Predecisional Environmental Assessment

Livestock Grazing Permit Issuance-2010

Shoshone National Forest
Cody, WY

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[Predecisional Environmental Assessment available at
http://www.fs.fed.us/r2/shoshone/projects/planning/forest_projects/env_analysis_index.shtml]
Abstract. The action proposed by the Shoshone National Forest to meet the purpose and need is to continue to permit livestock grazing by incorporating adaptive management on five allotments to meet Forest Plan 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, and wildlife habitat relative to livestock grazing.

The purpose of this project is to develop and apply commercial livestock management that is consistent with the goals, objectives, standards, and guidelines for the Forest Plan, as amended. The Forest Service rangeland allotment management process calls for periodic review of allotment conditions and management practices.

The Proposed Action includes five cattle and horse allotments: Little Rock, Sugarloaf, Washakie Needles, Middle Fork, and Bayer Mountain totaling 66,525 acres and 2,695 animal unit months (AUMs). The proposal includes one allotment (Little Rock) on the Clarks Fork Ranger District; two allotments on the Greybull District (Sugarloaf and Washakie Needles); and two allotments (Middle Fork and Bayer Mountain) on the Washakie Ranger District.

All adaptive management actions would be within the scope of effects documented in this environmental assessment (EA) or a supplemental NEPA document, and decision as appropriate. Allotment specific actions and range improvement projects are proposed, they are described in more detail in Section 2.4 of the EA.

In addition to the Proposed Action, the Forest Service also evaluated No Action (no livestock grazing) alternative. Based upon the effects of the alternatives, the responsible official will decide on an alternative.

This EA is required per Public Law 104-19 (Rescission Bill), which directs the Forest Service to develop and adhere to a schedule for National Environmental Policy Act analysis to evaluate commercial livestock grazing and permitting on an allotment management level.

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Introduction

1.1 About this Document

The 2010 Livestock Grazing Permit Issuance Environmental Assessment (EA) has been initiated as part of implementing the 1986 Shoshone National Forest Land and Resource Management Plan (Forest Plan), as amended. The EA has been prepared in compliance with the National Environmental Policy Act and other relevant federal and state laws and regulations. This EA is tiered to the Forest Plan (as amended) and the associated environmental analyses and decision documents. This is not a decision document; the responsible official would document the decision after a 30-day public review of the EA. Changes to the EA may occur between the Predecisional EA and the Final EA.

Tiering is in accordance with CEQ regulations (40 CFR 1502.20 and 1508.28), which allow the responsible official to focus on site-specific issues that are within the scope of a broader plan, program, or analysis that is already approved. All documents are incorporated by reference in this document, and can be reviewed upon request at the Wapiti Ranger District.

The Shoshone National Forest is implementing the Forest Plan as required by the Forest and Rangeland Renewable Resources Planning Act of 1974 (RPA, P.L. 93-378) and the National Forest Management Act of 1976 (NFMA, P.L. 94-588). This EA is required per Public Law 104-19 (Rescission Bill).

The Forest Plan establishes management direction for the Shoshone National Forest. This direction is described forest-wide and by management area. Designing and implementation of projects consistent with this direction is the means to move the Forest toward the desired future conditions as described in the Forest Plan. Forest Plan direction established sideboards for the development of alternatives to the Proposed Action. Within these sideboards, the Interdisciplinary Team (IDT) developed alternatives, project design, and/or mitigation that responded to the issues and concerns; all of which are designed to be consistent with Forest Plan direction unless specifically noted.

1.2 Introduction/Background

Project Area Description/Location

The five commercial livestock grazing allotments comprising the project area are located on the Clark Forks, Greybull, and Washakie districts of the Shoshone National Forest (SNF), located in Park, Hot Springs, and Fremont Counties, Wyoming (see Map 1.1). The five cattle and horse allotments are: Little Rock, Sugarloaf, Washakie Needles, Middle Fork, and Bayer Mountain.

The allotment boundary determined the project area for the analysis, unless otherwise noted.

Three of the allotments, totaling 34, 617 acres, are administered by the north zone of the SNF in Cody, Wyoming and two allotments totaling 31,908 acres are administered by the south zone in Lander, Wyoming (Table 1.1). These five allotments total 66, 525 acres and 2, 695 animal unit months (AUMs) for commercial livestock grazing.

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1 An animal unit month is the amount of forage required by one cow and one calf, or the equivalent, for one month.
Table 1.1. Allotments in the project area.

<table>
<thead>
<tr>
<th>Allotment</th>
<th>Ranger district/zone</th>
<th>Management areas</th>
<th>Management area allows for grazing?</th>
<th>Total acres</th>
</tr>
</thead>
<tbody>
<tr>
<td>Little Rock</td>
<td>Clarks Fork (North)</td>
<td>2A, 3A</td>
<td>Yes</td>
<td>4,901</td>
</tr>
<tr>
<td>Sugarloaf</td>
<td>Greybull (North)</td>
<td>8B, 3A</td>
<td>Yes</td>
<td>21,944</td>
</tr>
<tr>
<td>Washakie Needles</td>
<td>Greybull (North)</td>
<td>8B</td>
<td>Yes</td>
<td>7,772</td>
</tr>
<tr>
<td>Bayer Mountain</td>
<td>Washakie (South)</td>
<td>2A, 3A, 5A, 7E</td>
<td>Yes</td>
<td>5,636</td>
</tr>
<tr>
<td>Middle Fork</td>
<td>Washakie (South)</td>
<td>2A, 2B, 3A, 7E, 8B, 8C, 9E</td>
<td>Yes</td>
<td>26,272</td>
</tr>
</tbody>
</table>

1.1 Forest Plan Direction and Management Areas

The Forest Plan assigns a management emphasis to each portion of the Forest to meet multiple-use objectives. The Forest Plan contains a complete description of the applicable direction for these management areas and a description of desired future conditions, goals, objectives, and standards and guidelines. The Forest Plan management area designations for the allotments are shown in Table 1.1.

Management prescriptions for management areas reflect multiple use resource principles. Congressional mandates and policy and implementing regulations call for multiple uses on Forest Service-administered lands, including commercial livestock grazing. All of the affected Forest Plan management areas allow grazing.

“Capable rangeland” is basically lands that are able to produce vegetation that is consumed by grazing or browsing animals. “Suitable Rangelands” are those rangelands where there is no Forest Plan or other binding decisions to preclude the permitting of livestock grazing. All of the included Forest Plan management areas allow grazing. Because the livestock grazing practices proposed and analyzed and the rangeland habitat affected are not different or unique from those included in the Forest Plan, no changes in range suitability and/or capability were needed for this analysis.
Map 1.1. Livestock Grazing Permit Issuance: The five commercial livestock grazing allotments comprising the project area are located on the Clark Forks, Greybull, and Washakie districts of the Shoshone National Forest.
1.1.1 Management Area 2A

*Emphasis on semi-primitive motorized recreation opportunities.* Provide for recreation opportunities such as snowmobiling, four-wheel driving and motorcycling on roads and trails. Motorized travel may be seasonally prohibited or restricted to designated routes (Forest Plan III 118-123).

1.1.2 Management Area 2B

*Emphasis on rural and roaded recreation opportunities.* Management emphasis includes motorized and non-motorized recreation activities. Conventional use of highway-type vehicles is provided for in design and construction of facilities. Motorized travel may be prohibited or restricted to designated routes to protect physical and biological resources (Forest Plan III 124-131).

1.1.3 Management Area 3A

*Emphasis on semi-primitive non-motorized recreation opportunities.* Provides for recreation in both roaded and unroaded areas. Recreation opportunities such as hiking, horseback riding, hunting, and cross-country skiing are available. Seasonal or permanent restrictions on human use may be applied (Forest Plan III 140-144).

1.1.4 Management Area 4D

*Emphasis on aspen management.* Management emphasis is on maintaining and improving aspen sites. Other tree species, if present, are de-emphasized. Aspen is managed to produce wildlife habitat, wood products, visual quality, and plant and animal diversity. On larger areas, a variety of aspen stand ages, sizes, shapes, and interspersion are maintained. Both commercial and noncommercial treatments are applied. Diversity objectives are achieved by varying the size, age, shape, and interspersion of individual stands (Forest Plan III 153-157).

1.1.5 Management Area 5A

*Emphasis on winter range in non-forested areas.* Provide for winter range in non-forested winter ranges for deer, elk, bighorn sheep and mountain goats. Treatments are applied to increase forage production of existing grass, forb, and browse species or to alter plant species composition. Prescribed burning, seeding, spraying, planting and mechanical treatments may occur. Browse stands are regenerated to maintain a variety of age classes and species (Forest Plan III 158-162).

1.1.6 Management Area 7E

*Emphasis on wood fiber production.* Provides for wood-fiber production and utilization of large round wood of a size and quality suitable for sawtimber (Forest Plan III 174-180).

1.1.7 Management Area 8B

*Emphasis on the protection and perpetuation of natural biophysical conditions.* Provides for primitive wilderness opportunities; on-site regulation of recreation use is minimal. Travel is cross-country or by use of low density trail systems (Forest Plan III 185-191).

1.1.8 Management Area 8C

*Emphasis on the protection and perpetuation of essentially natural biophysical conditions inside wilderness boundaries.* Solitude and a low level of encounters with other users or evidence of past use are not essential parts of the setting (Forest Plan III 185-191).
1.1.9 Management Area 9A

**Emphasis on riparian area management.** Resource use would be managed to protect and maintain the riparian area. Vegetation treatment would enhance plant and animal diversity. Primitive, semi-primitive non-motorized, semi-primitive motorized, roaded natural and rural recreation opportunities can be provided. This prescription applies to all riparian areas located anywhere on the Forest, except those in wilderness, research natural areas, and special interest areas (Forest Plan III 207-222).

1.1.10 Management Area 9E

Provides needed water impoundments where beneficial effects are demonstrated and water rights have been obtained. Provides for recreation developments and wildlife habitat (Forest Plan III 223-230).

1.2 Purpose and Need for Action

This EA is required per Public Law 104-19 (Rescission Bill), which directs the Forest Service to develop and adhere to a schedule for National Environmental Policy Act analysis to evaluate commercial livestock grazing and permitting on an allotment management level.

The purpose of this project is to develop and apply commercial livestock management that is consistent with the goals, objectives, standards, and guidelines for the Forest Plan, as amended. The Forest Service rangeland allotment management process calls for periodic review of allotment conditions and management practices.

The purpose and need were developed by comparing the existing conditions to the desired conditions for the allotments to identify any need for change (action).

1.3 Management History

Domestic livestock grazing has occurred on the analysis area for over 100 years, even prior to designation as National Forest System lands. Early permitted commercial livestock grazing was loosely regulated and management usually consisted of an “on” and “off” date. In the past 50 years, management has continuously improved and evolved, addressing issues such as rangeland condition, wildlife habitat needs, watershed and riparian health, and other resource user needs. Likewise, resource conditions have generally improved as stocking rates have been adjusted to more closely reflect carrying capacity and multiple use demands.

Over the last 100 years, there have been many social, economic, and ecological influences that have resulted in the vegetation communities that occur on the Forest today.

