversity, or >15-25% bare ground	Implement adaptive management option

Silver Creek Allotment Monitoring Plan					
Monitoring Site	**Desired Conditions**	**Method**	**Frequency**	**Trigger Point**	**Change Needed**
Key Upland Grazing Areas	≤50% utilization	Ocular Utilization	Every year; Periodically throughout the grazing season	50% utilization	Remove livestock from affected area
Key Riparian Areas	4-6" stubble height (WCP 3h)	Stubble height	Every year; Periodically throughout the grazing season	4-6" stubble height	Remove livestock from affected area
Key Riparian Grazing Areas	Maintain 74% stable stream banks (WCP 3k)	Stream bank alteration	Every year; Periodically throughout the grazing season	>26% stream bank alteration	Remove livestock from affected area
Key Riparian Grazing Areas	Maintain 74% stable stream banks (WCP 3k)	Stream bank stability	Every 3-5 years	<74% stable stream banks	Implement adaptive management option
Meadow above Boardinghouse Spring	Maintain plant diversity (WCP 3h), <5% bare soil (WCP 2a)	Cover-Frequency	Every 5-10 years	Loss of species diversity*, or >5% bare ground	Implement adaptive management option
Pete Spring	Maintain diverse riparian plant community (WCP 3h), achieve and maintain <5% bare ground (WCP 2a).	Photo point	Every 5-10 years	>5% bare ground	Implement adaptive management option

Silver Creek Allotment Monitoring Plan					
Monitoring Site	**Desired Conditions**	**Method**	**Frequency**	**Trigger Point**	**Change Needed**
Fish Canyon *Botrychium campestre* R2 sensitive plant site BOCA5-8	Maintain R2 sensitve *Botrychium campestre* site BOCA5-8	Documented field visit/ocular estimation of habitat condition	Every 3 years	Unacceptable impacts (such as trailing or trampling) to sensitive plants and habitat	In consultation with botanist, implement adaptive management to reduce impacts.

* - Loss of species diversity means a reduction in the number of desirable native plant species or a reduction in the frequency of any one desirable native plant species.

Stearns Park/Willow Springs Allotments Monitoring Plan					
Monitoring Site	**Desired Conditions**	**Method**	**Frequency**	**Trigger Point**	**Change Needed**
Key Upland Grazing Areas	≤50% utilization	Ocular Utilization	Every year; Periodically throughout the grazing season	50% utilization	Remove livestock from affected area
Key Riparian Grazing Areas	4-6" stubble height (WCP 3h)	Stubble height	Every year; Periodically throughout the grazing season	4-6" stubble height	Remove livestock from affected area
Key Riparian Grazing Areas	Maintain 74% stable stream banks (WCP 3k)	Stream bank alteration	Every year; Periodically throughout the grazing season	>26% stream bank alteration	Remove livestock from affected area
Key Riparian Grazing Areas	Maintain 74% stable stream banks (WCP 3k)	Stream bank stability	Every 3-5 years	<74% stable stream banks	Implement adaptive management option
Buffalo Park Benchmark	Maintain plant diversity, <5% bare soil	Cover-Frequency	Every 5-10 years	Loss of species diversity*, or >5% bare ground	Implement adaptive management option
Sec. 16 Benchmark	Maintain plant diversity, <5% bare soil (WCP 2a)	Cover-Frequency	Every 5-10 years	Loss of species diversity*, or >5% bare ground	Implement adaptive management option
Calvert/Sackett Benchmark	Maintain plant diversity, <5% bare soil (WCP 2a)	Cover-Frequency	Every 5-10 years	Loss of species diversity*, or >5% bare ground	Implement adaptive management option

Stearns Park/Willow Springs Allotments Monitoring Plan					
Monitoring Site	**Desired Conditions**	**Method**	**Frequency**	**Trigger Point**	**Change Needed**
Katan Spring Benchmark	Maintain plant diversity (WCP 3h), <5% bare soil (WCP 2a)	Cover-Frequency	Every 5-10 years	Loss of species diversity*, or >5% bare ground	Implement adaptive management option
Guidinger Meadow Benchmark	Maintain plant diversity (WCP 3h), <5% bare soil (WCP 2a)	Cover-Frequency	Every 5-10 years	Loss of species diversity*, or >5% bare ground	Implement adaptive management option
Guidinger Creek	Maintain diverse riparian plant community (WCP 3h), utilization on willows <40% (WCP 3j), achieve and maintain at least 74% stable stream banks (WCP 3k).	Willow regeneration; streambank stability	Every 5-10 years	≥74% stable streambanks and obvious willow regeneration	Decide whether grazing is appropriate in this area, if so, how it should be grazed
Three Willows Spring and other springs	Maintain diverse riparian plant community (WCP 3h), achieve and maintain <5% bare ground (WCP 2a)	Photo point and ocular estimation of bare ground	Every 5-10 years	>5% bare ground	Implement adaptive management option
Calochortus apiculatus (Black Hills Species of Insufficient Info) site 07SP03/04M039	Maintain *Calochortus apiculatus* site 07SP03/04M039	Documented field visit/ocular estimation of habitat condition	Every 3 years	Unacceptable impacts (trailing or trampling) to plants and habitat	In consultation with botanist, implement adaptive management to reduce impacts.

* - Loss of species diversity means a reduction in the number of desirable native plant species or a reduction in the frequency of any one desirable native plant species.

East Rapid Allotment Monitoring Plan					
Monitoring Site	**Desired Conditions**	**Method**	**Frequency**	**Trigger Point**	**Change Needed**
Key Upland Grazing Areas	≤50% utilization	Ocular Utilization	Every year; Periodically throughout the grazing season	50% utilization	Remove livestock from affected area
Key Riparian Grazing Areas	4-6" stubble height (WCP 3h)	Stubble height	Every year; Periodically throughout the grazing season	≤4-6" stubble height	Remove livestock from affected area
Key Riparian Grazing Areas	Maintain 74% stable stream banks (WCP 3k)	Stream bank alteration	Every year; Periodically throughout the grazing season	≥26% stream bank alteration	Remove livestock from affected area
Key Riparian Grazing Areas	Maintain 74% stable stream banks (WCP 3k)	Stream bank stability	Every 3-5 years	<74% stable stream banks	Implement adaptive management option
Gimlet Meadow Benchmark	Maintain plant diversity (WCP 3h), <5% bare soil (WCP 2a)	Cover-Frequency	Every 5-10 years	Loss of species diversity*, or >5% bare ground	Implement adaptive management option
Gimlet Creek Benchmark	Maintain diverse riparian plant community (WCP 3h), achieve and maintain at least 74% stable stream banks	Photo-point of temporary exclosure and benchmark sites Stream bank stability at temporary exclosure and benchmark sites	Every 3-5 years Every 3-5 years	Loss of species abundance and/or diversity* <74% stable stream banks	Implement adaptive management option Implement adaptive management option

East Rapid Allotment Monitoring Plan					
Monitoring Site	**Desired Conditions**	**Method**	**Frequency**	**Trigger Point**	**Change Needed**
	(WCP 3k).	Streambank alteration at benchmark site	Every year; Periodically throughout the grazing season	≥26% stream bank alteration	Remove livestock from affected area

* - Loss of species diversity means a reduction in the number of desirable native plant species or a reduction in the frequency of any one desirable native plant species.

Griffith Allotment Monitoring Plan					
Monitoring Site	**Desired Conditions**	**Method**	**Frequency**	**Trigger Point**	**Change Needed**
Key Upland Grazing Areas	≤50% utilization	Ocular Utilization	Every year; periodically throughout the grazing season	50% utilization	Remove livestock from affected area
Key Riparian Grazing Areas	4-6" stubble height (WCP 3h)	Stubble height	Every year; periodically throughout the grazing season	4-6" stubble height	Remove livestock from affected area
Key Riparian Grazing Areas	Maintain 74% stable stream banks (WCP 3k)	Stream bank alteration	Every year; periodically throughout the grazing season	>26% stream bank alteration	Remove livestock from affected area
Key Riparian Grazing Areas	Maintain 74% stable stream banks (WCP 3k)	Stream bank stability	Every 3-5 years	<74% stable stream banks	Implement adaptive management option
Moses Pasture Benchmark	Maintain plant diversity, <5% bare soil (WCP 2a)	Cover-Frequency	Every 5-10 years	Loss of species diversity*, or >5% bare ground	Implement adaptive management option
Arnold Pasture Benchmark	Maintain plant diversity, <5% bare soil (WCP 2a)	Cover-Frequency	Every 5-10 years	Loss of species diversity*, or >5% bare ground	Implement adaptive management option
Lander Spring	Maintain diverse riparian plant community (WCP 3h),	Ocular estimation	Every year; periodically throughout the grazing season	Loss of species diversity*, or >5% bare ground	Implement adaptive management option

Griffith Allotment Monitoring Plan					
Monitoring Site	**Desired Conditions**	**Method**	**Frequency**	**Trigger Point**	**Change Needed**
	achieve and maintain <5% bare ground (WCP 2a).				

* - Loss of species diversity means a reduction in the number of desirable native plant species or a reduction in the frequency of any one desirable native plant species.

Pettigrew Allotment Monitoring Plan					
Monitoring Site	**Desired Conditions**	**Method**	**Frequency**	**Trigger Point**	**Change Needed**
Key Upland Grazing Areas	≤50% utilization	Ocular Utilization	Every year; periodically throughout the grazing season	50% utilization	Remove livestock from affected area
Key Riparian Grazing Areas	4-6" stubble height (WCP 3h)	Stubble height	Every year; periodically throughout the grazing season	4-6" stubble height	Remove livestock from affected area
Key Riparian Grazing Areas	Maintain 74% stable stream banks (WCP 3k)	Stream bank alteration	Every year; periodically throughout the grazing season	>26% stream bank alteration	Remove livestock from affected area
Key Riparian Grazing Areas	Maintain 74% stable stream banks (WCP 3k)	Stream bank stability	Every 3-5 years	<74% stable stream banks	Implement adaptive management option
Baldy Pasture	Maintain plant diversity, <5% bare soil (WCP 2a)	Cover-Frequency	Every 5-10 years	Loss of species diversity*, or >5% bare ground	Implement adaptive management option
Red Lake Pasture	Maintain plant diversity, <5% bare soil (WCP 2a)	Cover-Frequency	Every 5-10 years	Loss of species diversity*, or >5% bare ground	Implement adaptive management option
Prospect Spring and Ladyfinger Seep	Maintain diverse riparian plant community (WCP 3h),	Documented field visit of species diversity and bare ground	Every year	Loss of species diversity*, or >5% bare ground	Implement adaptive management option

Pettigrew Allotment Monitoring Plan					
Monitoring Site	**Desired Conditions**	**Method**	**Frequency**	**Trigger Point**	**Change Needed**
	achieve and maintain <5% bare ground (WCP 2a).				
Ladyfinger Gulch	Protect *Carex alopecoidea* site CAAL8-19	Documented field visit/ocular estimation	Every year	Unacceptable impacts (trailing, trampling, grazing) to *C. alopecoidea* plants and/or habitat	Implement adaptive management option
	Maintain at least 74% stable stream banks (WCP3k)	Streambank alteration	Every year; periodically throughout the grazing season	>26% stream bank alteration	Move livestock
		Streambank stability	Every 3-5 years	<74% stable stream banks	Implement adaptive management option
Pettigrew Gulch	Protect *Carex alopecoidea* site CAAL8-20	Documented field visit/ocular estimation of habitat condition	Every year	Unacceptable impacts (trailing, trampling, grazing) to *C. alopecoidea* plants and/or habitat	Implement adaptive management option
Pettigrew Gulch *Viburnum opulus* R2 sensitive plant site VIOPA2-6	Maintain R2 sensitve *Viburnum opulus* site VIOPA2-6	Documented field visit/ocular estimation of habitat condition	Every year	Unacceptable impacts (>40% browsing, trampling) to sensitive plants and habitat	In consultation with botanist, implement adaptive management to reduce impacts.

Pettigrew Allotment Monitoring Plan					
Monitoring Site	**Desired Conditions**	**Method**	**Frequency**	**Trigger Point**	**Change Needed**
Boeson Spring *Viburnum opulus* R2 sensitive plant site VIOPA2-29	Maintain R2 sensitve *Viburnum opulus* site VIOPA2-29	Documented field visit/ocular estimation of habitat condition	Every year	Unacceptable impacts (>40% browsing, trampling) to sensitive plants and habitat	In consultation with botanist, implement adaptive management to reduce impacts.

* - Loss of species diversity means a reduction in the number of desirable native plant species or a reduction in the frequency of any one desirable native plant species.