Allotment Management Plans (AMPs) have been in place on these allotments for many years. The following chart displays the 60 year trend of actual stocking for the five allotments. The AUM figure for each decade is the total of actual use for all five allotments. (Figure 1.1)
1.4 Desired Conditions

Desired conditions for the allotments are derived from the Forest Plan, Watershed Conservation Practices Handbook, scientific information, and interdisciplinary team input. Desired conditions provide a future vision for the area and can help develop management options for the project area over time (Forest Service Handbook 2209.13, Chapter 90, 93.3a).

The desired conditions for this analysis are tied to the key issues identified in Section 1.7 and address rangeland health; watershed conditions, to include riparian areas, wetlands, and stream bank conditions; wildlife and wildlife habitat; and goods and services. The Proposed Action is designed to maintain and/or move these resources toward the desired conditions.

**Desired condition for rangelands**

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. 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 toward desired conditions.

The goals from the Forest Plan (Forest Plan III 8) for rangelands are:

---Develop, protect, and manage the range resource (as authorized by the basic laws, Secretary’s regulations, Forest Service policy, and the Chief’s and Regional Forester’s goals and objectives) to maintain it in fair or better condition status with an upward trend.

Other 1986 Forest Plan direction includes:

---Provide for grazing of commercial livestock to maintain dependent existing livestock industry.

General direction and standards and guidelines are found in the Forest Plan in Chapter III, pages 53 through 59.

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**Desired conditions narrative:** The dominant cover types on the Shoshone continue to be grasslands, Douglas fir, spruce/fir, lodgepole pine, and whitebark pine. Cover types of aspen, willow, and sagebrush have increased over 2009 levels as disturbance processes reverse the encroachment of conifer on those cover types.

Vegetation conditions continue on upward conditions and trends. Proper utilization of upland vegetation is followed to maintain adequate ground cover to protect soil productivity.

Riparian vegetation is supportive of hydrologic functions and good water quality. Vegetation in riparian areas is composed of a diverse structure of native plant communities that perpetuate the distribution of woody debris, soil cover, bank stability, aquatic habitat, and shading characteristics of resilient riparian ecosystems. Ground cover is typically comprised of organic litter, shrubs, grasses, and forbs. Riparian vegetation composition and structure are similar to what would be expected with natural disturbance processes and varies by ecotype. Vegetation displays a mosaic of successional stages and age classes that sustain the range of riparian communities over time.

Region 2 sensitive plant species are maintaining or increasing in number of occurrences. Habitat is monitored for potential impacts.

Existing occurrences of terrestrial invasive species are declining. New outbreaks of terrestrial invasive species are neither established nor spreading to adjacent lands. Livestock grazing contributions to terrestrial invasive species introduction and spread are minimized.

Desired plant community selection is crucial to effective rangeland planning. Desired plant community (Table 1.4) is part of the overall desired condition developed by the interdisciplinary team. 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 (USDA Forest Service, R2 Rangeland Analysis and Management Training Guide 1996). Desirable plant species/upland vegetation types and characteristics are derived from Grassland and Shrub land Plant Associations of the Shoshone National Forest (S.J. Tweit and K.E. Houston (1980); Forest Habitat Types of Eastern Idaho-Western Wyoming (Steele et.al., 1983); Riparian and Wetland Plant Community Types of the Shoshone National Forest (Walford et al. 2001); and Ecological Types of the Eastern Slope of the Wind River Range (Wells, 2008).
<table>
<thead>
<tr>
<th>Community Type</th>
<th>Desired Conditions/ Desired Plant Community</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upland Grasslands</td>
<td>Mixed native grass and forb communities provide a diverse mosaic of plant species, a variety of vegetation structures, and effective ground cover (not more than 5-20% bare ground depending on soil type) to maintain soil and watershed stability. Maintain the quality of desired plant communities by managing for native species. Primary native graminoid species may include Agropyron (wheatgrass), Carex (sedge), Festuca (fescue), Poa (bluegrass) and Koeleria (june grass). Forb species may include Balsamorhiza (Balsamroot), Lupinus (lupine) and Achillea (yarrow). Shrub species may include Artemisia (sagebrush) and Potentillia (cincofoil). Noxious weeds should be less than 2% of the species composition.</td>
</tr>
<tr>
<td>Alpine Grasslands</td>
<td>Manage and maintain mixed native alpine communities to provide a diverse mosaic of plant species, a variety of vegetation structures, and effective ground cover to maintain soil and watershed stability. Primary species include alpine bluegrass, alpine avens, various sedges, tufted hair grass, kobresia, spike trisetum, sheep fescue, and various cushion plants. Management directions should account for short growing seasons, shallow soils, and low site productivity.</td>
</tr>
<tr>
<td>Sagebrush</td>
<td>Manage and maintain mixed native shrub lands communities that provide a diverse mosaic of plant species, a variety of vegetation structures, and effective ground cover to maintain soil and watershed stability. Sagebrush taxa may include black, mountain, Wyoming, and basin Big sagebrush. Other shrubs include Bitterbrush, cinquefoil, fringed sage, and rabbit brush. Graminoids include Blue bunch wheatgrass, Idaho fescue, June grass, Indian rice grass, various sedges, and king fescue.</td>
</tr>
<tr>
<td>Riparian Communities</td>
<td>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, and maintain stream bank stability. Plant species may include Carex spp. (sedges), Juncus spp. and Scirpus spp. (rushes), and desirable riparian grass species (ex: Deschampsia and Calamagrostis (reed grass)). In shrubland systems, plant species include Salix spp. (willows). 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. Streambanks should be mostly stable consistent with the potential of the site.</td>
</tr>
<tr>
<td>Aspen</td>
<td>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 are present. Aspen shoots are present and develop into saplings over time.</td>
</tr>
</tbody>
</table>
**Desired condition for water, soil, and riparian areas**

The 1986 Forest Plan contains many goals (Forest Plan III 6-10). Of these goals, the following directly relate to management of water, soil and riparian areas. Broad goals for water, soil and riparian areas are (Forest Plan III 8):

--- Maintain or improve soil productivity and water quality (Forest Plan II-8)
--- Maintain or restore the inherent biological, physical, and aesthetic values of riparian ecosystems (Forest Plan III-8)
--- Protect wetlands, riparian areas and floodplains (Forest Plan III-9)
--- Meet state water quality standards (Forest Plan III-9)
--- Increase water yield while maintaining water quality (Forest Plan III-9)

Other 1986 Forest Plan direction includes:

--- Improve or maintain water quality to meet state water quality standards
--- Design and implement activities in management areas to protect and manage the riparian ecosystem.

**Desired conditions narrative:** Desired conditions were developed in conjunction with the Forest Plan Revision and are summarized below (USDA, 2009).

Watersheds are characterized as having high geomorphic, hydrologic, and biotic integrity relative to natural potential. Vegetation and ground cover maintain good hydrologic function. Soil quality characteristics—soil depth, structure, organic matter, and nutrients—provide for vegetation growth.

Erosion and sedimentation are within the expected natural range for frequency, duration, and intensity. Disturbed areas are not connected to streams, lakes, or wetlands. All ground water and surface waters meet state water quality standards to fully support State of Wyoming designated uses. Watersheds support favorable conditions of water flow to fully support multiple uses, biological resources, and a range of flows that transport sediment and maintain natural channel dimensions.

Base flows support riparian vegetation and in-stream needs. Streams are in dynamic equilibrium with their water and sediment supplies. Streams retain their ability to transport sediment, they neither aggrade nor degrade, and the floodplain is accessible when stream flows are above bankfull level. Periodic floods are the primary disturbance factor shaping stream channel structure and vegetation patterns. Flood timing and duration follow expected patterns based on amount of precipitation, season, aspect, elevation, and upland vegetation condition. High flows exceeding bankfull discharge for a short number of days at least every one to two years and provide for flood dependent vegetation and channel maintenance.

Floodplains and water tables dissipate floods and sustain the natural timing and variability of water levels in riparian, wetland, and meadow habitats. Wetland habitats (springs, seeps, ponds, lakes, bogs, etc.) remain intact and properly functioning with natural water flow patterns. Fens support the features and functions inherent to these special habitats. The hydrologic function and integrity of fens, along with the surrounding sub-watersheds, are maintained.
Desired condition for goods and services and open space

The 1986 Forest Plan contains many goals (Forest Plan III 6-10). Of these goals, the following directly relate to providing goods and services related to commercial livestock grazing. A broad goal for goods and services from the 1986 Forest Plan (Forest Plan III 8) is:

---Provide for grazing of livestock to maintain dependent existing industry.

Desired conditions narrative: Goods and services, including commercial livestock grazing and animal unit months, provided by or derived from the Shoshone contributes to social, economic, and/or ecological sustainability. These goods and services provide important contributions to the sustainability and growth of local communities.

Forest watersheds provide water of good quality to support the surrounding communities, existing water rights, and forest resources.

Rangeland conditions are maintaining or improving over time, providing forage for commercial livestock and habitat for wildlife, while maintaining soil productivity. Commercial livestock grazing provides forage for ranch operations and contributes to local economies. Forage availability for local ranches helps support ranch operations, which in turn helps maintain open space adjacent to the Forest, which is integral to meeting desired conditions and maintaining the economic and social sustainability of local communities.

1.5 Proposed Action

The action proposed by the Shoshone National Forest (Alternative 2) to meet the purpose and need is to continue to permit livestock grazing by incorporating adaptive management on all five allotments to meet Forest Plan 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, and wildlife habitat relative to livestock grazing.

The Proposed Action is designed to maintain or improve resource conditions in rangeland health, vegetation, watershed conditions, and wildlife habitat relative to livestock grazing. The Proposed Action includes five allotments totaling 66,525 acres; a total of 2695 animal unit months (AUMs).

The proposal includes one allotment on the Clarks Fork Ranger District; two allotments on the Greybull District; and two allotments on the Washakie Ranger District.

All adaptive management actions would be within the scope of effects documented in this environmental assessment or a supplemental NEPA document, and decision as appropriate. Allotment specific actions and range improvement projects are proposed, they are described in more detail in Section 2.4.

1.6 Public Involvement

The proposal was listed in the schedule of Proposed Actions since January 1, 2010. Scoping and a 30-day comment period were initiated February 2, 2010. Five comment letters were received, including comments from local governments (Hot Springs and Pop Agie Conservation Districts, Fremont County government), State agencies (Wyoming Game and Fish Department and Wyoming Department of Agriculture) and permittees. Comments are discussed below as part of the issue section and copies of the letters are found in the project file.

1.7 Issues

The key issues are those issues that the decision maker needs to consider in selecting an alternative. The key issues include major issues as defined in NEPA regulations (40 CFR
1500.4[1]) that are used in the development of alternatives to the Proposed Action. Guided by the Forest Plan, the IDT developed project design features and alternatives to the Proposed Action to address the key issues, comments, and concerns identified during scoping (see Appendix B). A brief description of the key issues identified for this project follows:

**Key Issues**

Key issues relative to commercial livestock grazing center on: *How to maintain or improve resource conditions for rangeland health and vegetation diversity, watershed conditions, wildlife habitat and open space, and goods and services.* These issues were used to develop design criteria and adaptive management actions.

**Issue 1-Rangeland Health**

*What effect will the proposed grazing strategies have on rangeland health and vegetation diversity? How will the Forest Service maintain or move toward desired conditions for upland and riparian vegetation, including controlling invasive species, and maintaining wildlife habitat?*

There is concern about the possible direct, indirect, and cumulative effects of commercial livestock grazing on rangeland health and vegetation diversity and possible effects to other resources. Specifically, comments and concerns are:

- The Wyoming Department of Agriculture (WDA), wrote that they are in support of the continuation of livestock grazing by incorporating adaptive management techniques on the allotments in order to meet Forest Plan direction. They encourage a discussion of using livestock as a tool to achieve natural resource objectives, such as improving wildlife habitat and support utilizing and developing range improvement projects to achieve healthy rangelands for the benefit of both livestock and wildlife.

- WDA does not support a no grazing alternative. To adequately assess vegetation and commercial livestock grazing, data detailing forage and browse utilization is needed.

- Local governments strongly desire to see AUM stocking rates maintained at the current level, recognizing that, the current AUM stocking rates are well below the historically established highs. As such, the EA should document the historically established stocking rates and clearly demonstrate that the current rates are substantially lower. In addition to supporting the continuation of existing levels of grazing, local governments want to be fully informed and involved in any proposals such as changes of class of livestock, season of use, and restrictions on range improvement maintenance, use, or new construction.

- In similar past proposals, permittees have commented, with an emphasis on the strong tradition of conservation and stewardship that guides their grazing practices. The well-documented grazing practices on the Forest allotments demonstrates sound range management, preservation of wildlife, and a cooperative relationship with the Forest Service to preserve and enhance these lands. Efforts include riders with the herd, salt locations, riparian area protection, stream bank stability, willow growth, and proper distribution of animals for proper utilization of range forage.

- In the past, local Conservation Districts emphasized their work to support and assist other entities in providing for continued livestock grazing on public lands and to improve rangeland and riparian health in partnership with their local, state, and federal agencies. They have supported the use of livestock as an important
tool for vegetation management and recommend that grazing permits be reissued.

- Numerous articles, editorials, research, and guides regarding grazing management were submitted by Western Watersheds Project (WWP), Pinedale, Wyoming (project file). Some of the literature presents opposing views, downplaying the importance of livestock grazing on public lands to local economies and the number of jobs provided by federal lands grazing. WWP contends that livestock grazing competes with other uses of public lands, including clean water, recreation, and wildlife habitat and that these other uses are important to local economics.

**Issue 2-Water, Soil and Riparian**

*What effect will the proposed grazing strategies and range improvements (such as fences) have on watershed health?* There is concern about the possible direct, indirect, and cumulative effects of commercial livestock grazing on watershed health. Specifically, comments and concerns are:

- How to reduce soil disturbance (erosion and compaction) and maintain or improve bank stability, in order to improve stream health, riparian ecosystem condition, and aquatic habitat?
- What grazing management actions would improve and protect watershed conditions to provide the water quality and quantity and soil productivity necessary to support ecological functions and intended beneficial water uses?

**Issue 3-Wildlife and Wildlife Habitat**

*What effect will the proposed grazing strategies have on wildlife and wildlife habitat? How will the Forest Service maintain or move toward desired conditions for upland and riparian vegetation, including controlling invasive species, and maintaining wildlife habitat? How can conflicts between commercial livestock use and wildlife be reduced? How can conflicts with predators such as wolves and grizzly bears be reduced?* There is concern about the possible direct, indirect, and cumulative effects of commercial livestock grazing on wildlife habitat. Specifically, comments and concerns from Wyoming Game and Fish Department (WGFD) are:

- Comments specific to the north zone were that the Sugarloaf and Washakie Needle allotments provide elk calving and summer range for the Gooseberry elk herd unit (EL214). We recommend that forage allocations for elk continue to be considered. Based on our summer observations of these areas, it appears forage production is sufficient for supporting both livestock and elk. One site-specific area of concern has been the confluence of Slaughter Creek and the East Fork of the Sugarloaf allotment. Based on our summer observations in 2007 and 2008, livestock forage use was heavy in this area, particularly within the open meadows and the riparian area of the East Fork.

- Aquatic considerations pertain to the north zone. Game and Fish recommended that the EA stress the importance of best grazing practices in all allotments, but particularly those that encompass South Fork Owl Creek and Rock Creek that have been found to contain Yellowstone cutthroat trout. Riparian areas in these drainages are extremely vulnerable to overgrazing resulting in reduced stream channel stability and increased sediment discharge.

- On the south zone, comments identified both Bayer Mountain and Middle Fork allotments as containing crucial winter range for elk, moose, and bighorn sheep, and have designated elk parturition areas. In Bayer Mountain, a series of
prescribed burns and other treatments have been initiated in this allotment; livestock use should be carefully monitored to allow vegetation recovery goals and objectives to be attained following treatments. In Middle Fork allotment, livestock use should be monitored to avoid overuse of important riparian and aspen habitats. Mule deer and elk use of the lower end of this allotment has increased dramatically, thus a review of big game seasonal ranges by Game and Fish and possible revision of some seasonal ranges is scheduled for 2010.

- Both Bayer Mountain and Middle Fork allotments have bighorn sheep populations that are presently at a very low level, but if greater separation from domestic sheep can be accomplished throughout the southern Wind River Mountains, the possibilities of a supplemental transplant remains. Therefore, we (WGFD) recommend no domestic sheep be permitted in these allotments to prevent potential disease transmission issues with existing bighorns, and to avoid unnecessary conflicts.

- Wyoming Game and Fish commented that they support the Forest in its efforts to improve resource conditions through careful monitoring and potential adjustment of grazing use to reduce potential impacts. If adjustments are made, we (WGFD) recommend they be made to season of use and/or utilization rates that will result in improved opportunity for vegetation re-growth following grazing.
**Issue 4-Goods and Services and Open Space**

*What effect will the proposed grazing strategies have on the agricultural industry and grazing permittees?* Specifically, comments and concerns are:

- Grazing on public lands represents a vital economic value to agricultural producers and to local communities. Commercial livestock grazing is an essential component of the multiple use and sustained yield mandate under which the USFS manages the Shoshone National Forest. This mandate is supported by local government policy contained in local plans such as the Fremont County Land Use Plan/Natural Resource Land Use Plan.

- These allotments are essential to many ranch operations, as they utilize summer pasture off the ranch in order to raise winter feed for their cattle.

- In the past, the contention of the local Board of County Commissioners and local conservation districts that mitigation measures intended to alleviate conflicting resource utilization, can be used effectively to maintain the productivity of the federal lands; and therefore, avoid detrimental affects upon the local economies. Livestock grazing is an important part of the local economy because producers not only raise food and fiber for others, but they live here and spend money on groceries, fuel, clothing, schools, utilities, taxes, etc. They are supportive of issuing commercial livestock grazing permits on the five affected allotments.

- Some comments pertain to commercial livestock grazing and economic impacts; the contention is that livestock grazing represents irreplaceable environmental and social values. These values contribute valuable and irreplaceable wildlife habitat, open spaces, ranchland buffers between federal lands and developments, scenic vistas, and the traditional image and heritage of the historical rural landscapes of Wyoming and the West. Losses of these essential environmental, historic, and social values of livestock grazing to users and visitors of the area and residents of impacted communities should be included in the EA scope.

**1.8 Decision Framework/Decision to Be Made**

An EA is not a decision document. The purpose of this EA is to disclose the effects and consequences of the Proposed Action and alternatives and to solicit public input. The responsible line officer would make a decision based on consideration of the purpose and need for the project, the effects of the alternatives, and public involvement. The responsible official must decide:

- Whether to implement the Proposed Action or the no action alternative. The decision would be documented in a decision notice that would be issued no sooner than 30 days after the EA is distributed for public review and comment.
- Whether to prepare an environmental impact statement. If the environmental analysis indicates to the decision maker that impacts associated with the alternatives are not major, then the responsible official would make a finding (Finding of No Major Impact, 40 CFR 1508.13) that allows the action to proceed without performing an environmental impact statement. Also, whether site-specific Forest Plan amendment(s) are required for implementation, the nature of the amendment(s), and whether the amendment(s) would be a major change to the Forest Plan.

**1.9 Maps**

Maps for the five allotments, with key monitoring and trend transect locations are found in Appendix D.
Chapter 2 Alternatives

2.1 Alternatives Considered but Eliminated from Detailed Study

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 the reasons summarized below:

**Forage Reserves**– Term grazing permits would not be issued on the five allotments but instead be used for replacement forage (forage reserves) 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 and until such time this alternative is not feasible. Environmental effects under this alternative would be similar to the Proposed Action since livestock grazing would continue to be permitted on an intermittent basis.

**Current Management**– Current management is meeting the stated purpose and need, those management practices have been incorporated into the Proposed Action. Monitoring and adaptive management needs are incorporated into the Proposed Action as described in Section 2.4.

2.2 Alternatives Considered and Analyzed in Detail

2.3 Alternative 1 – No Action

Under the No Action alternative (No Grazing), no commercial livestock grazing would be permitted on any of the five allotments under consideration in this EA. This alternative would require the cancellation of all grazing permits upon implementation of the decision and resolution of any appeals. This alternative could not be implemented until one year after the notification of each affected permittee (Forest Service Handbook R2 ID 2209.13, Section 16.13 and 36 CFR 222.4(A0 (7) (8)).

The no grazing alternative will always be fully developed and analyzed in detail. No Action is synonymous with “no commercial livestock grazing” and means that commercial 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 cattle guards not needed for management of allotments sharing common boundaries would eventually be removed (Forest Service Handbook 2209.13, Chapter 90, section 94.1, R2 ID of 12/19/2005).

2.4 Alternative 2 – Proposed Action

Alternative 2 is the Proposed Action; under this alternative livestock grazing would be permitted on the five allotments under an adaptive management system designed to meet desired conditions (Forest Service Handbook 2209.13, Chapter 90, 93.3g). The project design/design features are an integral part of the Proposed Action alternative.

Adaptive management is the “the process of making use of monitoring information to determine if management changes are needed, and if so, what changes, and to what degree” (Quimby,
It is a process that allows for dealing with uncertainty and changing conditions over time. This alternative focuses on the end results of meeting or moving toward desired conditions for the resources influenced by grazing as opposed to detailing specific seasons of use, permitted livestock numbers, and grazing rotations.

Monitoring would be used by the Forest Service to make adjustments to management as needed to ensure adequate progress toward the defined conditions.

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 adaptive management actions to be taken if resource conditions do not move toward or maintain the desired conditions in an acceptable timeframe.

The maximum allowable forage utilization would range from 35-50% depending on the vegetation type, current range conditions, livestock management, and other resource needs (Forest Plan III 118-123).

Monitoring would occur over time with evaluation of the results being used by the rangeland management specialist and/or interdisciplinary team and the district ranger to determine what adjustments, if necessary, are needed to ensure adequate progress toward or maintenance of desired conditions.

All adaptive actions would be within the scope of effects described in this document, or a supplemental NEPA document and decision will be prepared as appropriate.