Upper Elk Allotment Monitoring Plan					
Monitoring Site	**Desired Conditions**	**Method**	**Frequency**	**Trigger Point**	**Change Needed**
Key Upland Grazing Areas	≤45% utilization	Ocular Utilization	Every year; periodically throughout the grazing season	45% utilization	Remove livestock from affected area
Key Riparian Grazing Areas	4-6" stubble height (WCP 3h)	Stubble height	Every year; periodically throughout the grazing season	4-6" stubble height	Remove livestock from affected area
Key Riparian Grazing Areas	Maintain 74% stable stream banks (WCP 3k)	Stream bank alteration	Every year; periodically throughout the grazing season	>26% stream bank alteration	Remove livestock from affected area
Key Riparian Grazing Areas	Maintain 74% stable stream banks (WCP 3k)	Stream bank stability	Every 3-5 years	<74% stable stream banks	Implement adaptive management option
SW ¼ Sec. 29	Maintain plant diversity, <5% bare soil (WCP 2a)	Cover-Frequency	Every 5-10 years	Loss of species diversity*, or >5% bare ground	Implement adaptive management option
SE ¼ Sec. 32	Maintain plant diversity, <5% bare soil (WCP 2a)	Cover-Frequency	Every 5-10 years	Loss of species diversity*, or >5% bare ground	Implement adaptive management option
Englewood Springs Botanical Area, including *Listera convallarioides* SOLC site LICO5-2	Maintain current extent of known R2 sensitive and SOLC plant occurrences. Impacts by livestock on sensitive and SOLC plant species and suitable habitat will be incidental.	Multiple documented field visits through grazing season, including photopoint documentation of trampling impacts (see attached monitoring plan)	Every year; periodically throughout the grazing season	Greater than 30 hoof prints in LICO5-2 photopoint; OR additionally documented adverse impacts to R2 sensitive or SOLC plant occurrences;	Implement adaptive management option

Upper Elk Allotment Monitoring Plan					
				OR Use by livestock is adversely affecting values for which Botanical Area was designated.	
Upper Bear Butte Creek	Maintain SOLC *Listera convallarioides* site (LICO5-3)	Documented field visit/ ocular estimation	Annually for 3 years; if no impacts, monitor every 3 years	Unacceptable impacts to SOLC	Exclude livestock from SOLC population in consultation with botanist

* - Loss of species diversity means a reduction in the number of desirable native plant species or a reduction in the frequency of any one desirable native plant species.

Plan for Monitoring Livestock Impacts to Black Hills National Forest Species of Local Concern (SOLC) *Listera convallarioides* (Site LICO5-2) Englewood Springs Botanical Area

Introduction:

Livestock trampling to Black Hills National Forest (SOLC) *Listera convallarioides* site (LICO5-2) within Englewood Springs Botanical Area (Management Area 3.1) has been documented. Forest plan standard 3.1-2053 states "Restrict access of domestic livestock to protect the R2 sensitive and species of local concern plant occurrences in designated botanical areas." This monitoring plan was established in order to document the density of trampling from livestock to this SOLC site vicinity so that, action can be taken to appropriately administer grazing permits in order to comply with forest plan standard 3.1-2053. A trigger point/threshold was established in order to guide management on determining when an adaptive management option should be implemented to eliminate livestock access to the area.

This particular concentration area of site (LICO5-2) was chosen because impacts had already been documented and it appears to be at the highest risk for future impacts due to easier livestock accessibility. (Other concentration areas are on steep slopes or are better protected from access by spruce downfall or other factors.)

Management Objective:

Allow no more than 30 livestock hoof prints from the current season (represented by pin flags in photo) to occur in the established photopoint photo at any time during the grazing season (June 1 – Sept 30).

Any visible imprint the size and shape of a livestock hoof should be included in the count. Imprints may be down to bare mud in saturated areas or may be clear hoof impressions that still have some moss or other vegetation cover. If two hoof prints are partially overlapping but still discernable then they should be counted as separate hoof prints.

Management Implications:

If at any point during the grazing season, the number of livestock hoof prints reaches or exceeds this threshold (30 hoof prints), an adaptive management option will be implemented to eliminate livestock access to the spruce dominated wetland habitat in Englewood Springs Botanical Area west of FSR 228 for the remainder of the grazing season. If monitoring data shows that the number of livestock hoof prints reaches or exceeds this threshold three seasons in a row, then an adaptive management option will be implemented to permanently eliminate livestock access to the spruce dominated wetland habitat in Englewood Springs Botanical Area west of FSR 228.

Monitoring Design:

A single photopoint capturing an overview of the habitat directly adjacent to one of the concentration areas of *Listera convallarioides* site LICO5-2 was established. (Additionally a 1 meter square plot was established at the edge of the occurrence to generally track *Listera convallarioides* individuals and livestock hoof prints in a small area over time. Methods and recommended frequency for the plot monitoring is further described in Mayer and Wheeler 2008.)

Since the site area is very mossy with often saturated soils, the use of a photopoint, as opposed to other more intensive monitoring methods, limits potential trampling impacts from individuals doing the monitoring. To further limit impacts to known individuals, the frame of the photo was centered on the area directly adjacent to the main concentration area. *Listera convallarioides* individuals were found within 2 feet of the edge of the photo frame.) Although, a person will still need to walk through the suitable habitat in order to flag individual hoof prints, the amount of human trampling and other impacts is anticipated to be less with this method than from setting up transects or plots directly within the central concentration area.

The photopoint was established in the Englewood Springs Botanical Area in the spruce dominated wetland that runs west of and adjacent to FSR 228 about ¼ mile south of the intersection of FSR 227 and FSR 228. (Legal description: T4N R3E Sect. 29 SW ¼ SW ¼ NE ¼, GPS coordinates [UTM, NAD 83 Zone 13N]: N 4903512, E 597086) The point is located at a 4 inch diameter, ca. 35 foot tall paper birch tree that leans downslope (away from the road). The photo was taken approximately 5 feet from ground level at a bearing of 285 degrees (magnetic) with the photographer's right shoulder against the birch tree. A red pin was pushed into the ground at the base of the tree on the downslope side and was labeled "LICO5 PP1". The photo was taken at a slight angle downward to better capture the ground surface. There is a down log parallel with the top of the photo frame, about 1/3 of the way down from the top of the photo. This log marks the boundary of the area of recorded livestock impacts, and any hoof prints beyond this log were not included in the total count. (See attached photo for clearer explanation of this.) The area of the ground captured in the frame of the photo (in front of the above described log) measures approximately 17 feet deep by 15 ½ feet across. It represents an overview of the habitat immediately adjacent to this *Listera convallarioides* concentration area. The initial photo was taken with a Cannon Power Shot A630 digital camera on auto mode with no zoom.

Supplies Needed:

- Digital camera
- Pin flags
- Compass
- Measuring device (to determine height of photo)
- Monitoring form
- Previous photo taken of site for reference

Supplies Needed for Additional Monitoring (see Mayer and Wheeler 2008):

- 1 meter square monitoring frame
- Additional monitoring form

Procedure:

1. Using the above description and the attached photo for reference, relocate the photopoint location.
2. Before taking the photo, mark each livestock hoof print within the photopoint frame with a single pin flag. Since individual hoof prints cannot be distinguished in a photo, the pin flags will act as a visible representation of hoof prints.
3. Position the camera according to the above location description and take the photo. The attached photo should be taken to the field so that the photo position can be compared and lined up accordingly.
4. Record the number of flags (hoof prints) within the photo on the accompanying data form. This should be done while at the site in case the number of flags is not clear from the photo (e.g. If there are flags that overlap in the photo multiple flags may appear as one.) This may require two people to determine which flags are in and out of the photo – i.e. one to hold the camera and tell the other if the flags are in or out of the frame and one to count the flags.

Monitoring Frequency:
The above described monitoring is to take place at least once every three weeks throughout the grazing season, with the first monitoring visit to occur no later than 3 weeks after livestock are on the allotment.

Responsible Party:
Northern Hills district range personnel and/or supervisor's office botany monitoring personnel. This needs to be determined prior to the grazing season.

Photopoint view from first year of monitoring (86 flags recorded):

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APPENDIX C - Forest Plan Management Direction

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The Proposed Action and alternatives are guided by the Black Hills National Forest Land and Resource Management Plan (LRMP), as amended (USFS 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.

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 216. Manage to conserve or enhance the integrity of the following important botanical areas: .....Bear/Beaver Gulches, Higgins Gulch, Black Fox Valley.....
- 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).
- 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.

a. 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).

b. 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)

c. Maintain habitat for golden-crowned kinglets, as outlined in specific direction pertaining to spruce habitat (e.g., Objective 200-01).

d. 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-Wide Standards and Guidelines

Soil

Direction on Soil Quality Standards is provided in Rocky Mountain Region Supplement (FSH 2509.18) 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.

- 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.

- 1208. Design water developments to minimize damage to channel capacity, aquatic habitat and riparian vegetation.

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.
- 2503. Developed recreation sites will be closed or restricted to grazing through use of fencing, as opportunities permit. However, grazing may be used as a management tool in these areas. Recreational livestock will normally be fed in designated areas.

- 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.

    a. Satisfactory range conditions occur when the existing conditions are at, or progressing towards the desired conditions identified through the project planning process.

    b. 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:

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:

c. 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).

d. 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.

e. No authorized utilization will be allowed on known occurrences of willow emphasis species (e.g. *Salix candida, Salix, serissima, Salix lucida*).

f. 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 allotment management plans (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 Species – Protection and Management Sensitive Species

3103. Manage known sensitive species and species of local concern (SOLC) snail colonies to:

a. Retain overstory sufficient to maintain moisture regimes, ground level temperatures and humidity.

b. Retain ground litter, especially deciduous litter.

c. 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.

3111. From April 15 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.

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.

a. Provide stable stream banks.

b. Retain woody vegetation along streams and lakes to provide shading for aquatic life and habitat for terrestrial species.

c. 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

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

3.1 – Botanical Areas – This area is managed for protection of unusual or special characteristics. Management emphasis is on conserving or enhancing areas of botanical interest. Livestock grazing is allowed if it does not conflict with the values for which the botanical areas was designated.

- 3.1-2501 – Allow livestock grazing is if it does not conflict with the values for which the botanical areas was designated.
- 3.1-2502 – Allow new improvements only when they are necessary to maintain, restore, or enhance the values for which the botanical area was designated.
- 3.1 – 2503 – Restrict access of domestic livestock to protect the R2 sensitive and species of local concern plant occurrences in designated BAs.

3.32 – Backcountry Non-Motorized Recreation Emphasis - These areas are managed to provide recreation opportunities in a semi-primitive setting. Summer use is non-motorized. Over-the-snow vehicles could be allowed during the snow season. Livestock grazing is designated as a suitable use. (DFC – Vegetation may be altered through a variety of management activities, including prescribed fire to achieve resource management objectives. Improvements to this management area include fences and roads will be maintained at level 2 for administrative use.)

- 3.32 - 401. Emphasize visually appealing landscapes such as vista openings, rock outcroppings, and diversity of vegetation.
- 3.32 - 5101. All resource management activities should be compatible with and minimize impacts to recreational resources and opportunities.
- 3.32 - 9101. Motorized road and off-road vehicle travel is prohibited. There may be exceptions for main Forest Development Roads and administrative use.

4.1 – Limited Motorized Use and Forest Product Emphasis – These areas are managed for non-motorized recreation, while providing for timber production, forage production, visual quality and a diversity of wildlife. Roads provide intermittent commercial, but are normally closed to other than administrative use.

- 4.1-2501. Prepare livestock management strategies in the allotment management plan that will be compatible with recreation objectives.
- 4.1-2502. Locate or design structural improvements to meet Scenic Integrity Objectives.

4.2A - Spearfish Canyon - This area is managed for recreational opportunities in roaded settings that appear natural.

- 4.2A-2501. The management area is designated unsuitable to grazing and is closed to this use.

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.)

5.3A - This area is managed for research conducted by scientists assigned to the Rocky Mountain Research Station. The area is highly roaded, with gravel and native surfaces. Motorized recreation is allowed. Hiking and hunting may occur. Livestock grazing is allowed and cattle may be seen. Wildlife habitat research is encouraged. The occurrence of some wildlife species may be associated with the habitat conditions created through experimentation.

- 5.3A-202. Perform range restoration work in association with research projects.

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.)

- 5.4-204. Improve forage on range areas.
- 5.4 -2501. Design livestock management strategies including distribution and stocking rates to be compatible with big-game habitat objective.
- 5.4 -2502. Feature big-game use of forage increases that result from the vegetative improvements, while also allowing for livestock increases. Follow Forestwide proper allowable use guidelines or residual levels documented in AMPs or AOIs for combined use by wildlife and livestock.

5.6 – Forest Products, Recreation, and Big Game Emphasis – This area is managed for timber production, non-motorized recreational opportunities, and big game habitat value, with low open road densities and near-optimum arrangement of forage and cover areas.

- 5.6-2501. Feature big game use of forage increases, that result from the vegetative improvements, while also allowing for livestock increases. Follow the forest-wide proper allowable use or residual guidelines for forage use by wildlife and livestock combined.