Using the list of possible adaptive grazing management options displayed in Table 2.1, the interdisciplinary team developed a specific Proposed Action for each allotment.
Table 2.1. List of possible grazing adaptive management options used to develop the Proposed Action (Alternative 2) for the five commercial livestock grazing allotments.

<table>
<thead>
<tr>
<th>Possible Grazing Management Options</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CHANGE SEASON OF USE</strong>- (i.e. implement a different grazing system, and/or change number of pastures (deferred rotation, more pastures, rest-rotation, short-duration grazing, etc.) to meet resource objectives on the allotment.</td>
</tr>
<tr>
<td><strong>CHANGE LIVESTOCK NUMBERS</strong>- (within permitted AUMs)- i.e. change the permitted livestock number and season of use until demonstrated progress toward desired future condition is made (as evidenced by monitoring and inventory data)</td>
</tr>
<tr>
<td><strong>CHANGE LIVESTOCK CLASS</strong>- i.e. change in class of livestock (cow/calf pairs, dry cow, yearling) – do not exceed permitted AUMs</td>
</tr>
<tr>
<td><strong>ADJUST GRAZING INTENSITY/DURATION</strong>- i.e. implement specific dates of use or nonuse to protect areas of concern</td>
</tr>
<tr>
<td><strong>ADJUST LIVESTOCK HERDING to MANAGE SPECIFIC AREAS of CONCERN</strong>- i.e. use of range rider (herding) to aid in livestock distribution and help reduce predation</td>
</tr>
<tr>
<td><strong>REST SPECIFIED AREAS FROM LIVESTOCK GRAZING OR ENACT NON-USE FOR RESOURCE PROTECTION</strong>- i.e. utilize forage reserve allotments or implement pastures non-use years to address resource concerns or conflicts with predators or otherwise alter periods of use/non-use.</td>
</tr>
<tr>
<td><strong>RESTRICT OR DISCOURAGE LIVESTOCK GRAZING IN SPECIFIED AREAS</strong>- i.e. adjust how a pasture is used, exclusion of a pasture, use of range improvement projects, encourage livestock grazing in specified areas, discourage use in specified areas such as alpine, use herding to achieve management objectives, adjust pasture or allotment boundaries</td>
</tr>
<tr>
<td><strong>CREATE, MODIFY, OR REMOVE ALLOTMENT INFRASTRUCTURE (fences)</strong>- i.e. construct fence to exclude livestock from areas of concern (springs, seeps, riparian, R2 sensitive species sites, species of local concern, heritage site, or other). Construct permanent fence to influence livestock distribution, Use temporary electric fence for short-term control of livestock distribution, Remove (permanent or temporary) fence to influence livestock distribution</td>
</tr>
<tr>
<td><strong>CREATE, MODIFY, OR REMOVE ALLOTMENT INFRASTRUCTURE (water developments)</strong>- i.e. Use water to control livestock distribution: control availability of developed water sources to control livestock distribution, 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)</td>
</tr>
<tr>
<td><strong>ADJUST PASTURE OR ALLOTMENT BOUNDARIES</strong>- i.e. split or combine allotments.</td>
</tr>
</tbody>
</table>

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 maintain or move toward the desired condition. 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.
Each of these allotments is summarized in the Range Section 3.1 of Chapter 3, including allotment summary information; current stocking rate; currently permitted kind, class, numbers, and season of use; resource condition and trend; and conflicts with other users.

**Project Design Features for the Proposed Action**

Project design features (PDFs) that apply to all five allotments include incorporation of best management practices (BMPs) and would apply to Alternative 2. They include the State of Wyoming Range BMPs, the State of Wyoming Water BMPs, and the R2 Watershed Conservation Handbook (Appendix C).

Based on the issues identified through public comment on the Proposed Action, the Forest Service developed the following design criteria for all allotments under the action alternatives.

- Acceptable type of livestock to be grazed is cattle or horses. Acceptable classes of livestock are cow, cow/calf, yearling and pack and saddle stock.
- Allowable utilization will range from 0-50% based on Forest Plan standards and guides (Forest Plan III 53-III-56)
- Maintain existing range improvements as assigned in the term grazing permits.
- Water developments will incorporate practices that sustain both the needs of spring ecosystems as well as the off-site water. This could include only utilizing water when the allotment is occupied. Fencing the spring source and habitat may also be necessary depending on the distance to the off-site water.
- Ground disturbing activities such as installation of water developments, pipelines, fences or enclosures may require additional environmental analysis if not covered in this document; heritage resources and sensitive species surveys would be required prior to construction.
- Reconstruct/replace existing range improvements as their useful life expectancy is amortized or to respond to natural disasters.
- Evaluate range readiness and adjust turn-on date as needed. Range readiness is defined as: the stage of plant growth at which grazing may begin under a specific management plan without permanent damage to vegetation or soil (Society of Range Management). Range readiness indicators used on the SNF are found in Appendix E.
- Evaluate utilization and adjust pasture move dates and move-off dates based on allowable use standards (Forest Plan III 53-III-56).
- Locate new livestock/wildlife water sites out of riparian communities when feasible.
- Use salting to influence livestock distribution patterns. Do not salt within ¼ mile of water sources, eligible heritage sites, or developed recreation sites
- Tribes will be notified if culturally major artifacts or burial sites are found during project implementation.
- When long-term drought situations occur, range permittees would be notified in writing that reductions in season of livestock numbers may be anticipated.
Defer wildfire or prescribed burn areas from livestock grazing for a portion or all of the following two growing seasons to ensure regrowth of forage species.

All Allotments

The following project design features would be implemented for commercial livestock grazing permits:

Range improvement projects (allotment infrastructure-fencing) are part of the Proposed Action and adaptive options, and include these design criteria to lessen potential impacts:

- Locate new livestock/wildlife water sites out of riparian communities when feasible.
- Construct new permanent water development to influence livestock distribution (dugouts/ponds, wells, pipeline, tanks, pump, solar)
- Construct fence to exclude livestock from areas of concern (springs, seeps, riparian, Region 2 sensitive species sites, species of local concern, heritage sites, or other)
- Construct permanent fence to influence livestock distribution

Further design criteria for any ground disturbing activities such as installation of water developments, pipelines, fences or enclosures, and spring developments should:

- Consult Shoshone National Forest hydrology staff prior to construction,
- Give consideration to groundwater dependent ecosystems (springs, wetlands, perennial channels, riparian areas) and groundwater dependent flora and fauna downstream of spring source,
- Assess other alternatives that provide protection to ecosystem structure (i.e. divert water from a perennial stream, which receives it’s flow from multiple groundwater sources, rather than divert a spring that feeds a single ground-water dependent ecosystem),
- Complete heritage resources and sensitive species surveys prior to construction.

Spring developments should protect the source area from trampling (i.e. fencing during grazing season), pipe water to an upland water tank, and use automatic shut-off valves that stop the flow once the water tank is filled. Only a small portion of the total discharge should be diverted to a stock water tank, to ensure survival of the downstream ground-water dependent ecosystem. All water rights shall be obtained in the name of the landowner, the U.S. Forest Service.

All fences need to be repaired and maintained in order to provide the desired results.

To reduce indirect effects from artifact collection, and increase resource protection awareness, all grazing permits would include Archaeological Resource Protection Act (ARPA) and Code of Federal Regulation (CFR) specific language.

Currently, each grazing permit includes general language about the protection of cultural resources. The permits would include discussion more specific to ARPA violations and repercussions, as well as possible actions permit holders may take when encountering cultural resources.

The following is to be incorporated into the grazing permits:

Heritage Sites, including Archaeological Sites and Historic Structures:

It is prohibited to collect surface artifacts, gather surface artifacts into piles, dig into, excavate, disturb, injure, destroy, and in any way knowingly damage any prehistoric, historic, or archaeological resource, structure, site, artifact, or property.

Information about cultural resources (e.g., archaeological sites) is confidential and not to be released to the general public (36 CFR 296.18).
Applicable laws and Codes of Federal Regulation are found in the cultural specialist report.

Cultural Resource Discoveries:

In the event that cultural resources are discovered during any allotment or livestock management activities (e.g., herding, improvement maintenance), care shall be exercised by the permittee and the Forest Service to ensure that such finds are not disturbed.

The permittee shall inform authorized Forest Service personnel of discoveries as soon as possible. Permit holders should not hesitate to report historic and prehistoric finds to the forest’s archaeologist, range conservationists, district rangers and law enforcement officers. The Forest Service shall work expeditiously to implement procedures to evaluate the significance of discoveries. If the cultural resource(s) is determined to be significant, the Forest Service shall prescribe and implement appropriate actions(s) to preserve or conserve the resource(s). The permittee shall not continue with any activity that may disturb the discovery until permission to proceed is received from the Forest Officer.

It is possible that not all cultural resource discoveries will be discovered in the kind of disturbing context discussed above. Permit holders are encouraged to relay information about cultural resources they may find while participating in any grazing-related activity on forest.

Permit holders are encouraged to take photographs and identify find locations on maps or use Geographic Positioning System (GPS). Once discoveries have been identified by the agency, they can be properly documented, researched, and incorporated into site stewardship programs. Permit holders are encouraged to become site stewards to help protect and monitor archaeological and historical sites on the forest.

Violation of the applicable Acts and Codes of Federal Regulations may result in the cancellation of the grazing permit. Figure 2.2 is a summary of the Proposed Action, including current and proposed management, and AUMs.
<table>
<thead>
<tr>
<th>Allotment</th>
<th>Current Management</th>
<th>Adaptive Management Options</th>
<th>Specific Proposed Actions for the allotment - Implement adaptive grazing management practices as monitoring dictates to maintain or move toward meeting desired conditions.</th>
<th>AUMS</th>
</tr>
</thead>
</table>
| Little Rock, Sugarloaf and Washakie Needles | Modified Deferred-Rotation System with active herding | ✓ Change season of use  
✓ Change livestock numbers  
✓ Intensify livestock herding  
✓ Change livestock class  
✓ Rest specified areas  
✓ Restrict livestock grazing in specified areas  
✓ Adjust pasture or allotment boundaries  
✓ Infrastructure/developments (Little Rock only) | None planned at this time | Little Rock-256  
Sugarloaf-810  
Washakie Needles-549 |
| Bayer Mountain                | Grazed as one of six pastures in a Modified Deferred rotation system with no more than 177 AUMs planned. This allotment is part of the Red Canyon CRM. (Coordinated Resource Management) with full time rider for herding. | ✓ Change season of use  
✓ Change livestock numbers  
✓ Intensify livestock herding  
✓ Change livestock class  
✓ Rest specified areas  
✓ Restrict livestock grazing in specified areas  
✓ Infrastructure/developments  
✓ Adjust pasture or allotment boundaries | None planned at this time | 177 |
| Middle Fork                  | Four pasture Modified Deferred-Rotation System with active herding | ✓ Change season of use  
✓ Change livestock numbers  
✓ Intensify livestock herding  
✓ Change livestock class  
✓ Rest specified areas  
✓ Restrict livestock grazing in specified areas  
✓ Infrastructure/developments  
✓ Adjust pasture or allotment boundaries | None planned at this time | 903 |

*Table 2.2. Summary of the Alternative 2-Proposed Action, including current and proposed management, including permitted AUMs.*
2.5 Monitoring and Monitoring Plan(s)

Rangeland monitoring and analysis on the Forest are focused on rereading Parker 3-Step long term trend transects and overlaying them with Cover Frequency and Sample Point protocol in accordance with the Region 2 Rangeland Analysis and Management Training Guide (USDA 1996). Short term or “annual use” and additional trend monitoring are accomplished with methods from the Wyoming Rangeland Monitoring Guide. These methods include, but are not limited to, photo points, photo transects, landscape appearance utilization for both browse and herbaceous species, stubble height and herbage, ungrazed residual forage measurements, greenline stability, cover by life form, and grazing response index. These methods are primarily implemented by Rangeland Management Specialists and/or permittees.

Additionally, an interdisciplinary team, including botany, wildlife, soils, hydrology, fisheries and rangeland management specialists, perform best management practice reviews annually on two allotments. The results of these monitoring efforts have identified some localized areas of concern where isolated upland sites have exceeded use standards, stream bank trampling appears excessive, and riparian shrubs are decadent or not regenerating. However, these problems are localized in nature with long term rangeland and riparian trend data showing most areas are healthy and support diverse plant communities improving toward or meeting desired conditions.

All of the key areas established on the Little Rock, Sugarloaf, Washakie Needles, Middle Fork and Bayer Mountain allotments are either meeting or moving towards desired conditions under the existing management. The monitoring plans and maps for these allotments are included in Appendix D.

Recommended Monitoring for Soil Resources

**Little Rock:** Monitor cheatgrass populations in prescribed and wildfire areas as needed.

**Sugarloaf and Washakie Needles:** Monitor livestock use of alpine habitat. Rangeland monitoring and analysis and utilization studies would continue for long term trend transects as described above for range monitoring. Monitoring and survey for R2 sensitive plants is needed.

**Middle Fork:** Rangeland monitoring and analysis and utilization studies would continue for long term trend transects as described above.

**Bayer Mountain:** Monitoring of ground cover and species composition is needed to assure that range condition is improving given the amount of erosion pavement and bare ground recorded in range transect data.

Recommended Monitoring for Watershed Resources


**Watershed Conservation Practices Handbook, 2509.25 (WCPH):** This includes applicable standards and design criteria in Chapter 10 of Forest Service Handbook 2509.25 – Watershed Conservation Practices Handbook (FSH 2509.25). This handbook provides practices to protect water, soil, aquatic, riparian, wetland, and floodplain
systems. Appendix C presents a summary of the standards and design criteria, as well as monitoring needs. These standards and design criteria meet the requirements of the Best Management Practices in the Wyoming Nonpoint Source Management Plan per a 2006 memorandum of understanding between the Forest Service and Wyoming Department of Environmental Quality.

Project design features (PDFs) have been selected from the Watershed Conservation Practices Handbook (WCPH) to reduce the effects of the action alternative(s) to provide for watershed conservation. The objectives of PDFs are to: 1) conserve the ability of watersheds and riparian areas to absorb water, filter sediment, and sustain stream channel integrity, 2) restore and maintain the long-term inherent productive capacity of the soil, and 3) sustain water quality and aquatic habitat in each aquatic ecosystem, unless excepted by law.

It is Forest Service policy to: 1) apply conservation practices to sustain healthy ecosystems, 2) adopt a stewardship ethic that treats land and resources as public assets for long-term benefits, and 3) temper land and resource use to conserve limited resources for future generations. The PDFs are designed to be an integral component of the project design to meet the project objectives and associated policies.

2.6 Climate Change

The two perspectives from which to discuss climate change concepts and concerns are:

- How climate change will be affected by the proposed land management practices
- How will climate change likely affect conditions on the planning unit/project area

Relative to the question of effects of the proposed land management practices on climate change; global standards and thresholds for greenhouse gas emissions and sequestration do not yet exist, thus there is no context from which to determine “significance” of project impacts at the scale of the proposed action. Greenhouse gas mixing in the global atmosphere also make it currently impossible to determine indirect effects of emissions from the proposed action of permitting five cattle allotments, affecting approximately 66,525 acres.

On the issue of climate change effects on livestock grazing and the land unit, climate change science is refining predictive change scenarios using vegetation, precipitation and temperature modeling. The Shoshone National Forest is currently participating in a case study with the Rocky Mountain Research Station. Outputs from this case study will include area-specific analysis of predictive models as well as synthesis of past temperature, precipitation and vegetation trends, which in combination are used to describe trends (Tredennick and Joyce, in review).

With the continued refinement of global models and more specific regional climate input, the ability to ascertain and understand climate change will only improve with time. In particular, there is always the question of time scale; how soon and what is the expected rate of climate change and its manifestations (i.e. disturbance regimes). Relevant climate change science and literature review, physical processes and the interpretation of climate change effects are summarized in a recent article (Bakke, 2009).

At this time, and given the time scale of the proposed action (10 year permitted action period) climate change impacts to the planning unit and proposed action are too uncertain to assess in any meaningful way.

One of the most critical tools and approaches that can apply to climate change assessment at this time is the application of monitoring and adaptive management principles, which aligns precisely with the Proposed Action.
2.7 Summary of Effects Analysis

Available trend and monitoring data have shown that these range allotments (Little Rock, Sugar Loaf, Washakie Needles, Bayer Mountain and Middle Fork) are meeting or moving towards desired conditions. Desired conditions include healthy and functioning streams and riparian habitats, sufficient forage production for both cattle and wildlife, and a high level of species diversity of grasses and forbs. In some allotments, there are some specific areas of concern where changes in management will be required to improve conditions.

The following section (Table 2.3) summarizes the effects analysis. Please refer to the Chapter 3 for additional detail.
### Table 2.3. Summary table of effects

<table>
<thead>
<tr>
<th>Issue</th>
<th>Alt. 1- The No action alternative (no grazing)</th>
<th>Alt. 2 – Proposed Action alternative (adaptive management)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Issue #1- Rangeland Health</td>
<td>This alternative would require the cancellation of all grazing permits upon implementation of the decision and resolution of any appeals. 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 stream banks 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.</td>
<td>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. 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. If any of the proposed adaptive management options 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 year’s advance notice prior to implementation of the decision. Adaptive management options such as change season of use, change livestock numbers, change livestock class, adjust livestock grazing intensity/duration, herding, rest, restrict livestock grazing in specified areas, and range developments are summarized in Table 3.1.11.</td>
<td>This alternative allows managers to address issues and degraded areas by allowing greater flexibility in management.</td>
</tr>
<tr>
<td>Water-shed-Issue #2-Water, Soil and Riparian</td>
<td>Alternative 1 would be beneficial to watershed resources due to the removal of livestock grazing. Effects of livestock grazing would be removed and all resources would begin to move toward a more natural state. The rate and duration of this reversal would vary and depend on the size and location of effect. Riparian area soil and vegetation would be the first to show signs of reversal, while streams and aquatic habitat would follow.</td>
<td>Most of the allotments are meeting or trending toward desired conditions. Alternative 2 would perpetuate that trend and maintain enough winter range for elk and deer after the livestock has grazed. Continuing livestock grazing with adaptive management would be more beneficial for elk and deer, as it allows more opportunities to fix problem areas and maintain better forage conditions. Under this alternative, a better balance may be achieved from one year to the next between cattle and ungulate grazing as management will be more flexible.</td>
<td></td>
</tr>
<tr>
<td>Wildlife-Issue #3-Wildlife and Wildlife Habitat</td>
<td>Removal of livestock from these allotments could lead to an increase in the level of wildlife use on adjacent lands. 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.</td>
<td></td>
<td>This alternative would impact ranching and goods and services some, but grazing permits and current management would continue; helping to sustain the local communities’ social and economic viability. Commercial livestock grazing on the Shoshone sustains ranches and helps maintain open working private landscapes and wildlife habitat. Forest allotments are important to ranch operations as part of multiple pasture rotation. Many cattle ranches depend on summer pasture off the ranch in order to raise winter feed for the livestock.</td>
</tr>
<tr>
<td>Issue #4- Goods and Services and Open Space</td>
<td>There would be no permit(s) issued for commercial livestock grazing. This alternative would impact ranching and goods and services the most; affecting the social and economic sustainability of local communities. Commercial livestock grazing on the Shoshone sustains ranches and maintains open working private landscapes and wildlife habitat, Alternative 1 would increase the risk of loss of open space and wildlife habitat on private ranches.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Chapter 3  Affected Environment and Environmental Consequences

This chapter summarizes the biological, physical, social, and economic environments and the effects associated with implementation of an alternative. It also presents the scientific and analytical basis for comparison of alternatives.

Only resources the interdisciplinary team determined to be affected are analyzed, and detail is provided commensurate with amount of information needed to understand effects.

The effects discussions presented in this chapter are summaries of information from the resource specialists and their field work, meeting participation and input into the document. The summaries focus on the resource issues and purpose and need discussed in Chapter 1.

In general, the time period over which effects are projected for the analysis is 10 years, the length of the grazing permit period, unless otherwise noted.

3.1 Rangeland Management

Affected Environment

Table 3.1.1 shows the five grazing allotments in the Proposed Action, the existing condition/affected environment, and the key areas being monitored to evaluate meeting the need for action and moving toward the desired conditions. Key areas are an area of rangeland selected because of its location, grazing or vegetation value. It serves as a monitoring and evaluation point for range condition, trend, or degree of grazing use. Properly selected key areas give an indication of the overall acceptability of current grazing management to meet all resource management objectives. A key area guides the general management of the entire area of which it is a part. For this analysis, key areas can be located on uplands, in riparian, along streams and in winter range (See Appendix D for maps of key areas).

Table 3.1.1. Affected environment summary of existing condition, trends and status of monitoring transects for key areas.