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APPENDIX D - Response to Public Comment

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Appendix D provides a paraphrased summary of, and Forest Service responses to substantive comments received during the 30-day public comment period for the North Zone Range 08 Proposed Action and Additional Information. All of the comments received were considered prior to the preparation of the EA and incorporated where relevant. These comments have been identified by COMMENTER and listed by concerns disseminated from their letters.

The Public Comment Period

On July 18, 2008 a legal notice was published in the Rapid City Journal of the availability of the Proposed Action and Additional Information for this project, located on the Black Hills National Forest. Copies of the Proposed Action were also mailed to 32 individuals, groups, and state or local agencies who expressed interest in the project. The Proposed Action was also mailed to 30 tribal representatives. The comment period concluded on August 18, 2008.

Comments and Analysis

A total of fourteen responses were received and are detailed below. This information is available for review at the Northern Hills Ranger District, Spearfish, South Dakota and the Bearlodge Ranger District, Sundance, Wyoming.

This Appendix contains all of the substantive comments that were received during the comment period on the Proposed Action. District and Forest resource specialists and staff reviewed the comments received during the comment period, and the appropriate resource specialists generated responses to the comments.

How to Find Your Comments

The list of commentors is listed in the table below.

Letter #	Commentor
01	Barb Sachau
02	Gene Reinecke
03	Northern Cheyenne Tribe
04	South Dakota Game, Fish and Parks
05	Jonathan Ratner, Western Watersheds Project/Biodiversity Conservation Alliance
06	Wyoming Game and Fish Department
07	Eric Jennings
08	Elaine Ebbert

Letter #	Commentor
09	Ron Watson
10	Jeff Olsen
11	Crook County Land Use Planning and Zoning
12	Audry Gabel
13	Mark Gabel
14	Grace Kostel

The following letters and substantive comments were submitted. Responses are provided to each substantive comment. Substantive comments are defined in 36 CFR 215.2 as follows: "*Substantive comments* – Comments that are within the scope of the proposed action, are specific to the proposed action, have a direct relationship to the proposed action and include supporting reasons for the Responsible Official to consider."

Letter 01: Barb Sachau

Comment A: Do not renew any grazing permits at all. Turn them all down. Grazing is environmentally destructive to the highest degree. The cattle ruin the land.

Response: The No Action alternative was considered. No grazing permits would be renewed under this alternative.

Comment B: The ranchers pay such cheap rates, they are getting away with murder on taxpayers, taking advantage of us taxpayers right and left.

Response: Grazing fees are set by Congress and the Forest Service cannot charge more.

Comment C: Wild horses should be on these sites.

Response: Currently all of the allotments are allocated to permittees. Grazing allotments are administered in cooperation with permittees based on the nature of their ranching operations. None of the current permittees have requested grazing wild horses; nor has the Forest received any requests from the Bureau of Land Management for grazing of wild horses on the Forest.

Comment D: There is no "need" at all to "improve livestock management".

Response: The "need" to "improve livestock grazing" is detailed in Table 5 of the EA.

Comment E: Native wildlife has been wiped out for the rancher's profiteering.

Response: Wildlife impacts are addressed in the EA.

Comment F: We need to prevent global warming which the Ranchers are exacerbating.

Response: The commenter does not make clear how she believes ranchers may be exacerbating global warming. There is literature suggesting that methane gas emissions from livestock flatulence contribute to the overall buildup of greenhouse gases in the earth's atmosphere. It would be difficult to quantify such emissions that may occur as a result of implementing this project; however, we believe they would be negligible in the scope of the total greenhouse gases contributed by various sources in this country, not to mention on a global scale.

Letter 02: Gene Reinecke

Comment A: The Proposed Action is the only reasonable alternative for utilizing a renewable resource and protecting the ecosystem.

Response: Comment noted.

Comment B: It should be emphasized that removing livestock grazing from the landscape would have unnatural and detrimental consequences. The botanical resources of the Black Hills evolved with thousands of years of grazing by buffalo. The current overgrown characteristics of the forest, due to wildfire suppression, combined with a large increase in highly combustible fuel due to lack of grazing, would result in catastrophic wildfire

Response: Effects of the No Action alternative are addressed in the EA.

Comment C: The best way to protect riparian areas and their botanical resources is through watershed management. Too much forest overgrowth results in less water available for riparian areas.

Response: Vegetation management is outside the scope of the proposed action. The umulative effects of vegetation management are addressed in the EA

Comment D: Also, it should be pointed out, that by utilizing grazing to manage a renewable resource, basically harvesting sunlight, it keeps ranching viable around the Black Hills

Response: Comment noted.

Comment E: …utilizing grazing…..preserves open spaces which so many people come here to enjoy.

Response: Comment noted.

Letter 03: Northern Cheyenne Tribe

No Comment at this time.

Letter 04: South Dakota Game, Fish and Parks

Comment A: Background Page 3: EA states "Sheep grazing on Forest System lands in the Black Hills has occurred since, but not to the scale it had early this century and late last century". We are not aware of sheep allotments on BHNF in this century.

Response: This section is a direct quote from the listed citation. Please refer to full citation included in References at the end of the EA.

Comment B: EA states "Heavy grazing and agricultural development weren't the activities that have influenced vegetative components in the Black Hills." Assume it should read "were not the only activities….."

Response: Comment noted.

Comment C: Recent Management History Page 6: EA references "Wheeler et al. 2008" but there is no literature citation section. Throughout the EA, very few of the proposed action strategies, assertions and impacts analysis were supported with cited literature.

Response: The EA includes a full list of references.

Comment D: Desired Condition Page 8: EA states "Appendix B includes all appropriate FS Direction used in this analysis." Appendix B contains the monitoring plan, but we do not find FS Directives.

Response: The EA was corrected.

Comment E: Page 8 Smooth Brome, Non-Native Grasses, Desired Conditions: EA states non-native species such as smooth brome provide high value forage for deer and elk (Region 2 Rangeland Analysis and Management Training Guide, USDA FS 1996.) This is not accurate.

Response: The EA has been edited to better address the value of non-native grasses to wildlife.

Comment F: There was no definition of range condition or range health that provided goals and sideboards for percentages of native vs. non-native species.

Response: The Desired Plant Community (DPC) is addressed in the EA. There is no requirement to include percentages for native vs. non-native species.

Comment G: There was no discussion of long-term and cumulative impacts of how non-natives plants can out compete natives, including R2 Sensitive Species (R2SS) and Species of Local Concern (SOLC) (FP Goal 221).

Response: Indirect and cumulative impacts to R2 sensitive pants and SOLC are addressed in the EA including competition with non-natives.

Comment H: It is one thing to admit that management cannot feasibly eradicate high percentages or monocultures of non-native species, and another to set direction to manage for them.

Response: The rationale for including non-natives in the DPC is addressed in the EA.

Comment I: We find it alarming that the EA states that non-native grass species are "acceptable for the current and proposed management of the project area". Once accepted, management will advocate for and retain them on the landscape (FP 2504 Guideline) which will compromise biodiversity of native flora and fauna.

Response: The rationale for including non-natives in the DPC is addressed in the EA.

Comment J: The desired plant community (DPC) was assigned across the project area with no consideration for goals of various FP Management Area (MA) directions, including botanical areas (BA) and Spearfish Canyon.

Response: The DPC is a function of the species and soil types present. Forest Plan direction for managing rangelands does not vary between Management Areas except for MA 3.1 - Botanical Areas and MA 4.2A - Spearfish Canyon. A specific DPC was provided for Botanical Areas. No grazing is allowed or occurs in Spearfish Canyon so a DPC was not needed.

Comment K: For example, the EA does not discuss effects of managing for non-native grasses on….. FP 3211, 3212.

Response: The EA addresses riparian habitat diversity (FP 3211) and streambank stability (FP 3212).

Comment L: The EA did not address persistence of these species in season-long pastures and allotments where native grasses will be more heavily selected and repeatedly grazed (favoring non-native grasses). It is inappropriate and environmentally unacceptable on public lands to deem smooth brome, Timothy and Kentucky Bluegrass part of the DPC and at a minimum violates FP 5.4-204 to improve forage on range areas in big game winter range, to provide for healthy plant communities and FP Goal 3 to provide for sustained commodity uses in an environmentally acceptable manner

Response: The DPC displayed in the EA includes both native and non-native species and complies with Forest Plan direction which specifies: 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.)

Comment M: Table 2 and Appendix B Trigger Points do not set measurable levels of desired vegetative species or forms (grass, forb, shrub), much less what percent of non-native grasses will be considered "desired".

Response: Table 2 has been edited to make it clear that non-native grasses are not as desirable as native species but are acceptable.

The R2 RAMTG specifies that: "Often existing plant communities comply with Forest Plan direction, providing a broad range of resource benefits. In these situations, allotment management objectives should maintain existing conditions.…Desired plant communities must currently exist in the general area in similar environmental settings, and are capable of

occupying the site within a reasonable time period, through a management change….It is not necessary to select the ultimate DPC that satisfies all Forest Plan and allotment objectives immediately. It is reasonable to identify a DPC that establishes the correct trend over the short-term, and then adjust the DPC later as the vegetation responds to the management change….Many communities are difficult to change through normal management practices. For example, many bluegrass dominated sites exist due to prolonged, past overgrazing. It is often extremely difficult to convert them to a native bunchgrass community."

The non-native grass communities on these allotments are very stable. Monitoring of long-term range exclosures indicates that even complete removal of livestock has not resulted in increases of native grasses. Therefore it is pointless to specify percentages of native vs. non-native because changes in livestock management are unlikely to effect a change in the percentages or to result in the establishment of native species.

Comment N: It is unacceptable to achieve forest and range health goals by reclassifying non-native grasses as desirable. To do so demonstrates reduction of range management principles on public lands.

Response: The rationale for including non-natives in the DPC is addressed in the EA.

Comment O: Existing conditions Table 3 did not examine within the analysis area wildlife and fish habitat characteristics (FSH 2209.13, Chapter 90 at 93.3b). Therefore, there is no "data and information pertinent to identifying differences between existing and desired conditions related to rangeland resources" and how conditions affect wildlife and fish habitats.

Response: Existing conditions and effects to wildlife and fish habitats are discussed in the EA.

Comment P: Throughout, the EA failed to use and incorporate local and applicable science (NEPA 40 CFR 1502.9(b), 1502.22, 1502.24), failed to use the role of science in planning (36 CFR §219.11, §219.36(a)) and failed to state how science was interpreted and applied including uncertainty and risk.

Response: The EA includes a full list of scientific references considered in preparation of this analysis. (Note: 40 CFR 1500 regulations apply to preparation of an EIS, 36 CFR 219 regulations pertain to Forest Planning, not project level planning)

Comment Q: A Framework for Revising Deer and Elk Strategic Management Direction on the BHNF, SAIC project number 01-0209-04-4456-106. and M.Rumble. 2008. Pers. Communication and data on elk feeding sites study on BHNF. Rocky Mt. Research Station, Rapid City, SD). We cited the SAIC memo in our scoping comments and it is a BHNF reference document. It appears the Memo was not used.

Response: This reference has been reviewed and incorporated into the EA where appropriate.

Comment R: Proposed Action Pages 13, 16: EA states "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." Acceptable and stated timeframes were not given in the EA as directed in (FSH 2209.13, Chapter 90 at 93.3h and 93.3g states: "The purpose of the proposed action is to meet or move toward those desired conditions within a stated timeframe.)

Response: The timeframes for changes are based on the frequency of monitoring specified in the monitoring plans for each allotment. The EA has been edited to make this more apparent. It should be noted that most areas of concern are small and localized and are being excluded from livestock grazing under the proposed action.

Comment S: NEPA analysis did not consider and disclose effects of timing, intensity, frequency and duration of livestock grazing in the proposed action for adaptive management. Goals and desired conditions reached through various grazing systems (and lack of systems such as season-long-grazing) were not discussed. Therefore, the BHNF has no baseline to determine if management is meeting FP standards and guidelines.

Response: Effects of grazing on range resources are discussed in the EA. Results of short-term monitoring reflect the effects of timing, intensity, frequency and duration on range resources and is used to evaluate overall livestock management. In addition, long term monitoring data is used to evaluate vegetative condition and trend specific to FP direction.

Comment T: The EA failed to discuss why season-long grazing was retained and failed to discuss the effects (positive and negative) to riparian areas, range health, plant communities, wildlife and fisheries habitats, soils, hydrology and recreation.

Response: Effects to all resources are discussed in the EA. Long term monitoring data indicates that these allotments are meeting or at least moving towards desired condition objectives with the current season long grazing system; therefore it is not necessary to convert or change the current grazing system to a system that requires more intensive management. Studies have shown that impacts caused by livestock are primarily a function of the timing, frequency, and intensity of use (Platts 1981, Grider et al. 1995). Clary and Webster (1989) concluded that vegetation appears to be more affected by grazing intensity than by grazing systems. The success of grazing systems depend in part upon managerial control of intensity and duration of forage utilization. Short term monitoring will be used to manipulate the timing, intensity and frequency of livestock grazing on these allotments. When allowable use standards are reached in either upland or riparian areas, livestock will be removed or herded to different locations.