<table>
<thead>
<tr>
<th>Allotment</th>
<th>Existing Condition- Trend and/or monitoring data show rangeland resources are generally meeting or moving toward desired conditions unless otherwise noted.</th>
<th>Key Area</th>
<th>Status of Key Area (DC = Desired Condition)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Little Rock</td>
<td>Trend and monitoring data show rangeland resources are within the parameter of desired conditions. Forage utilization data collected in 2008 showed levels well below allowable levels. Parker 3-Step data is scheduled to be collected in 2010.</td>
<td>Northwest</td>
<td>Meeting/Moving Towards Desired Condition</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Northeast</td>
<td>Meeting/Moving Towards Desired Condition</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Duck Pond</td>
<td>Meeting/Moving Towards Desired Condition</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Gulch</td>
<td>Meeting/Moving Towards Desired Condition</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Canyon</td>
<td>Meeting/Moving Towards Desired Condition</td>
</tr>
<tr>
<td>Location</td>
<td>Monitoring Data</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-------------------</td>
<td>-----------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sugarloaf</td>
<td>Trend and monitoring data show rangeland resources are within the parameter of desired conditions. Of interest is the Parker 3-Step transects trend data. Of the six transects located and re-read in 2009 only one was in an area of major cattle use. The other five were in portions of the converted sheep allotments, areas only lightly utilized by cattle. Of the six transects only the one most utilized by cattle showed an increase in plant density and decreased litter and bare soil. The other five transects in areas lightly utilized by cattle all showed a decrease in plant density and a large increase in litter. All ten sites studied showed good plant vigor and species composition.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Campbell FS</td>
<td>Meeting/Moving Towards Desired Condition</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Campbell BLM</td>
<td>Meeting/Moving Towards Desired Condition</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lower North Fork</td>
<td>Meeting/Moving Towards Desired Condition</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Upper North Fork</td>
<td>Meeting/Moving Towards Desired Condition</td>
<td></td>
<td></td>
</tr>
<tr>
<td>East Fork</td>
<td>Meeting/Moving Towards Desired Condition</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Slaughter Cr.</td>
<td>Meeting/Moving Towards Desired Condition</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blanchet Cr.</td>
<td>Meeting/Moving Towards Desired Condition</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Location</th>
<th>Monitoring Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Washakie Needles</td>
<td>In 2008 the three permanent Parker 3-Step transects were scheduled to be re-read and replaced with cover frequency transects. The original stakes could not be found so the cover frequency transects were established as close as possible within the same vegetation type. Based on the data collected and comparison of the transect photographs the rangeland resources appear to be within the parameter of desired conditions.</td>
</tr>
<tr>
<td>Needles</td>
<td>Meeting/Moving Towards Desired Condition</td>
</tr>
<tr>
<td>Dome Mtn.</td>
<td>Meeting/Moving Towards Desired Condition</td>
</tr>
<tr>
<td>East Rock Cr.</td>
<td>Meeting/Moving Towards Desired Condition</td>
</tr>
<tr>
<td>West Rock Cr.</td>
<td>Meeting/Moving Towards Desired Condition</td>
</tr>
<tr>
<td>Lower Rock Cr.</td>
<td>Meeting/Moving Towards Desired Condition</td>
</tr>
<tr>
<td>Needle Cr.</td>
<td>Meeting/Moving Towards Desired Condition</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Location</th>
<th>Monitoring Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bayer Mountain</td>
<td>There were no long-term transects established back in the 1950’s or 1960’s on the Bayer Mountain allotment as was usually done. Many of the key grazing areas have been inspected over the last fifteen years for ocular utilization with results at or below utilization standards. A photo transect was installed in 2008 and a landscape appearance (ocular utilization) was done with results at 33%. The allotment was rested in 2009.</td>
</tr>
<tr>
<td>Bayer Spring (BM 1)</td>
<td>Meeting/Moving Towards Desired Condition</td>
</tr>
<tr>
<td>Bayer Slope</td>
<td>Permanent transect to be installed. Utilization in 2008 and 2009 has been from 20-30%</td>
</tr>
<tr>
<td>Canyon Creek</td>
<td>Permanent transect to be installed.</td>
</tr>
</tbody>
</table>
Two Parker 3-Step clusters were established in Upper Hudson Meadows and Pinto Park in 1960. The last reading was done in 2004 on in Upper Hudson Meadow. In 2007, a baseline transect was established in Bill’s Park using permanent photo points and cover by lifeform.

Utilization has been monitored on a regular basis since 2004. Utilization percentages are between 15% and 25% and rarely reach over 30%. Allowable use is 40 -50% in riparian areas and 45 – 55% in uplands. Based on information from cover-frequency overlain on Parker 3-Step, Cover by lifeform and photo transects, trend in vegetative cover and composition are stable to upward. The overall trend for this allotment is upward.
Site-specific Range Allotment Analysis: Little Rock Cattle and Horse Allotment

Affected Environment

Total Acres: 4,901
Suitable Acres: 2,545
Acres per AUM: 9.9
Number of AUMs: 256
Acres of Big Game Winter Range: 0
Fence: 5.2 miles boundary, 3.75 miles interior
Water Developments: 5
Salt Grounds: 7

Figure 3.1.1. Actual commercial livestock use for the Little Rock allotment.

Resource Condition and Trend:
Trend and monitoring data show rangeland resources are within the parameter of desired conditions. Forage utilization data collected in 2008 showed levels well below allowable levels. Parker 3-Step data is scheduled to be collected in 2010. Livestock use trends are shown in Figure 3.1.1.

Conflicts with other Resources and Forest Users:
None have been documented in the past 20 years.
Currently Permitted:

<table>
<thead>
<tr>
<th>Permit</th>
<th>Season of Use</th>
<th>Livestock Numbers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Little Rock Creek Cattle and Horse Allotment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type</td>
<td>On Date</td>
<td>Off Date</td>
</tr>
<tr>
<td>Term</td>
<td>16-May</td>
<td>31-Oct</td>
</tr>
<tr>
<td>Totals</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 3.1.2. Permit data.

Background and Current Stocking and Management:
As recent as 1961 the area now encompassing the Little Rock Creek Allotment was a part of the Face of the Mountain Cattle and Horse Allotment. After it was separated out several cross fences were constructed and a rotational rest grazing system was initiated. This system is still in place and involves resting one of the five pastures every year.

A summary of permit information is shown in Figure 3.1.2.

In order to improve livestock distribution and make better use of the allotment five water sources have been developed.
Site-specific Range Allotment Analysis: Sugarloaf Cattle and Horse Allotment

Affected Environment

Total Acres: 21,944 (includes off-forest acres)
Suitable Acres: 3,999
Acres per AUM: 4.9
Number of AUMs: 810
Acres of Big Game Winter Range: 0
Fence: 0.25 miles boundary, 0.1 miles interior
Water Developments: 0
Salt Grounds: 10

Figure 3.1. Actual commercial livestock use for the Sugarloaf allotment.

Resource Condition and Trend:
Trend and monitoring data show rangeland resources are within the parameter of desired conditions. Of interest is the Parker 3-Step transects trend data. Of the six transects located and re-read in 2009 only one was in an area of significant cattle use. The other five were in portions of the converted sheep allotments, areas only lightly utilized by cattle. Of the six transects only the one most utilized by cattle showed an increase in plant density and decreased litter and bare soil. The other five transects in areas lightly utilized by cattle all showed a decrease in plant density and a significant increase in litter. All ten sites studied showed good plant vigor and species composition. Five transects were not located so trend data for those are not available. Livestock use trends are shown in Figure 3.1.2.
**Conflicts with other Resources and Forest Users:**
Minor predation losses to grizzly bears and high altitude disease have occurred in the past 20 years.

**Currently Permitted:**

<table>
<thead>
<tr>
<th>Sugarloaf Allotment</th>
<th>Season of Use</th>
<th>Livestock Numbers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Campbell’s Inc.</td>
<td>On Date: July 1</td>
<td>Off Date: Sept. 30</td>
</tr>
<tr>
<td>Term Grazing Permit</td>
<td># Days: 92</td>
<td>Cow/calf: 150</td>
</tr>
<tr>
<td>Term Private Land Grazing Permit</td>
<td># Days: 92</td>
<td>Dry Cow: 40</td>
</tr>
<tr>
<td>Term BLM Grazing Permit</td>
<td># Days: 92</td>
<td>Yearling: 10</td>
</tr>
<tr>
<td>Total</td>
<td># Days: 92</td>
<td>Horse:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Bull:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>AUMs: 607</td>
</tr>
<tr>
<td></td>
<td></td>
<td>AUMs: 162</td>
</tr>
<tr>
<td></td>
<td></td>
<td>AUMs: 40</td>
</tr>
<tr>
<td></td>
<td></td>
<td>AUMs: 810</td>
</tr>
</tbody>
</table>

*Figure 3.1.4. Permit data.*

**Background and Current Stocking and Management:**
In 1968 this allotment was converted from sheep to cattle with a reduction of approximately 200 AUM’s. A small BLM Allotment (3-Peaks) and an adjacent parcel of private land were added to the management of the allotment in 1996. Rangeland analysis supported a stocking level of 150 cow/calf pair on the Forest, 40 pair on the private land and 10 pair on the BLM. As interest and demand for domestic sheep grazing on the forest fell a number of adjacent sheep and goat allotments became vacant. With no livestock management on these areas and few if any fences separating them cattle drift became an issue. Rather than create an administrative problem with unauthorized use the East Fork Sheep and Goat allotment was converted to authorize cattle grazing and deal with any incidental drift that might occur. Under the most recent Allotment Management Plan the pastures in the East Fork Allotment have been included in the grazing schedule creating an eight pasture deferred rotation system. As there are few interior fences, pastures are separated only by geographic barriers. Rather than a hard and fast pasture rotation schedule, movement is more of a drift, dictated by annual vegetative conditions and allowable utilization. A summary of permit information is shown in Figure 3.1.4.
Site-specific Range Allotment Analysis: Washakie Needles Cattle and Horse Allotment

Affected Environment
Total Acres: 7772  
Suitable Acres: 3112  
Acres per AUM: 6.8  
Number of AUMs: 549  
Acres of Big Game Winter Range: 1050  
Fence: 3 miles boundary, 0.2 miles interior  
Water Developments: 0  
Salt Grounds: 5

Figure 3.1.5. Actual commercial livestock use for the Washakie Needles Cattle and Horse Allotment.

Resource Condition and Trend:
In 2008 the three permanent Parker 3-Step transects were scheduled to be re-read and replaced with cover frequency transects. The original stakes could not be found so the cover frequency transects were established as close as possible within the same vegetation type. Based on the data collected and comparison of the transect photographs the rangeland resources appear to be within the parameter of desired conditions. Livestock use trends are shown in Figure 3.1.5.

Conflicts with other Resources and Forest Users:
Minor predation losses to grizzly bears and high altitude disease have occurred in the past 20 years.
**Currently Permitted:**

<table>
<thead>
<tr>
<th>Washakie Needles Allotment</th>
<th>Season of Use</th>
<th>Livestock Numbers</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>On Date</td>
<td>Off Date</td>
</tr>
<tr>
<td>High Island Ranch</td>
<td>11-Jul</td>
<td>30-Aug</td>
</tr>
<tr>
<td>Term Grazing Permit</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Figure 3.1.6. Permit data.**

**Background and Current Stocking and Management:**
Prior to 1971 the Washakie Needles Allotment was permitted for sheep grazing under a herder system. A single term grazing permit authorized a band of 1200 ewes with lambs from July 16th to September 10th for 684 AUM’s. In 1971 the allotment was converted to cattle grazing, combined with the adjacent South Fork of Owl Creek allotment and a permit for 240 head of cow/calf pairs was issued from July 16th to August 30th for 486 AUM’s. The allotment is currently managed in a modified deferred rotation grazing system, utilizing five pastures. There are few interior drift fences so pastures are separated only by geographic barriers. Cattle are generally drifted through the pastures with movement determined by annual conditions and desired vegetative utilization. A summary of permit information is shown in Figure 3.1.6.
Site-specific Range Allotment Analysis: Middle Fork Cattle and Horse Allotment

Affected Environment

Total Acres: 50573
Suitable Acres: 27184
Acres per AUM: 30.1
Number of AUMs: 903
Acres of Big Game Winter Range: 954.2
Fence: 5.4 miles of Boundary, 0.3 miles of interior
Water Developments: 4
Salt Grounds: 9

Figure 3.1.7. Actual commercial livestock use for the Middle Fork Cattle and Horse Allotment.