Comment U: Issues Page 14: Please send us a copy of the list of non-significant issues and reasons regarding categorization as non-significant found in the project record.

Response: This request will be responded to under the terms of the MOU with SDGF&P and FOIA.

Comment V: Allotment Names Page 16: Incorrect names were listed.

Response: The EA has been corrected.

Comment W: FP Standards are mandatory unless an Amendment was taken. All Standards should have been implemented long ago but are listed as possible criteria and mitigation.

Response: Applicable standards have been incorporated into the project as design criteria. Design criteria are intended to be implemented as part of the proposed action.

Comment X: Grazing Response Index was mentioned but could not be found in the 1996 R2 Rangeland Analysis and Management Training Guide or the 2005 Phase II Forest Plan Amendment.

Response: Refer to pg. 4-75 of the R2 Range Analysis and Management Training Guide.

Comment Y: The EA lists mitigation measures through adaptive management, but does not analyze possible actions in detail nor does it explain effectiveness of known adaptive management and mitigation actions to meet purposes and needs.

Response: Effects of the Proposed Action, including adaptive management actions, are included in the EA.

Comment Z: Effects in the Proposed Action are different than effects from current management (EA page 40) but those effects will not be known until after a Decision has been made and the Allotment Management Plan and Annual Operation Instructions are written.

Response: The effects of the Proposed Action are included in the EA which will be available at the same time the Decision is made. The Allotment Management Plan will be prepared following the publication of the EA and Decision Notice. Annual Operating Instructions are prepared each spring prior to the grazing season.

Comment AA: Annual monitoring will take decades to set a trend and trends cannot be determined without uniform timing (before, during and after livestock grazing). Time delays for implementation will not assure the FS and public that adaptive management actions are effective

Response: Annual monitoring is not used to establish trend but to determine whether standards and management practices are implemented as detailed in the AMP and Forest Plan, and to identify the next management action if needed. Long-term monitoring has been occurring on these allotments for several decades prior to the current analysis. Trend has been established based on that data.

Comment BB: In the situation of MA 3.1 Englewood Springs, no timeframe was given and it is unacceptable for a rare botanical community to withstand years of additional monitoring before protective measures are taken. By then, it could be too late (species viability, economically) to protect the values for which it was designated.

Response: A specific monitoring method and protective actions are included in the EA that will set a threshold for preventing unacceptable affects to the sensitive and SOLC species. This monitoring method was developed by an interdisciplinary team and will be implemented in 2009. This monitoring method and threshold will be included in the subsequent AMP and monitoring section of the Annual Operating Instructions.

Comment CC: Table 4 is simply a listing of management actions that do not have a demonstrated effectiveness on BHNF. FS defined adaptive management as "a system of management practices based on clearly identified outcomes and monitoring to determine if management actions are meeting desired outcomes." (36 CFR § 219.16). The EA does not meet this definition in our opinion.

Response: The EA notes that this list was used as source of possible management actions considered for each allotment. The specific adaptive action(s) selected for each situation is included in Table 5. Effectiveness of the site-specific adaptive actions is discussed in the EA.

Comment DD: The EA must determine whether the BHNF considered relevant factors and articulated a rational connection between the facts found and the choice made (Natural Resources Defense Council v. USDI, 113 F.3d 1121, 1124 (9th Cir.1997) from Resources Ltd v. Robertson., 35 F.3d at 1304).

Response: Rationale for the choices made by the Responsible Officials is documented in the Decision Notices for this project.

Comment EE: Upper Elk Allotment Page 12: Table 3 has 3 benchmarks listed to monitor trends. Table 5 (Pages 38-39) lists an additional benchmark of Upper Elk Spring #2. What is the explanation for this additional benchmark and should it have been included in Table 3?

Response: Table 5 identifies benchmarks for each allotment along with areas of concern. Upper Elk Spring 32 is identified as an area of concern.

Comment FF: Englewood Springs Botanical Area (MA 3.1): We are alarmed at the EA's inconsistency between identifying issues with MA 3.1 Englewood Springs Botanical Area (Pages 1, 7, 14, 18-19) and contradictions that impacts by "unknown grazers", livestock and a misplaced culvert do not occur at levels that require mitigation (Pages 5, 39, 41). The scoping notice identified an issue and the EA confirmed it by stating, "There is a need to reduce trailing and trampling by livestock in the Englewood Springs Botanical Area to protect and improve the values for which the botanical area was designated."

Response: Refer to response BB above specific to protection of sensitive species. The EA had been edited to better address the concerns and issues identified at Englewood Springs.

Comment GG: *Listera* has been a species of concern since the 1980's. We expressed our concerns for this plant and this unique site in a letter regarding the Woodville Project Plan (SDGFP letter to David Blackford of Nemo Ranger District, 9/5/86) and we asked for better protection of the area. BHNF was notified in 1987 with a Site Ecological Summary documenting cattle trampling which threatened ecological integrity. The BHNF 1987 Decision Notice deferred logging activities in the immediate vicinity of the site and also identified livestock grazing problems in the Englewood area. Englewood Springs has been a designated botanical area since the 1997 Forest Plan and livestock impacts have been identified as an issue for over 10 years.

Response: Comment noted.

Comment HH: One known site is Englewood Springs area west and east of FS Road 228, administered by BHNF. *Listera* is an ecoregionally rare species and listed as S1 in our Heritage database. The Game, Fish and Parks Department considers this area of such importance that we will participate in a joint venture or cooperative effort to protect and preserve this important area.

Response: Comment noted.

Comment II: The EA failed to propose immediate and appropriate management to retain the values for which Englewood Springs was designated – those being at least the rare occurrence of *Listera*, other rare flora and fauna and the hydrological functions that provide habitat for these species.

Response: Refer to response BB above specific to protection of sensitive species.

Comment JJ: EA states that "the unnamed stream in the Englewood Botanical Area [is] currently not at desired condition" but does not give full and proper NEPA analysis of known information to mitigate and restrict livestock. The EA claims that action was not warranted at this time (page 40). This violates FP Standard 3.1-2503 to "Restrict access of domestic livestock to protect R2 sensitive and SOLC plant occurrences in designated botanical areas." Continued monitoring is not mitigation.

Response: The EA had been edited to better address the concerns and issues identified at Englewood Springs including monitoring and adaptive actions.

Comment KK: There are no alternative water sources for livestock in the adjoining meadow east of FS Road 228 nor does the EA indicate water tanks or fencing will be installed near the BA as mitigation. Season-long grazing within the BA forces livestock to water from perennial water sources, including the impaired spring that runs through the culvert into the eastern part of the BA. The nearest tanks are along FS Road 229.1F, a good half-mile away, according to FS allotment maps.

Response: Development of an alternate water source has been added as an adaptive management option.

Comment LL: Englewood Springs Site Visit 2008: We visited the area and documented extensive streambank impairments. The culvert is small but could not possibly cause hydraulic back-flushing up a very steep road embankment (and then some) without also damaging the road and downstream of the culvert. The road was not damaged. We followed this small spring west uphill and found livestock feces and riparian damage at the top of the road cut. We walked the area east of the road and found some deer sign. However, the repeated occurrence of recent sheering and hummocking were made by livestock.

Response: The Forest Service has also conducted numerous visits to this area. The results are available in the project record and are summarized in the EA.

Comment MM: We believe the EA and proposed action are flawed and do not incorporate required NEPA-analysis for the Botanical Area and a SOLC. There was no determination in the EA that further reduction of this plant population would not cause a species viability concern or move it towards possible listing (page 50).

Response: Effects to the Botanical Area and SOLC are addressed in the EA.

Comment NN: Risks to MIS, R2SS and SOLC were not specifically identified. Instead, the EA affords casual mention that populations and habitats would be maintained. Table 6 states “risks” to values for which Englewood Spring BA was designated are low with either alternative. If the rarest orchid in the State is not afforded credible mitigation and protection now, how can the FS and public be assured that other R2SS and SOCL will be given proper management? Risks to MIS, R2SS and SOLC were not specifically identified. Instead, the EA affords casual mention that populations and habitats would be maintained. Table 6 states “risks” to values for which Englewood Spring BA was designated are low with either alternative. If the rarest orchid in the State is not afforded credible mitigation and protection now, how can the FS and public be assured that other R2SS and SOCL will be given proper management? FSM 2670.32 - Sensitive Species states in part:

1. Assist States in achieving their goals for conservation of endemic species (SDGFP has a desire to conserve sensitive, endemic species).

Response: SOLC were identified in consultation with the SD Natural Heritage program. The EA addresses impacts to this species.

Comment OO: The EA does not clarify between riparian and upland standards and guidelines. There is no discussion of impacts to sensitive habitats and riparian areas.

Response: The EA addresses impacts to riparian areas and sensitive plant populations.

Comment PP: Season-long grazing will remove greater than 50% herbaceous cover in some areas and this was not addressed.

Response: Pastures with season-long grazing are limited to 45% utilization as displayed Table 5.

Comment QQ: Specific wildlife species were not mentioned. Discussion for leopard frogs was not mentioned (FP 240-HAB).

Response: The EA addresses impacts to leopard frogs.

Comment RR: Water Quality Monitoring Page 45: The method adopted from the Medicine Bow National Forest-Thunder Basis National Grassland was not disclosed. Qualitative and quantitative metrics, indices or targets were not mentioned for effective AMP's.

Response: The EA describes the WCP monitoring approach and WCP monitoring is included in the monitoring plans for each allotment where perennial water is present.

Comment SS: NEPA procedures insure that complete environmental information is available to public officials and citizens before decisions are made and before actions are taken (40 CFR 1500.1(b)) and, NEPA requires consideration of the potential impact of an action before the action takes place.

Response: The actual quote from 40 CFR 1500.1(b): "(b) NEPA procedures must insure that environmental information is available to public officials and citizens before decisions are made and before actions are taken. The information must be of high quality. Accurate scientific analysis, expert agency comments, and public scrutiny are essential to implementing NEPA. Most important, NEPA documents must concentrate on the issues that are truly significant to the action in question, rather than amassing needless detail."

The Proposed Action was available for public review and comment from 7/18/2008 to 8/18/2008 per 36 CFR 215.5(iv). Forest Service NEPA regulations 36 CFR 220.7 apply to this project.

Comment TT: The Northzone 08 EA reads as a pre-decision Decision and a mere summary of some of the effects is not full disclosure to the public on all past, present, future and cumulative impacts to wildlife, botany, water quality, recreation, riparian areas and habitats.

Response: The Proposed Action was not a decision document. It was developed to solicit public comment on the project and its components. Disclosure of impacts is provided in the EA.

Comment UU: Watershed Resources Page 47: EA states that "Although there are impacted streambanks and degraded riparian wetland conditions in localized areas throughout the project area, the majority of sites show acceptable trends based on PFC monitoring." PFC is subjective, is not based on qualitative measurements and trends take years to ascertain.

Response: PFC is an assessment methodology, not a monitoring technique. Wording in the EA has been changed to reflect this. PFC assessments are not quantitative, but they are an accepted method for assessing the health of stream channels and riparian areas. PFC looks at variables such as: whether the floodplain is functioning, whether the channel geometry is in balance with the landscape setting, whether the riparian zone is improving or being degraded, whether there is a diverse composition and age class of riparian vegetation, whether the

riparian vegetation is capable of dissipating high flows, whether the riparian plants exhibit high vigor, whether the stream is vertically stable, and whether the stream is in balance with the water and sediment being supplied. PFC includes an assessment of apparent trend based on these characteristics for streams determined to be functioning-at-risk. For the reader's benefit, this is a summary of the PFC checklist. For the complete PFC checklist, see the project record.

After performing PFC, it is apparent whether grazing or other activities are impacting stream channels/riparian areas. Based on the PFC assessment, if needed, management practices will be modified and monitored for effectiveness.

Comment VV: Trend and quantitative data were not provided and to our knowledge, PFC has been conducted one year.

Response: See above response.

Comment WW: Reference and guidance provided by FSM 2500 (Watershed and air management, Chapter 2520, Watershed protection and management, Section 2520- Riparian Area Management Policies) were not integrated into the EA effects analysis or quantitative monitoring.

Response: The Proposed Action incorporated WCPs as design criteria. WCPs are found in Forest Service Handbook 2509.25 and were developed to "to protect soil, aquatic, and riparian systems. Design criteria are specific ways to meet the standards using current knowledge and technology." Design criteria were included in the analysis of effects for the Proposed Action. Monitoring of these specific design criteria is included in the monitoring plans for each allotment with perennial water.

Comment XX: EA states that without livestock grazing, range condition would eventually decrease due to buildup of accumulated dead plant material (also page 49). No local studies or applicable science was cited to support this for native plant communities and for plants that did not evolve with repeated clipping. Monocultures of non-native grasses can have buildups without any form of disturbance. The EA did not mention that fire and other disturbances to both native and non-native grasses also recycle dead plant material.

Response: The Proposed Action included a summary of expected effects. Impacts of the No Action alternative including references are provided in the EA.

Comment YY: BHNF is applying range science in an attempt to change undesirable plant species (annual brome) but question how livestock will be forced to consume cured annual brome in the fall.

Response: Livestock are not expected to consume cured annual brome in the fall. However, some years significant late summer/fall precipitation can initiate a second growth of annual brome. It is this green second growth that would be targeted if and when it occurs.

Comment ZZ: EA determined that direct and indirect impacts to mountain sucker and its habitats may not result in a loss of viability in the Planning Area. We suggest a new review may be warranted due to a recent population impairment in Anne Creek, which drains into Little Spearfish and Spearfish Creeks of the Pettigrew Allotment. Drainages within the Planning Area that have confirmed populations of mountain sucker require utmost in water quality, increased water temperature if impaired, and high riparian health.

Response: Annie Creek is located upstream of the Pettigrew Allotment and flows into Spearfish Creek from the east. Streams within the Pettigrew Allotment flow into Spearfish Creek from the west and downstream of Annie Creek. Species viability for mountain sucker was determined at the Forest-scale as part of the Forest Plan Phase II Amendment. There is no need to reassess this species' viability as part of this decision due to the lack of direct or indirect effects to the mountain sucker in Annie Creek from either of the Alternatives. Any information on the recent population impairment of mountain sucker in Annie Creek would be appreciated and would be used to evaluate this species' status both as a Management Indicator Species and a Region 2 sensitive species in the context of our next Black Hills National Forest Plan Annual Monitoring and Evaluation Report.

Comment AAA: There was no analysis for recreational resources and impacts of livestock grazing, infrastructure or desired conditions adjacent to or within the George S. Mickelson Trail. Please add the following to the EA and incorporate Design Criteria into the Proposed Action and Decision.

Response: Since the commentor did not provide any specific location for these impacts of livestock grazing, it is not possible to discuss effects or mitigate impacts. However the Mickelson Trail is a railroad right-of-way managed by the South Dakota Game, Fish and Parks. As such it is the responsibility of the landowners and managers to restrict livestock access to their right-of-way.

Comment BBB: The Pettigrew Range allotment is located in the Roughlock Falls Nature Area administered by the SD Game, Fish and Parks and in the past, livestock frequented the area. Our agency has conducted considerable landscaping of this public site and we wish to discuss best ways to keep livestock out of Roughlock Falls area and wetlands.

Response: Livestock that occasionally enter the Roughlock Falls area are not from the Pettigrew allotment. As with all areas on the Forest, livestock occasionally enter areas that are excluded from livestock use. If you have thoughts or suggestions specific to Roughlock Falls, please contact Northern Hills District range staff.

Comment CCC: The East Rapid Allotment is also of concern because it encompasses part of the Mickelson Trail. Livestock cause extensive damage to the trail in this area and we need to discuss management options. Please contact the SD Department of Game, Fish and Parks, Division of Parks and Recreation for EA Design Criteria and to coordinate immediate mitigation and monitoring.

Response: Range staff on the Northern Hills Ranger District are routinely in contact with the Parks and Recreation personnel of your agency in regards to Mickelson trail. We have not been advised of any damage to the trail system from livestock.

Comment DDD: Monitoring shall be included in the project-level Decision (FSH 2209.13, Chapter 90 at 97).

Response: The final monitoring plans for each allotment will be included in the EA and referenced in the Decision Notice

Comment EEE: The EA should determine highest priority for permit and allotment administration (FSH 2209.13, Chapter 90 at 99.1).

Response: As stated in FSH 2209.13, Chapter 90, 99.1 we do prioritize on a yearly basis the Allotments to stress administration on and we strive to be on all our allotments. The needs of administration are ever changing and to plan this in an environmental document would not allow the flexibility needed to react to those changes.

Comment FFF: The following items were listed in our 12/3/07 scoping comments and no responses were addressed in the EA. We again ask for clarification of the following and tier this to our 12/3/07 comments rather than reiterate the entire letter.

Response: Comments from the public, other agencies, and tribes during scoping were used to formulate issues concerning the proposed action. The Forest Service separated the issues into two groups: key and non-key. Key issues were defined as those directly or indirectly related to implementing the proposed action which should be resolved by the alternatives. Non-key issues were identified as those: 1) outside the scope of the proposed action; 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 on Environmental Quality (CEQ) NEPA regulations explain 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)…".

Comment GGG: We proposed possible joint projects and have not been contacted. Englewood Springs Botanical Area is an area we could jointly fence

Response: The Forest acknowledges the offer by SDGF&P of jointly working with us to fence Englewood Springs. If a decision is made to fence a portion or all of the Englewood Springs Botanical Area, the Northern Hills Range staff will contact SDGF&P regarding the possibility of jointly funding or constructing the fence.

Comment HHH: NEPA (40 CFR 1502.24) requires that agencies "insure professional and scientific integrity of the discussions and analyses in environmental statements. They shall identify any methodologies used and shall make explicit reference by footnote to the scientific and other sources relied upon for conclusions relied upon in the statement." Therefore, we strongly recommend that you reconsider and revise this EA.

Response: The Proposed Action was not an EA. The EA will be available at the time the Decision Notice is signed.

Letter 05: Jonathan Ratner, Western Watershed Project

Comment A: About one quarter of the analysis area is within management areas with big game emphasis, particularly became winter range. We have not found within the draft EA any utilization standards or other criteria to meet the needs of big game winter range.

Response: A lack of forage in big game winter range was not identified as a concern or issue. Based on forage condition/production, and big game populations in the Black Hills, the current utilization standards in place appear to be meeting the needs of the vegetative community and big game. Currently the combined white-tail and mule deer populations in the

Black Hills are above the population objectives for South Dakota (USDA Forest Service 2007). Wyoming does not have specific Black Hills population objective for deer.

Comment B: Nowhere within the document was there a discussion of capable and suitable acres, their arrangement or productivity. Case law has shown that the Forest Service needs to apply the general capability suitability analyses done at the forest plan level, during site-specific NEPA analysis such as this.

Response: The Proposed Action discussed suitable rangelands. Range capability can be a useful tool at the project level to identify where forage is available and how management can affect use of that forage. However, range capability is a modeling tool only and may not portray an accurate assessment of on the ground conditions. Capable acres for these allotments were initially developed using the latest GIS data available (This information is available in the project file). Factors such as tree canopy cover, vegetative type and production, slope and aspect were all used to determine acres that were capable for grazing. The ID Team determined that the capable acres derived from this data did not accurately represent the carrying capacity of the allotments as a whole. Overall, annual monitoring data, long term trend data as well as field site visits confirmed that the current stocking rate is within the actual carrying capacity unless otherwise stated in the existing condition section of the range report.

Comment C: We are again concerned with the misuse of PFC in this process. PFC is not a method to determine "robust stream health".

Response:

Comment D: We are concerned by the dumbing down of the "desired plant community" to include community is made up of almost entirely non-native species. Non-native species do not provide the same ecosystem function that native species do. Setting the bar so low is not appropriate management of public lands.

Response: The Proposed Action mentions that many upland sites are dominated by non-native grasses. Vegetation inside range exclosures built in the 1940s demonstrates that these species are very stable. Elimination of grazing inside the exclosures has had little to no effect on species composition in the last 60 years. Species are essentially the same both inside and outside the exclosures. Efforts to reduce non-native annual brome are included in the Proposed Action. The description of the desired plant community has been edited to reflect that management is not intending to focus on maintaining non-native grasses but reflects the stability of the naturalized non-natives.

Comment E: We also find that the principles of adaptive management is laid out in the literature have not been followed. Even the fairly basic by Chuck Quimby called "A Practical Approach to Adaptive Management" has not been followed in this process. Objectives tend to be general, often unmeasurable, and without time frames.

Response: The allotment specific monitoring plans do set timeframes and measurable standards for resource objectives and for changes in management.

Comment F: A total of 8510 AUMs would be authorized but fails to provide any information regarding capable and suitable acres, current productivity, current conditions or other information.

Response: See response to B above. The EA includes information on current vegetative and riparian conditions on the allotments.

Comment G: One allotment is prescribed 70% utilization to supposedly reduce cheatgrass but the Forest Service fails to provide any information or literature to support the effectiveness of this. Our review of literature in this matter did not show that significant utilization of cheatgrass reduces cheatgrass.

Response: The EA contains a discussion of the effectiveness of this approach and supporting literature citations.

Comment H: The document failed to provide any information regarding permit compliance, success and failures of the previous AMP, permit actions or true or false assumptions made in the previous NEPA processes

Response: The EA contains a summary of past practices and success/failure of previous AMPs. The details of historic management on these allotments are included in the Range Specialist report for this project.

Comment I: one of the measures is "compliance with state water quality standards, trend and bank alteration and stability, trend in bare ground, number of springs protected." But most of these issues will not be measured such as compliance with state water quality standards.

Response: The monitoring plan for the Proposed Action includes water quality monitoring based on BMP/WCP effectiveness. The Bearlodge and Northern Hills Ranger Districts will use a similar version of a method developed by the Medicine Bow NF to monitor WCP effectiveness. If WCPs are implemented correctly with the NZR08 project then no further water quality degradation is expected. Should it be found that WCPs are not effective then adaptive management will be utilized to protect water resources. Adaptive management options are discussed in the EA.

Comment J: The current process proposes new "range improvements" but fails to provide any defensible information regarding the effectiveness of more "range improvements". For nearly a century we have been adding more and more of these "range improvements" yet riparian areas continue to be severely degraded

Response: The effectiveness of range improvements is addressed in the EA.

Comment K: The EA needs to provide information regarding compliance with permit terms and conditions specifically in this case, regarding permittee compliance with maintenance requirements.

Response: Maintenance responsibilities and requirements are assigned through the terms and conditions of the Permit. Permit administration is a process tied to but separate from the EA process. Permittee compliance with terms and conditions of the permit are handled through the permit administration thus are outside the scope of this analysis.

Comment L: Most of the streams within the project area are degraded but nothing within the EA provides a clear, defensible, and implementable process to reach the required robust stream health within the next plan period.

Response: Strategies to improve stream conditions, where needed, are discussed in the EA.

Comment M: The same issue goes with forest plan standard 1301 management measure 3. Also, forest plan standard 2505 and 2507 also will not be met proposed action.

Response: The Proposed Action was designed to maintain or improve stream health and riparian ecosystem condition. Impacts are discussed in the EA. Utilization levels identified in Table 5 of the Proposed Action comply with FP Guideline 2505 except as identified for reduction of non-native annual brome. FP standard 2507 does not apply since there are no fenced riparian pastures in these allotments.

Comment N: Common with all other adaptive management proposals from the forest service, this one likewise provides a list of various actions or "tools" all of which have been available to the Forest Service for decades. Most of these have not been implemented because permittees do not like them. We do not see anything in this document which would indicate that the Forest Service would now have the spine to implement these actions went over the past it has not

Response: The Decision Notice will identify the selected alternative and the supporting rationale for the decision.

Comment O: The Forest Service proposes to continue season-long grazing in the Black Haw allotment which is incompatible with virtually every management objective and is not in compliance with forest plan standards and guidelines and Watershed Conservation Practices Handbook.

Response: FP guideline 2502 requires conversion of season-long grazing systems…as opportunities permit. WCP 3 (i) does not allow grazing throughout the entire growing season in areas that contain riparian or wetlands. The Black Haw allotment is a very small allotment with a limited riparian area. The only identified resource problem on the allotment is the riparian area. The Proposed Action will consider other options to eliminate impacts to the riparian area, including the exclusion of livestock from the riparian area. Refer to Table 5, Adaptive Management Options.

Comment P: …where existing conditions show no willow regeneration the Forest Service fails to implement a willow utilization criteria capable of allowing regeneration.

Response: The Proposed Action includes fencing of springs and seeps with limited or no willow regeneration.

Comment Q: The proposed action for the Silver Creek and Upper Elk allotment also continues season-long grazing.

Response: The Silver Creek allotment does not contain any riparian areas, therefore WCP 3(i) does not apply. Implementation (short term) monitoring has been collected for the purpose of manipulating the timing, intensity and frequency of livestock grazing on these allotments. When allowable use standards are reached in either upland or riparian areas, livestock are removed or herded to different locations. Long term monitoring data indicates that we are meeting or at least moving towards desired condition objectives with the current season long grazing system; therefore it is not necessary to convert or change the current grazing system to a system that requires more intensive management. Studies have shown that impacts caused by livestock are primarily a function of the timing, frequency, and intensity of use (Platts 1981). Clary and Webster (1989) concluded that vegetation appears to be more affected by grazing intensity than by grazing systems. The success of grazing

systems depends in part upon managerial control of intensity and duration of forage utilization.