Resource Condition and Trend:
Past assessments indicate that Shoshone Basin was an area of concern where livestock were having an adverse impact on the streambank and channel morphology. Since 2001, non-use and different management for the allotment has limited grazing in Shoshone Basin from 25 to 45 days and grazing utilization has been at 30%. Livestock use trends are shown in Figure 3.1.6.

Two Parker 3-Step clusters were established in Upper Hudson Meadows and Pinto Park in 1960. The last reading was done in 2004 in Upper Hudson Meadow. In 2007, a baseline transect was established in Bill’s Park using permanent photo points and cover by lifeform.

Utilization has been monitored on a regular basis since 2004. Utilization percentages are between 15% and 25% and rarely reach over 30%. Allowable use is 40 –50% in riparian areas and 45 –55% in uplands. Based on information from cover-frequency overlain on Parker 3-Step, Cover by
lifeform and photo transects, trend in vegetative cover and composition are stable to upward. The overall trend for this allotment is upward.

**Conflicts with other Resources and Forest Users:**
The Middle Fork is a major corridor for recreationist to access much of the high country and specifically the Cirque of the Towers. The grazing permittee is well aware of the high visibility and grazes the allotment with these people in mind. To this specialist’s knowledge, there have been no negative confrontations or problems since 2004 when the current permittee started using the allotment. Livestock are kept out of Sinks Canyon during the “One Shot” sight in during September.

**Currently Permitted:**

<table>
<thead>
<tr>
<th>Allotment Name</th>
<th>Acres</th>
<th>Management</th>
<th>Dates and Permitted Use</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Middle Fork</td>
<td>27,184</td>
<td>Modified Deferred Rotation</td>
<td>160 C/c 60 yearlings from 6/16 - 9/30 903 AUMs</td>
<td>Term Grazing permit Ron &amp; Becky Weber</td>
</tr>
</tbody>
</table>

**Figure 3.1.8. Permit data.**

**Background and Current Stocking and Management:**
The Middle Fork allotment is located approximately five miles southwest of Lander, Wyoming. This allotment is comprised of 27184 acres of National Forest System (NFS) lands. Currently this allotment has a modified deferred rotation use with four pastures. Grazing is authorized under a term grazing permit with a total of 160 cow/calf pairs and 60 yearlings permitted to graze from June 16 to September 30. Since 2001, full to partial non-use has been approved due to drought and livestock numbers have been from 85 cow/calf pairs and 19 yearlings in 2004 to 109 cow/calf pairs and 37 yearlings in 2009.

A summary of permit information is shown in Figure 3.1.8.

The allotment is drained by the Middle Fork of the Popo Agie River into the Wind River off Forest. The allotment is well watered by the Middle Fork and there are approximately 217 acres of riparian within the suitable range with the majority of the riparian moving towards desired condition. There is one developed spring on Fairfield Hill, one on Seventy Six spring and two developed springs on Timber Top.
Site-specific Range Allotment Analysis: Bayer Mountain Cattle and Horse Allotment

Affected Environment

Total Acres: 5275
Suitable Acres: 2511
Acres per AUM: 14.1
Number of AUMs: 177
Acres of Big Game Winter Range: 1441.71
Fence: 0 miles of Boundary, 0.87 miles of interior
Water Developments: 1
Salt Grounds: 3

![Bayer Mountain Cattle and Horse Allotment Livestock Use Trend](image)

*Figure 3.1.9. Actual commercial livestock use for the Bayer Mountain Cattle and Horse Allotment.*

Resource Condition and Trend:
The Bayer Mountain allotment is part of the Red Canyon Coordinated Resource Management (CRM). Past assessments indicate that suitable upland range is moving towards desired condition because of winter range forage being used during the dormant period and the summer livestock are under a deferred system of grazing that provides for adequate plant rest. This is due primarily to management practices started in 1995 by the Red Canyon CRM.

There were no long-term transects established back in the 1950’s or 1960’s on the Bayer Mountain allotment as was usually done. Many of the key grazing areas have been inspected over the last fifteen years for ocular utilization with results at or below utilization standards. A photo transect was installed in 2008 and a landscape appearance (ocular utilization) was done with results at 33%. The allotment was rested in 2009. Livestock use trends are shown in Figure 3.1.9.
Conflicts with other Resources and Forest Users:
The only conflict with other users that has surfaced in recent years is the increased ATV use. Gates have been left open, particularly during hunting season, allowing livestock into units already grazed. These situations are usually corrected within 24 hours due to the range rider on site daily.

Currently Permitted:

<table>
<thead>
<tr>
<th>Allotment Name</th>
<th>Acres</th>
<th>Management</th>
<th>Dates and Permitted Use</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bayer Mountain</td>
<td>5275</td>
<td>The whole allotment is grazed as 1 pasture of a 7 pasture modified deferred rotation</td>
<td>600 cow/calf sometime between 7/1 - 9/30 177 AUMs</td>
<td>Used in conjunction with Ed Young, South Pass and Maxon Basin grazing allotments</td>
</tr>
</tbody>
</table>

Figure 3.1.10. Permit data.

Background and Current Stocking and Management:
The Bayer Mountain allotment is located approximately 15 miles south of Lander, Wyoming and immediately north of the Little Popo Agie River. This allotment consists of 5275 acres and is currently grazed together with the Ed Young Basin, Maxon Basin and South Pass allotments to form a seven pasture modified deferred rotation system.

Currently a total of 600 pairs (the same livestock from the Ed Young Basin, Maxon Basin and South Pass Allotments) are permitted sometime between July 1 and September 30. Generally, 177 AUM’s are the most that are scheduled on Bayer Mountain during those dates. A summary of permit information is shown in Figure 3.1.10.

There is one developed spring on top of Freak Mountain along with two undeveloped springs that provide water for livestock, although a few seasonal and ephemeral water sources exist.
Environmental Consequences

Note: The following discussion of environmental consequences and effects applies to all five allotments unless otherwise noted.

Effects to Rangelands-Alternative 1

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

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 stream banks in areas that are currently accessible to cattle. There would no longer be browsing of riparian shrubs by livestock.

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 (Forest Service Handbook 2209.13, Chapter 70).

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 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. 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 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 (Manier and Hobbs 2007). 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 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).

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 stream banks 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.

No range improvement projects and ground disturbing activities such as installation of water developments, pipelines, fences or enclosures would occur under Alternative 1.

Any potential adverse livestock grazing effects to aquatic life from excessive sediment caused by stream bank damage and channel widening would begin to recover over time.

Also, any potential adverse livestock grazing effects to aquatic life and riparian ecosystems from changed flow regimes, riparian damage, and excessive sediment from trampling and channel widening or chemical loads from livestock would begin to recover over time. Rate of recovery would depend on the amount of past disturbance and ability of the habitat to recover. Migration barriers to aquatic life would not change.

**Effects to Rangelands-Alternative 2**

**Effects Common to All Allotments**

Monitoring key areas provides insurance to all other areas of the pasture and is a key part of the action 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. 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.

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 and habitat types. The use of livestock grazing as a resource management
tool would be available to improve the quality of wildlife habitat (Anderson and Scherzinger 19795), (Derner et al. 2009), (Davies et al. 2009), and (Severson 1990).

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 and 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 options 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 year’s advance notice prior to implementation of the decision. The general environmental consequences/effects of grazing management options for the Proposed Action alternative are discussed below and summarized in a comprehensive table (See Table 3.1.11).

**Change Season of Use, 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.

**Change Livestock Numbers/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.

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/options through adaptive management would improve grazing efficiency and reduce potential adverse effects on soil, riparian areas, and upland vegetation within the allotments that have specific areas that are not meeting desired conditions.

**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, thus reducing vegetation impacts. 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.

**Adjust Grazing Intensity/Duration-Alter Period of Use/Non-Use**

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 life forms (grasses, grass like, 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 and management considerations such as stream bank 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. Effects from 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 the livestock cannot 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.

**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. Effects resulting from the use of a rider include increasing the intensity of management of livestock and associated range improvements. Use of range riders has improved pasture integrity, reduced the level of predation by grizzly bears and wolves, reduced conflicts with other users of the Forest, improved distribution, and reduced 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).

**Allotment Infrastructure-Use Water to Control Livestock Distribution**

In a pasture with multiple water sources, if one area is approaching allowable use while other areas are underutilized 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.

**Allotment Infrastructure-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.

Under the adaptive management alternative, there would be greater flexibility to address any potential adverse livestock grazing effects to aquatic life and riparian ecosystems from excessive sediment caused by stream bank damage, channel widening, changed flow regimes, riparian damage and excessive sediment from trampling or increased chemical loads from livestock.

Migration barriers to aquatic life would not change. Rates of recovery would depend on the amount of past disturbance, the measures implemented and ability of the affected habitat to recover. Addressing potential adverse livestock grazing effects would include range improvement projects for the affected allotments, the effects are described below.

This alternative allows managers to more rapidly and effectively address watershed resource issues than the current existing management. Alternative 2 allows managers an increased ability to adaptively manage livestock grazing. Managers can implement and evaluate different management measures and strategies, where current management is more restrictive in management options.

By following the design criteria in Section 2.4, impacts from fence building are reduced to the extent possible. However, livestock have the tendency to walk along fences 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 (EPA 2003). However, 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.

The effects of installing pipelines 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 hoof shear in stream banks. 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.

During construction or reconstruction, fencing or 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 would be minimal and would not have a negative effect on any of the streams within the allotment. Fencing off the springs, streams, and parts of the associated riparian area or other adaptive management techniques identified through monitoring would have a positive effect. i.e installing fences around springs would decrease the stream bank trampling and hummocks around the springs. Also, it would decrease the utilization on the riparian species near the springs and cause an 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 off spring areas. Sediment input is expected to be minimal and should not be moving downstream outside of the allotment boundary.

Exclusion fences around springs or streams would have a positive effect by decreasing the trampling and hummocks that is occurring around the spring or stream. Also, building exclusion fences is expected to help allow deciduous vegetation, including willow regeneration. Building 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 potential willow regeneration within the fenced area.

In summary, there would be positive effects on springs, streams, aquatic life, and riparian areas from range improvement projects implemented as described with proper installation, repair and maintenance.

Under this alternative, riparian areas may be able to recover from current or past problems by incorporating improvement projects such as providing additional water sources to relieve stream pressure. There would still be potential for direct impacts from grazing. Overall there would be more tools with which to improve problem riparian areas and prevent new impacts from occurring.
Table 3.1.11. General effects of grazing options (adaptive management) are summarized below.