Comment R: While a wide range of riparian impacts are described in the document, the Forest Service fails to implement Multiple Indicators Monitoring (MIM) and set objectives and timelines for the parameters measured by MIM.

Response: Several of the parameters included in the monitoring plans for the allotments are included in MIM. MIM is listed as one of the acceptable monitoring protocols.

Comment S: Current research is showing that very frequently annual stream bank alteration is the weakest link in the chain and needs to be implemented as a trigger to move out of the pasture. This EA continues with the old school thinking that stubble height alone will achieve the goal.

Response: The monitoring plans for each allotment include stream bank alteration as an indicator of when livestock should be moved.

Comment T: Monitoring the application of Watershed Conservation Practices is in no way a surrogate for compliance state water quality standards... The Forest Service cannot just assume that its actions are not causing violations of water quality standards.

Response: FSH 2509.25, Chapter 21 includes the following direction: “Follow this Nonpoint Source Management Strategy to meet State water quality requirements. It is consistent with the 1985 agreement between the EPA and the Forest Service. The Strategy includes the application, monitoring, and adjustment of watershed conservation practices (WCPs).

21.2 - Monitoring

The Forest Service shall monitor WCP implementation to ensure that WCPs are properly applied, and WCP effectiveness to ensure that State water quality standards are met and classified uses of water are protected.”

Comment U: Some streams within the project area are actually already listed as not supporting their designated uses it the Forest Service has failed to implement actions under a TMDL.

Response: We are not sure what the Commentor is attempting to say here. Existing conditions and impacts to streams in the project area are included in the EA.

Comment V: Page 45 continues the misapplication of PFC when it states that "the majority of sites show acceptable trends based on PFC monitoring." despite the clear direction within the implementing documents which state that PFC is not a monitoring method or a method for determining trend."

Response: The EA has been edited to reflect the use of PFC as an assessment tool. It is not included as a monitoring method.

Comment W: The cumulative impacts analysis suffers from all the usual weaknesses. For instance page 48 states "no cumulative effects are expected under any alternative because both alternatives would reduce impacts from livestock grazing."

Response: According the Council on Environmental Quality (CEQ) NEPA regulations, “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 such actions

(40 CFR 1508.7). Since the Proposed Action (grazing of 9,259 AUMS) is already occurring, its continuation is not an additional incremental impact. Because both alternatives would reduce adverse impacts from grazing, then there can be no "cumulative impact".

Comment X: The EA states" the project area was surveyed specifically for R2 sensitive plant species" but fails to provide information regarding the sufficiency and coverage of these surveys. Such information is critical in understanding the effectiveness of these surveys

Response: The EA discusses coverage of the surveys for sensitive plants.

Comment Y: The monitoring plan, while a good start, fails to provide both be specificity and the commitment necessary to implement adaptive management… Problems with monitoring plan are such things as the use of ocular utilization measurement which is highly subjective and often very inaccurate ocular methods with regular annual calibrations from actual clipped plots may be accurate but this provides no information regarding any calibration process.

Response: The Forest uses standard range monitoring techniques described in RAMTG (1996) including ocular utilization estimation.

Comment Z: The "Change Need It" is to "remove livestock from affected area". But fails to provide any information how this will be effectively accomplished.

Response: "Remove livestock from affected area" refers to moving the livestock off of the area of concern and can be accomplished through herding, removal from the pasture, or removal from the allotment.

Comment AA: Many of the monitoring plans failed to implement a reasonable suite of triggers such as willow utilization and annual stream bank trample.

Response: Annual streambank trample is included in all of the allotments with perennial water under "Key Riparian Grazing Areas". Willow utilization was added to the monitoring plans where appropriate. Current AOI's include willow utilization with a standard on woody plants.

Comment BB: …the longer-term monitoring is flawed by excessive length between monitoring points such as 10 years between points would require a 30 year period, or the entire lifespan of a Forest Service career in order to have the minimum data points to determine trend.

Response: Long-term monitoring has been occurring on these allotments for several decades prior to the current analysis. Adequate data exists to establish and monitor range trend.

Comment CC: ..many trigger points are listed in such general terms as "loss of species diversity" but fails to provide any information regarding what this is.

Response: "Loss of species diversity" means a reduction in the number of desirable native plant species or the frequency of any desirable native plant species. This has been clarified in the EA.

Comment DD: The criteria for sensitive species is likewise supported allowing 40% utilization or 40% of the plants be trampled could not be considered incidental or in compliance with the forest plan

Response: The Forest has adopted the hardwood/riparian shrub utilization guideline (2505(c)) for use on this species (*Viburnum opulus*) since it is a riparian shrub.

Comment EE: …we incorporate into these comments are entire scoping comments because there were many critical issues which we mentioned in those comments which were not incorporated into the current EA.

Response: Comments from the public, other agencies, and tribes during scoping were used to formulate issues concerning the proposed action. The Forest Service separated the issues into two groups: key and non-key. Key issues were defined as those directly or indirectly related to implementing the proposed action which should be resolved by the alternatives. Non-key issues were identified as those: 1) outside the scope of the proposed action; 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 on Environmental Quality (CEQ) NEPA regulations explain 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)…".

Comment FF: Need to detail out all FP S&G and other direction such as WCPH and provide rationale as to how each applicable direction will be met

Response: The Forest has an obligation to show consistency with the Forest Plan and we will do in the EA and Decision Notice.

Comment GG: Need to deal with BAS

Response: We are not familiar with this acronym.

Comment HH: The need to "reduce" trailing and trampling is not correct. You need to eliminate impacts. 3.1-2503 is a standard that requires restricting access to protect sens species. This standard does not allow for any use of sens species

Response: The EA includes a monitoring plan with a specific trigger point and adaptive management actions designed to protect R2 sensitive and SOLC plant occurrences. This method was developed by an interdisciplinary team and will be implemented in 2009. This monitoring method and threshold will be included in the subsequent AMP and monitoring section of the Annual Operating Instructions.

Comment II: 40% utilization or trampling of sens species is absurd. They can't take that massive level of impact. Native grasses which evolved with some grazing lose root mass and vigor at 40% utilization

Response: Browse species also evolved with a level of browsing. The Forest has adopted the hardwood/riparian shrub utilization guideline (2505(c)) for use on this species (*Viburnum opulus*) since it is a riparian shrub.

Comment JJ: Looking over the 2007 Sens plants forms gotten in the 2007 FOIA it is abundantly clear livestock are impacting Englewood BA. The EA ignores the direct information contained in these sheets. This does not comply with NEPA.

Response: The Forest acknowledges that livestock have access to Englewood Botanical Area. The EA had been edited to better address the concerns and issues identified at Englewood Springs including monitoring and adaptive management actions.

Comment KK: BA Plan needs to be written

Response: Preparation of the management plan is outside the scope of this analysis. The Forest is planning on preparing management plans for all of the Botanical Areas. However, the Forest is currently focusing on RNA establishment records.

Comment LL: From the plant forms it is clear livestock grazing is impacting the values for which the BA was designated so you are not meeting FP standards.

Response: The EA had been edited to better address the concerns and issues identified at Englewood Springs including monitoring and adaptive actions

Comment MM: The FS proposes to continue season-long grazing in Upper Elk despite failure to comply with WCPH-FP direction as well as BA management. Season long grazing is incompatible with any management objective other than permittee wishes.

Response: See response to Comment Q above.

Comment NN: Englewood impacts trigger is already being exceeded. Need actions now.

Response: The EA had been edited to better address the concerns and issues identified at Englewood Springs including monitoring and adaptive actions

Letter 06: Wyoming Game and Fish Department

Comment A: We previously provided comments in our letter dated November 29, 2007 which we include here by reference.

Response: Comment noted.

Comment B: We recommend the BHNF utilize guidelines for Livestock Grazing Management, Rangeland Standards and Guidelines, and Grazing Best management Practice, as these will greatly aid in meeting the needs of wildlife.

Response: The Proposed Action includes rangeland standards and guidelines from the Forest Plan as well as R2 Watershed Conservation Practices related to livestock grazing.

Comment C: We recognize the difficulty in trying to re-establish native grasses in current non-native dominated systems. However, it s inappropriate to list these same non-native grasses as past of a desired condition.

Response: The description of the desired plant community has been edited to reflect that management is not intending to focus on maintaining non-native grasses but reflects the inherent stability of the naturalized non-natives.

Comment D: We offer the technical assistance of our staff of habitat and wildlife biologists to help the BHNF work towards reaching appropriate desired conditions.

Response: Comment noted.

Comment E: We disagree with the assertion by BHNF of the value of smooth brome as forage to elk and deer. Deer may use early spring green up basal leaves of grasses but are otherwise unlikely to use grasses later in the season.

Response: The discussion of the value of non-native grasses in the EA has been edited to reflect this concern.

Comment F: Based on our experience and as demonstrated by significant lack of supportive evidence in the literature, elk are not particularly noted for using brome either. A recent study in the northern Black Hills, smooth brome only occurred in 89 of 622 sampled elk use sites.

Response: The discussion of the value of non-native grasses in the EA has been edited to better describe value to big game.

Comment G: We suggest the BHNF review the Framework for Revising Deer and Elk Strategic Management Direction on the BHNF, SAIC project number 01-0209-04-4456-106 that was developed for the forest plan revision in 2003.

Response: The reference has been reviewed an incorporated into the EA where appropriate.

Comment H: Intense fall grazing of cheatgrass will result in no real control of cheatgrass and likely worsen the problem.

Response: The effectiveness of this method is discussed in the EA.

Comment I: We recommend trying application of Plateau™ herbicide instead; followed by reduced grazing pressure. A year deferment of grazing post-treatment would be preferable.

Response: Herbicide treatment is included in the Proposed Action as an adaptive management option. A deferment period could be a part of that option.

Comment J: We recommend utilizing prescribed fire, where feasible, to help move habitats toward a desired native condition. Appropriately applied, prescribed fire can help reduce non-native grasses allowing natives opportunity for better establishment. Fire can help maintain species diversity in virtually all habitat types.

Response: We agree…prescribed fire can be used as a tool to manipulate or mange vegetative communities. However, the development of specific burn prescription is outside the scope of this analysis.

Comment K: We recommend an appropriate rest period post-fire as provided by Bunting we al (1987) who suggested rest for two growing seasons after a burn.

Response: The appropriateness of grazing post-burn depends on many factors including burn intensity, burn severity, season of burn, percent of area burned, and management objectives. Therefore no single post-burn prescription is appropriate. The EA provides for an interdisciplinary review prior to grazing burned areas.

Comment L: We recommend managing for residual stubble or regrowth to be at least 4-6 inches in height at the end of the grazing season to provide sufficient herbaceous vigor maintenance, bank protection, and sediment entrapment.

Response: The EA includes riparian stubble height standards. Utilization is used to measure grazing intensity for upland areas because of the diversity of plant species present.

Comment M: One of the signs of impending cattle grazing damage to riparian area was when stubble height of the most palatable species reaches 3 inches.

Response: The EA includes riparian stubble height standards of 3-6 inches depending on the season of grazing.

Comment N: Several studies recommend utilization rates of 20-20% of current annual growth, or even complete rest for one or more years, to restore the vigor and health of degraded riparian area.

Response: comment noted. The EA includes a full list of references used in preparation of this document.

Comment O: We suggest short duration grazing combined with a rest rotation or deferred grazing system in pastures with degraded riparian sections.

Response: Grazing related problems in riparian areas in this project area are localized in nature and many riparian areas are healthy and support diverse plant communities. Changes in grazing systems were considered and are included in the Proposed Action where appropriate.

Comment P: Error on page 16. The allotments named here are not the ones listed in this project. This makes the subsequent text questionable as to where it applies.

Response: The EA has been corrected.

Letter 07: Eric Jennings

Comment A: The improvements in range condition that has occurred on this allotment the past 18 years are a testament to Adaptive Management. Conditions in the forest are constantly changing so it is beneficial to have a plan that can be altered to meet these changes.

Response: Comment noted.

Comment B: This plan is calling for an extension of the fence of the Clayton Draw willow exclosure to reduce livestock impacts on willows. I have no problem with the fence being extended because it has no effect on the allotment management.

Response: Comment noted.

Comment C: I have monitored and documented the willow growth the past 15 years and have established that the cattle are having little effect on them. Dry conditions and suitable habitat seem to be limiting the willow growth in that area. In the wetter years that the willows have flourished the wildlife impacted them but the drought is what set them back.

Response: Comment noted.

Comment D: I feel the main reason for the fence has less to do with impacts from livestock and more to do with satisfying a Forest Plan objective to develop 500 acres of willow habitat, and this site allows a few acres of that.

Response: Comment noted.

Comment E: We can work on the Lander Spring area of concern. It is a difficult spot and will be difficult to improve to everybody's satisfaction. My gut feeling is that by the time we get the improvements in place the forest above the spring will re-populate and decrease the water yield to the point that it is no longer and issue.

Response: Comment noted.

Comment F: I encourage the Forest Service to sign the decision notice with out any additional changes to the Griffith Allotment.

Response: Comment noted.

Letter 08: Elaine Ebbert

Comment A: The underlying needs for this project that you have stated within your Introduction are extremely important, but I fail to see how you are going to accomplish these goals by reauthorizing grazing in all of these allotments!

Response: The EA discusses the impacts of the Proposed Action. The Decision Notice will include the rationale for the decision to be made.

Comment B: It is crucial that the current management regime for this Botanical Area be immediately changed to protect this unique area and stop the current resource damages that are occurring because of livestock grazing. Reauthorizing grazing by domestic livestock in this area is ludicrous, at best! It is endangering the viability of the rare plants, the seeps and springs, and the uniqueness of the habitat that allows for the growth of R2 Sensitive Species and Species of Local Concern (SOLC).

Response: The EA includes a monitoring plan with a specific trigger point and adaptive management actions designed to protect R2 sensitive and SOLC plant occurrences. This method was developed by an interdisciplinary team and will be implemented in 2009. This monitoring method and threshold will be included in the subsequent AMP and monitoring section of the Annual Operating Instructions.

Comment C: It is inconceivable that this proposed plan for the Black Hills National Forest is to reauthorize livestock grazing in the Englewood Springs Botanical Area in light of the fact that you have documented resource damage by livestock grazing.

Response: See Response to Comment B above.

Comment D: There has not been an adaptive management process in the past, nor are is there currently, to curtail the domestic livestock impacts that have been tolerated for many years. MA 3.1-2503 is the Rangeland Guideline that states, “Restrict access of domestic livestock to protect the R2 sensitive and species of local concern plant occurrences in designated botanical areas”.

Response: See response to Comment B above.

Comment E: I am requesting a copy of the current Biological Evaluation with species report and any monitoring data that has been incorporated into this EA for the NZR08 Project.

Response: The Biological Evaluation including monitoring data for this project will be available when the EA is finalized. This information is also available through the FOIA process.

Comment F: In Table 3. Existing range health, trends, and status of benchmark areas in the NZR08, the Existing Condition notes that “Sensitive Plants – Livestock may be accessing and impacting SOLC occurrences and suitable habitat”. The Benchmark Area – Trend Toward

Desired Conditions states that "Englewood Springs Botanical Area – may not be meeting; insufficient information". Again, this statement is inconsistent with the earlier information in the Introduction stating that "3) There is a need to reduce trailing and trampling by livestock in the Englewood Springs Botanical Area (MA 3.1) to protect…."

Response: See Response to Comment B above. The EA has been edited to clarify the nature of impacts occurring at Englewood Springs.

Comment G: In 1996, I saw the *Listera convallarioides* blooming at Englewood Springs. There were cattle grazing on the lower slopes of the hillside and in the ditch west of FS Road #228. There were many of the *Corallorhiza* species of orchids growing in the ditches.

Response: Comment noted.

Comment H: Knowing that this is a botanical area that has been impacted by livestock grazing for years, I was shocked to see that it is being proposed for reauthorization of livestock grazing!! This area has had season-long grazing for many years, resulting in soil compaction, trampling of the riparian area, stream bank erosion, and pollution. There was not any other water source in sight two weeks ago, and the livestock are naturally using the riparian areas.

Response: See response to Comment B above.

Comment I: It appears to me that the only role "Adaptive Management" is playing in this project is the need for a "current catch-phrase". Adaptive Management is not new – it has been in the business world for years.

Response: Comment noted.

Comment J: The fact that another population of the *Listera convallarioides* has been found on the West side of FS Road #228 and the fact that impacts from livestock grazing have not been addressed, demands that livestock be removed from the Englewood Springs Botanical Area immediately and that the Area be fenced in its entirety according to the boundaries depicted on the Forest Service map included in the EA.

Response: The Forest Plan allows livestock grazing in Botanical areas if it does not conflict with the values for which the botanical area was designated. See response to Comment B above.

Comment K: The "Comparison of Alternatives" table states that, with both alternatives, the risk to values for which Englewood Springs Botanical Area was designated are "Low". The conditions that I saw two weeks ago tell a different story – the risks are "High"! The trigger point was reached long ago!

Response: Risks described in the EA area based on implementation of the monitoring plan and adaptive management actions included in the Proposed Action.

Comment L: If, as stated in the EA, "Budgets, personnel and resource condition will determine the scope and degree of rangeland monitoring activities", then those AMPs that cannot be monitored must not be authorized or reauthorized for domestic livestock grazing.

Response: Range land monitoring does and will occur each year.

Comment M: I am enclosing pictures that I took two weeks ago showing bank shear caused by livestock hoof action, trampling of the habitat, impacts to the riparian area, and a "top-chewed"

plant of one of the *Listera convallarioides* plants that was blooming at the time of my visit. In addition I will provide pictures of the many cow pies that may help to clear up your lack of understanding and/or confusion about "unknown grazers". There were two small samples of elk dung amongst the many cow pies also.

Response: Comment noted.

Comment N: I was also unable to see any impacts to this Botanical Area resulting from an improperly functioning road culvert, nor have I seen this situation over the many years that I have been going there.

Response: Comment noted.

Comment O: The EA states that the BHNF will use a method developed on the Medicine Bow National Forest-Thunder Basin National Grassland to monitor WCP effectiveness. The document does not give any further information regarding this method and therefore I am unable to understand exactly how this process will work and if it will be effective. I am requesting that this information be made available to the public, and that I receive a copy of this methodology.

Response: The EA describes the WCP monitoring approach and WCP monitoring is included in the monitoring plans for each allotment where perennial water is present. The full strategy is included in the project record.

Comment P: I urge you to fence the entire Englewood Springs Botanical Area. It is the only way to ensure that the domestic livestock impacts will be controlled and that the MA 3.1 goals are met and remain in place.

Response: Fencing is included as an adaptive management action.

Comment Q: Monitoring should begin as soon as changes are implemented through adaptive management, not just annually, but during the time that the grazing allotments are active. This is the only way that it is possible to provide meaningful results that can be dealt with immediately

Response: "Annual" as used in the monitoring plans refers to "every year" compared to other monitoring which occurs only every "5-10 years". It does not mean only once per year. Annual monitoring of forage utilization and stream bank alteration occur frequently throughout the grazing season. Livestock are moved once forage utilization or stream bank alteration limits have been reached.

Letter 09: Ron Watson

Comment A: On page 16, Alternative A, Proposed Action. You have not listed the correct allotments that are referenced on page ii or analyzed in the remainder of the document.

Response: The EA have been corrected.

Comment B: We are disappointed in the apparent lack of consideration for the USFS to continue to invest in additional water development on all allotments.

Response: Comment noted.

Letter 10: Jeff Olsen

Comment A: There are many areas where riparian areas are getting trampled. There are no fences to protect these places from season long grazing

Response: The Proposed Action includes fences at 38 springs and other riparian areas. None of these areas will be grazed season-long. Implementation (short term) monitoring has been collected for the purpose of manipulating the timing, intensity and frequency of livestock grazing on these allotments. When allowable use standards are reached in either upland or riparian areas, livestock are removed or herded to different locations. Long term monitoring data indicates that we are meeting or at least moving towards desired condition objectives with the current season long grazing system; therefore it is not necessary to convert or change the current grazing system to a system that requires more intensive management. Studies have shown that impacts caused by livestock are primarily a function of the timing, frequency, and intensity of use (Platts 1981). Clary and Webster (1989) concluded that vegetation appears to be more affected by grazing intensity than by grazing systems. The success of grazing systems depends in part upon managerial control of intensity and duration of forage utilization.

Comment B: …little to no monitoring is done.

Response: Extensive monitoring data has been collected in the past. Monitoring plans are included for each allotment. These will be incorporated into the respective Allotment Management Plan and the Annual Operating Instructions for each allotment.

Comment C: the need to protect Englewood Springs (MA 3.1 area). This is in a season long grazing area and there are no fences to protect this area. It seems to me that fencing should be mandatory before any grazing season begins.

Response: The EA includes a monitoring plan with a specific trigger point and adaptive management actions designed to protect R2 sensitive and SOLC plant occurrences. This method was developed by an interdisciplinary team and will be implemented in 2009. This monitoring method and threshold will be included in the subsequent AMP and monitoring section of the Annual Operating Instructions.

Comment D: I do not see anything in the plan with any teeth that would help reach any of these 4 objectives.

Response: Comment noted.

Comment E: In many of the guidelines and management plans it states "do not allow livestock grazing through and entire growing season in pastures that contain riparian areas and wetlands." I see very little in this current plan that follows that statement.

Response: See Response to Comment A above.

Comment F: …"fences will be built over the 10 year permit period based on priority and as funds become available." That gives me little assurance. The fences need to be built BEFORE the cattle are placed in the allotment or at the very least, AUMs must be reduced.

Response: Implementation of the decision(s) in this EA will not be accomplished overnight and will take time. We certainly plan to accomplish the work as quickly as funding is available. The resource concerns at a majority of these spring protection fences would not warrant permit actions, but are being done for simple long term protection. We will use resource needs to set priority for the fencing.

Comment G: "locate new livestock/wildlife water sites out of hardwood communities when feasible." When "feasible" also gives me little assurance that any fencing will be done to protect hardwoods and other areas that need protection. Again, objective number 2 is a great goal but yet there is little stated in the plan that can make this a reality.

Response: No new livestock watering sites are planned in hardwood communities. It is already common practice on the Forest to re-locate stock tanks out of hardwood communities and riparian areas when the opportunity arises.

Comment H: If fencing proves to be too expensive then the AUMs need to be reduced in these areas.

Response: Reducing AUMs is an adaptive action for all allotments.

Comment I: Season long grazing is a poor practice. It is bad for native plants and soil compaction becomes a problem. Again, if rest rotation is not an option due to fencing then AUMs need to be decreased.

Response: Season-long grazing will only be continued where there are no resource conflicts. Reducing AUMS is an adaptive management option. See response to Comment A above.

Comment J: Smooth Brome is NOT a valuable forage of elk and deer. It is a non-native species that does not have much value for wildlife. They will eat it when they have to. Deer and Elk are browsers and when the brome is cured they will not eat it at all.

Response: The discussion of the value of non-native grasses in the EA has been edited to reflect this concern.

Comment K: Please increase native grasses and improve rangeland health. The big question in this plan is not the goals but HOW are you going to achieve them. This part of the proposed action is very limited.

Response: The EA discusses the problems associated with trying to change stable non-native grass communities. The Proposed Action includes management strategies for reducing non-natives annual brome.

Comment L: This plan states that short term monitoring will be done on an annual basis, I do not understand how checking a pasture once a year can help with any adaptive management.

Response: "Annual" as used in the monitoring plans refers to "every year" compared to other monitoring which occurs only every "5-10 years". It does not mean only once per year. Annual monitoring of forage utilization and stream bank alteration occur frequently throughout the grazing season. Livestock are moved once forage utilization or stream bank alteration limits have been reached.

Comment M: A proper monitoring system needs to be in place and funding needed for fencing off areas for protection.

Response: The Proposed Action includes a monitoring plan for each allotment. Unfortunately, our funding is dictated by Congress and varies from year to year, securing funding is outside the scope of this document. The agency will simply have to prioritize funding to implement range improvements.

Comment N: It does not seem like a "proposed action". It simply states what it should look like based on FP plan standards. There really is no specific plan for reaching the objectives.

Response: The plan is included in Table 5 for each allotment.

Comment O: Please make a bigger effort to protect the hardwood stands, Botanical areas, wetlands and riparian areas, reduce erosion and compaction.

Response: Comment noted.

Letter 11: Crook County Land Use Planning and Zoning

Comment A: We strongly support Alternative A, the proposed action,

Response: Comment noted.

Comment B: We reiterate the importance of close coordination among the Forest Service and the respective grazing allotment permittees during the implementation of the proposed action. The adaptive management options listed can only be effective and successful if arrived at through cooperative and collaborative means. As you develop more specific direction in the EA regarding each allotment, we highly recommend that you ask for active participation in that process by the individual permittees involved with those allotments.

Response: Comment noted. We routinely coordinate with permittees and other members of the public throughout the allotment planning process.

Letter 12: Audry Gabel

Comment A: I find it incredible and ludicrous that the Forest Service believes cattle do not severely conflict with the value of Englewood Springs and that it determined the livestock damage to be minimum at this site. Cattle grazing is conflicting with the values for which this botanical area was designated.

Response: The EA includes a monitoring plan with a specific trigger point and adaptive management actions designed to protect R2 sensitive and SOLC plant occurrences. This method was developed by an interdisciplinary team and will be implemented in 2009. This monitoring method and threshold will be included in the subsequent AMP and monitoring section of the Annual Operating Instructions.

Comment B: Cattle damage to this site is not a recent occurrence.

Response: Comment noted.

Comment C: Since you have been monitoring this site, can you send me a list of the species of orchids and estimated numbers of each that are now present at the site? What other unique or rare plants are still located at the site?

Response: Unfortunately we do not yet have a full vegetation survey done of the Englewood Springs Botanical Area. Our current focus is on surveys within our RNA's. You requested "the species list resulting from the monitoring…" All information we have regarding species present and monitoring is available through the FOIA process.

Comment D: Another botanical area being damaged by cattle grazing is Dugout Gulch.

Response: Comment noted. However, Dugout Gulch is outside the scope of this analysis.

Comment E: Botanical areas represent a miniscule part of the entire forest. It is not unreasonable to protect them. I am strongly recommending that all botanical areas be fenced starting with Englewood Springs. Fencing should protect all the riparian area west of FS 228, east to include the SE '14 of Section 29 and north to FS 228 10. A map is included.

Response: Fencing all or part of Englewood Springs is included as an adaptive management option. Fencing other botanical areas is outside the scope of this project.

Letter 13: Mark Gabel

Comment A: However, I find it strange that a stated purpose of the Proposed Action (p. 7) " ...is to authorize livestock grazing on all or part of the project area." Why would "all" be included in the purpose?

Response: The entire project area is currently authorized for grazing (except the small portion in Spearfish Canyon). This analysis and decision will decide whether or not that authorization should continue.

Comment B: By my own observation, there are approximately nine orchid species occurring at Englewood Springs and numerous other notable species including *Carex leptalea*, *Aquilegia brevistyla*, and *Moneses uniflora*. I assume that the US Forest Service has done a complete vegetation survey of the area due to its important biodiversity, the continuous threats from invasive plants and cattle, and the statement in the Proposed Action that "Monitoring for this project identified some isolated conflicts with management of these botanical resources related to livestock grazing." Please send me the species list resulting from the monitoring done for this project.

Response: Unfortunately we do not yet have a full vegetation survey done of the Englewood Springs Botanical Area. Our current focus is on surveys within our RNA's. You requested "the species list resulting from the monitoring…" . All information we have regarding species present and monitoring is available through the FOIA process.

Comment C: I do not know the impact of the cattle on the water quality, but assume that you are monitoring the water quality of this high-quality (Stewart and Thelenius, 1964) water from the springs. Please send me any water quality monitoring data you have from this area.

Response: Water quality monitoring is done by the State of South Dakota. It is available on their website.

Comment D: The phrase "unknown grazers" is clearly a purposely devious statement. It takes only a short walk to find bank shear and manure from cattle across the slope and on the west side of FS road 228. On p. 41, the Proposed Action document states essentially that deer and elk are the culprits impacting the vegetation and that "actual impacts from livestock appear to be minimal."

Response: The known grazers do include livestock. The term “unknown grazers” was referring to the unknown populations and unknown amount of use by other large herbivores (deer, elk).

Comment E: If the Proposed Action document Alternative A is implemented, the trigger point for elimination of cattle at Englewood Springs was reached by 1989…. Only 164 acres of over 83,000 acres in the Proposed Action area is classified as Botanical Area, less than 0.2% of the North Zone Range 08 Project Area. Alternative A needs to be amended to exclude botanical areas from grazing.

Response: The Forest Plan allows livestock grazing in Botanical areas if it does not conflict with the values for which the botanical area was designated. The EA includes a monitoring plan with a specific trigger point and adaptive management actions designed to protect R2 sensitive and SOLC plant occurrences. This method was developed by an interdisciplinary team and will be implemented in 2009. This monitoring method and threshold will be included in the subsequent AMP and monitoring section of the Annual Operating Instructions.

Comment F: It is my strong suggestion that the Englewood Springs Botanical Area be fenced to prohibit trampling, including the area west of FS road 228. This is not a new idea. The South Dakota Natural Heritage Program suggested this very action in 1987.

Response: Comment noted. Fencing of Englewood Springs Botanical Area is included as an adaptive management option.

Letter 14: Grace Kostel

Comment A: All pages, the EA document fails to provide citations for all information claimed therein….please provide.

Response: A full list of references used in preparation of the analysis is included in the EA.

Comment B: Page 1, EA Introduction, Item 3 states: "There is a need to reduce trailing and trampling by livestock in the Englewood Springs Botanical Area (MA 3.1) to protect and improve the values for which the botanical area was designated. Englewood Springs to date has received considerable damage from cattle. My photographs clearly show cattle damage (photographs to have been forwarded by Ranger O'Byrne August 6, 2008 and must be considered part of the administrative record for the EA NZR08

Response: Your photographs are included in the project record.

Comment C: The EA NZR08 states on Page 73 that the (so called) "trigger point" for the Englewood Springs Botanical Area [shall be] "Adverse impacts to R2 sensitive or SOLC plant occurrences or suitable habitat; OR [where] use by livestock is adversely affecting values for which Botanical Area was designated."… The trigger point is past having been reached. The very EA NZR08 names in its introduction on Page 1, Item 3 that "there is a need to reduce trailing and trampling by livestock in the Englewood Springs Botanical Area (MA 3.1).

Response: The EA includes a monitoring plan with a specific trigger point and adaptive management actions designed to protect R2 sensitive and SOLC plant occurrences. This method was developed by an interdisciplinary team and will be implemented in 2009. This monitoring method and threshold will be included in the subsequent AMP and monitoring section of the Annual Operating Instructions.

Comment D: That handbook (RAMTG) indeed does state is that *Bromus inermis* is a grass resource value having seasonal ratings of H (high) for Cattle, Sheep, Horse, M[ule] Deer, and Elk. In addition, I recognize the fact that Mule Deer are not the dominant species in the Black Hills-whitetail deer, however, are and no value of H (high) for whitetail deer can be claimed!

Response: The discussion of the value of non-native grasses in the EA has been edited to better address value of non-native grasses.

Comment E: Rangeland Ecosystem Analysis and Management Handbook for the Intermountain Region (Region 4) are [sic] the resource value rating identified for the Intermountain Region. They may not be entirely accurate for the Rocky Mountain Region [Region 2], so apply and review carefully before basing any management decisions on them."

Response: The document cited and used in this analysis is the Rocky Mountain Region Rangeland Analysis and Management Training Guide.

Comment F: The USDA USFS's own Fire Effects Information System (FEIS) Database, considered by many as a valuable scientifically sound resource for information, states the following for South Dakota and Wyoming (the areas with which the EA NZR08 is concerned):….Note that not only is there no rating for South Dakota and Wyoming, no information exists for the Black Hills species, which is white-tailed deer! In this well researched document the only mention of "high" with respect to smooth brome is that smooth brome is rated as " 'highly palatable" (Howard 1996) early in the spring, which is true for most all plant species at spring green-up, weedy or not.

Response: The discussion of the value of non-native grasses in the EA has been edited to reflect this concern. Habitat and forage information from SDFGP and WYFG was used in the analysis.

Comment G: The document cited admonishes the user "[that] the information in this ... Rangeland Ecosystem Analysis and Management Handbook for the Intermountain Region (Region 4) are [sic] the resource value rating identified for the Intermountain Region. They may not be entirely accurate for the Rocky Mountain Region [Region 2], so apply and review carefully before basing any management decisions on them.

Response: The discussion has been revised in the EA.

Comment H: "The USDA NRCS PLANTS website (2008) presents warnings about the potential weediness of smooth brome and cautions that the species may become invasive yet, none of these

admonishments are neither properly addressed nor are even mentioned in the EA NZR08. Hudak (2007) wrote "agencies and people on the ground have not done a very good job in alerting the public about the seriousness of ... issue[s].” Explain what scientific rationale supports how smooth brome is "acceptable for the current and proposed management of your project area," provides "valuable forage for wildlife" in the Black Hills, and what wildlife in the Black Hills exactly is smooth brome "valuable forage for ... " (as claimed in the EA) and provide documentation to support your explanations.

Response: The rationale for including non-natives in the DPC is addressed in the EA. The description of the desired plant community has been edited to reflect that management is not intending to focus on maintaining non-native grasses but reflects the inherent stability of the naturalized non-natives.

Comment I: Page 10 EA Desired Condition Table 2 states that "Botanical Areas (MA 3.1) & Sensitive and SOLC Plant Occurrences [will be] maintain[ed] [to] current extent of known sensitive and SOLC plant occurrences ... " Because the BHNF 2007 Rare Plant Survey/Monitoring Report estimates but does not specifically count the number of individuals for *Listera convallarioides* and other SOLC,… how will the BHNF maintain the current extent of a species for which there is only an estimate?

Response: The EA includes a monitoring plan with a specific trigger point that be used to monitor impacts and to protect *Listera convallarioides* and SOLC plant occurrences in this allotment. The Forest also monitors this species at this and other known locations through Forest level monitoring protocols which are designed to monitor the size and extent of the populations, as well as identify risks. The Forest level monitoring protocols are available at http://www.fs.fed.us/r2/blackhills/projects/planning/plant_monitoring_guide_2006.pdf and were begun in 2007 for this species.

Comment J: In addition, for any BHNF planning document to state that it will" ... maintain current extent ... " based upon a single estimate that was made during a drought year (indeed, the end year of several years of drought) is arbitrary and capricious…. How can the EA state that it will "maintain current extent of known sensitive and SOLC plant occurrences" without a clear knowledge of the current extent and factors related to that current extent?

Response: See response to Comment I above.

Comment K: The EA NZR08 has failed to meet obligations to analyze impacts to maintain viable populations as required by NFMA.

Response: Maintaining viable population is a Forest planning level issue and is outside the scope of this analysis. See response to Comment I above. The EA discusses effects expected from this project.

Comment L: Pages 16-19, EA Design Criteria for Allotments contains several items, and Page 17 final entry lists, "Implement the following Region 2 Watershed Conservation Practices (USDA Forest Service 2006) as they pertain to livestock grazing" and below lists (among others): …Explain justification for violating Design Criteria for Allotments and provide supporting documentation for your justification.

Response: The Decision Notice will address compliance with WCPs.

Comment M: Englewood Spring Botanical Area (MA 3.1) Proposed Action "Season long grazing" violates “d” above.

Response: We are unsure what “d above” refers to. The Forest Plan allows livestock grazing in Botanical areas if it does not conflict with the values for which the botanical area was designated. The EA includes a monitoring plan with a specific trigger point and adaptive management actions designed to protect R2 sensitive and SOLC plant occurrences in Englewood Springs Botanical area.

Comment N: Benchmark In SW 1/4 Sec. 29 "Continue season long grazing system" the EA violates "d" (yet again) above.

Response: Implementation (short term) monitoring has been collected for the purpose of manipulating the timing, intensity and frequency of livestock grazing on these allotments. When allowable use standards are reached in either upland or riparian areas, livestock are removed or herded to different locations. Long term monitoring data indicates that we are meeting or at least moving towards desired condition objectives with the current season long grazing system; therefore it is not necessary to convert or change the current grazing system to a system that requires more intensive management. Studies have shown that impacts caused by livestock are primarily a function of the timing, frequency, and intensity of use (Platts 1981). Clary and Webster (1989) concluded that vegetation appears to be more affected by grazing intensity than by grazing systems. The success of grazing systems depends in part upon managerial control of intensity and severity of forage utilization.

Comment O: Benchmark In SE 1/4 Sec. 32 same as comments above for Benchmark in SW 1/4 Sec. 29.

Response: See response to Comment N above.

Comment P: Page 40, EA Alternatives Not Considered in Detail-- Prohibit livestock grazing in Botanical Areas (MA 3.1). BHNF 2007 Rare Plant Monitoring Form clearly names cattle impacts as severe as does historical documentation at Englewood Springs. Kostel (2007) documented cattle trampling and hummocking of seeps and creek at North Fork Castle Creek Research Natural Area and its associated Botanical Areas. Thus, because livestock clearly do impact Botanical Areas, the EA already violates "a," "b," "c," "d," "e," and "f' of Design Criteria, this individual's submitted concern was, indeed, valid. The EA's published reply to this individual, which states "Prohibiting livestock use in this Botanical is not warranted at this time," is out of line and an outrageous avoidance tactic

Response: See response to Comment M above. Impacts at North Fork Castle Creek are outside the scope of this project.

Comment Q: In several instances the (so called) "trigger point" referenced in the EA Appendix B that is to serve as a point-of-change has already been met or exceeded at several sites covered by this document. Explain what use "trigger points" are for if they are not utilized, how trigger points are determined to have been reached, provide the specific monitoring protocols, and provide the citation(s) for the answers provided.

Response: Please refer to the EA for a review of the trigger points, monitoring protocols and associated citations.