<table>
<thead>
<tr>
<th>Adaptive Management Options</th>
<th>Effects of Adaptive Management Option</th>
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<tbody>
<tr>
<td>✓ Change season of use (length of season not to be extended beyond permitted AUMs).</td>
<td>The season of use is changed every year for each pasture within the allotment. In general, grazing a pasture early in the season means that cattle will spend more time in warmer areas of the pasture (uplands), because soil temperature in our area drives bud growth in grasses. Early use of a pasture also means that once cattle leave, the plants have the rest of the grazing season to continue to grow and recover from the effects of livestock grazing. In general, when using a pasture in the middle of the season, livestock will spend a proportionately larger portion of time in riparian areas. Sedges and other riparian graminoids are in active growth phases (palatable) as compared to other areas of the pasture and livestock are seeking more water. Trampling is most likely to occur in the middle of the growing season when riparian use is highest. Plants will have had some time to grow prior to grazing and may have recovery time after grazing. In general, grazing a pasture later in the summer season or fall means that livestock will likely be changing forage preference and consuming those plants that are curing the slowest and retaining their nutritional value. Riparian graminoids will no longer be favored, and livestock uses will likely shift to upland grasses such as mountain muhly. As protein values drop in herbaceous plants, livestock may browse shrubs to some extent, depending on what else is available. If a particular pasture is showing negative effects related to a specific characteristic (i.e. – percent of mountain muhly is consistently decreasing), then management would be changed to graze that particular pasture early in the season or in mid-season, and to avoid grazing it when that it is susceptible to negative effects (i.e. -in the fall for mountain muhly - when livestock are most likely to graze this species.) Plants grazed later in the season have had the growing season to reproduce and store energy root systems. Avoiding an accumulation of negative effects is a key reason to continue to change the season of use for each pasture. Based on the information gathered from monitoring, we may require some pastures to always be grazed early, mid-season, or late season in order to avoid certain negative effects. But within a season, every effort would be made to change the dates from year to year within that period (i.e. pasture A needs to be grazed in the early season – in year 1, grazing is scheduled from June 1 to June 9, then in year 2, grazing is scheduled from May 15 to May 23). In other situations, we may continue to switch the season of use and dates of use yearly. Soils, vegetation and noxious weeds: soil productivity could negatively be affected by early season of use. If this early in the season is utilized, monitoring soil conditions would be recommended to identify areas of potential concern. Late season or fall use can increase the amount of erosion do to more exposure of bare ground. For sensitive plants, riparian and alpine vegetation could negatively be affected by early or late</td>
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seasons of use. Monitoring conditions would be recommended to identify areas of potential concern. Late season or fall use can increase the amount of bare ground which provides a seed bed for invasive plants. Livestock consume some invasive plants reducing seed development. Livestock can be a source of seed spread of plants such as hounds tongue.

Hydrology. As related to forage palatability, riparian areas and streambank stability could be affected.

Wildlife. Ground nesting birds could negatively be affected if season of use is too early. If this early in the season is utilized, spring bird surveys would be recommended to identify areas of potential conflict.

Late season or fall use could increase the chance of bear/livestock conflicts as grizzly bears prepare for winter hibernation by looking for high protein food sources.

<table>
<thead>
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<th>Change livestock numbers – (within permitted AUMs).</th>
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<tr>
<td>Change livestock numbers – (within permitted AUMs).</td>
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</table>

- **Decreasing numbers** during drought or other periods of low-precipitation helps to balance decreased production with decreased consumption. Fewer cattle also means that there is less competition between animals, so that may actually leave animals to be more selective about the forage that they consume – allowing them to “take the best, and leave the rest”. Fewer cattle may lead to less trampling in riparian areas. Social interactions between fewer livestock may mean a tendency for them to stay grouped together and to not range as far (decreased distribution). **Increased numbers** may be warranted following years of above-average precipitation and production. Increased numbers may be beneficial if there are pastures needing a reduction in layers of previous years’ grass litter. Increased numbers increases the social interactions between individuals and groups of cattle. They may have more of a tendency to split into small groups and cover more ground (increased distribution). They may eat a wider variety of plants because of increased competition. Increasing numbers may lead to more significant or pronounced trampling effects.

Soils, vegetation and noxious weeds: Flexibility to current conditions generally has a positive effect on soil productivity and vegetation conditions. Increased numbers could have a negative effect.

Hydrology. Increasing or decreasing intensity could influence watershed condition, stream stability, flow regimes, sediment, and water quality.

Wildlife. Increased numbers could have a negative effect if used on areas that provide winter range for big game.

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<th>Change livestock class.</th>
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- **Pairs** of cattle (mother cow and her calf) may have more of a tendency to stay on the most productive parts of the range since the cow has to meet nutritional needs based on lactation. Pairs also tend to range less in some breeds, especially when calves are young. In general, **dry cows** (non-lactating animals) have a broader diet than pairs; they tend to range more and have lower input needs. Their nutritional requirements are lower than those for lactating cows or yearlings. **Yearlings** have the greatest tendency to roam which can be good for situations where improved distribution is desired. They have to meet higher nutritional requirements than dry cows because of their body
demands related to growth and energy expenditure in increased travel. The effects of stocking **bulls** are not discussed here, because stocking a herd of bulls would not be considered.

**Wildlife.** Switching to yearlings could increase the chances of bear/livestock conflicts as this age segment of the livestock population tends to lack the knowledge to avoid conflict that older cows acquire. Switching to yearlings could increase the chances of bear/livestock conflicts as this age segment of the livestock population tends to lack the knowledge to avoid conflict that older cows acquire.

| ✓ Adjust livestock grazing intensity and/or duration – (within permitted AUMs). | The general effects of **increasing grazing intensity** (more cows grazing in a smaller area, for shorter time periods) are to significantly increase the competition between cows and cause them to be less selective in their diets. This means they would eat a wider variety of plants – including those that are less palatable (grass plants with litter accumulations, or secondary range plants, or increasers [plants which increase under grazing pressure = less palatable species]). The higher intensity can also lead to increased trampling effects which may be negative in the case of riparian areas, or positive in the case of upland areas where organic matter is incorporated into the soil, increasing soil nutrition and assisting with the spread and germination of seed. The general effects of **decreasing grazing intensity** (lower numbers of cows grazing in larger areas, often for longer time periods) are to decrease competition between cows, making them more selective. It increases their choice of forages, likely allowing livestock to more freely graze decreasers (plants which decrease under grazing pressure = highly palatable species). Decreased grazing intensity may also allow livestock to remain in larger groups and range less. The effect of less travel and ranging would be increased livestock impacts in specific “favored” areas, including riparian areas and areas with highly palatable forages. **Soils, vegetation and noxious weeds:** Increased grazing intensity could have a negative effect on soil productivity if stocking rates are overestimated. Decreased grazing intensity could have a positive effect on soil productivity by increasing plant and litter cover and decreasing bare ground. **Hydrology:** Increasing or decreasing intensity could influence watershed condition, stream stability, flow regimes, sediment, and water quality. Increasing or decreasing intensity could influence watershed condition, stream stability, flow regimes, sediment, and water quality. **Wildlife:** Increased grazing intensity could have a negative effect if used on areas that provide winter range for big game. Decreased grazing intensity would have a positive effect if used on areas that provide winter range for big game. |
| ✓ Adjust livestock herding to manage specific areas of concern. | The effect of **using herding to discourage** livestock use in certain areas is totally dependent on the skill, knowledge, and application of technique by the herder. Done correctly (low-stress handling, consistent moving/dissuasion, movement to a quality |

|demands related to growth and energy expenditure in increased travel. The effects of stocking **bulls** are not discussed here, because stocking a herd of bulls would not be considered.

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Herding is highly effective at dissuading livestock from using areas of concern. The skills and abilities of the herder are directly tied to the effectiveness of this option. Herding can also be used to encourage livestock use in certain areas such as pockets of forage in areas distant from water or places where litter accumulations are high. The effects would be to move use from areas where livestock already have an established preference and impact into areas where there are little to no impacts. Herding spreads the use in an effort to better balance the impacts to resources from livestock grazing.

Soils, vegetation and noxious weeds: Using herding to achieve proper utilization has a positive effect on soil productivity by keeping livestock out of sensitive areas or noxious weed areas and increasing ground cover.

Hydrology: Livestock herding can minimize stream and riparian impacts at both the reach level and watershed level.

Wildlife: Using herding can have a positive effect on grizzly bears as human presence can deter bears from preying on livestock.

<table>
<thead>
<tr>
<th>✓ Rest specified areas from livestock grazing or enact non-use for resource protection.</th>
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<tbody>
<tr>
<td>Resting a specific area would provide at least a growing season (or longer, depending on what might be necessary) for plant, water, and soil resources to grow or function without the effects of livestock grazing. Plants would be able to grow, reproduce, and store energy in roots and biomass. Soil would not be disturbed by livestock, and water would not be consumed by cattle. Manure and urea from livestock would not be left by cattle. Seed dispersal relative to livestock will not take place. Litter will accumulate. These systems could function for as long as necessary without grazing in order to produce the desired conditions in those locations.</td>
</tr>
<tr>
<td>Soils, vegetation and noxious weeds: Resting specific areas for resource protection has a positive effect on soil productivity by increasing ground cover and decreasing potential disturbance.</td>
</tr>
<tr>
<td>Hydrology: Rest or non-use can improve impaired watershed conditions.</td>
</tr>
<tr>
<td>Wildlife: This would have the same, but short-term effect as discussed in the effects analysis for Alternative 1.</td>
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<thead>
<tr>
<th>✓ Restrict or discourage commercial livestock grazing in specified areas (does not apply to recreation and outfitter/guide livestock).</th>
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<tbody>
<tr>
<td>See effects above. Same as resting those areas. Restriction could be accomplished through annual operating instructions, herding, fencing, or whatever would accomplish a “no livestock grazing” zone.</td>
</tr>
<tr>
<td>Hydrology: Restricting use can improve watershed conditions, flow regimes, sediment in-puts, protect water resources, and water quality.</td>
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<table>
<thead>
<tr>
<th>✓ Use of a pasture.</th>
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<tr>
<td>Deciding to include a specific pasture in the rotation for a specific year subjects that pasture to some level of livestock grazing. The numbers, timing, duration, and intensity of grazing will all have an effect on the significance of including a pasture in the rotation. In general, forage will be consumed (plants that are relatively most palatable at the time, first), water will be consumed, livestock will step on soil, impressions will be left in wet soil, seeds will be dispersed, litter will be broken and consumed, and manure and urea will be spread across the landscape and incorporated into the soil in</td>
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</table>
### Exclusion of a pasture.

See effects of rest, above — but limit these effects to a single pasture. Resting a pasture usually means shifting that use to another pasture or pastures within the rotation. Hydrology. Pasture exclusion may benefit the specific pasture. Exclusion use can improve watershed conditions, flow regimes, sediment in-puts, source waters, and water quality.

### Create, modify, or remove allotment infrastructure.

**Developing water** provides a source of fresh drinking water for livestock and wildlife. The effects can be seen in benefits to animal health, increased distribution of animals, lessening animal impact in riparian areas, prevention of trampling, and spreading use across a larger area. Some of the negative effects of developing stock water are ground disturbance at the time of construction, potential impacts to the spring source site, and trampling around the tank. **Building temporary fence** would exclude cattle and to some extent, wildlife from using specific areas. If the fence is electric, it is fairly easy to install with very little ground disturbance, but frequent checking and maintenance is generally required. If the fence is in place for short periods of time, trailing along the fenceline is usually not an issue. The effects of **permanent fencing** to control livestock are trailing along the fenceline, especially if cattle can see places they want to go from that line; creating hazardous crossings or impediments to wildlife (especially ungulates); and allowing different levels of utilization of forages on either side of the fence. The effects of **routine fence maintenance** are due to travel along the fenceline with vehicles or pack animals, cutting of fallen trees using a chainsaw, and restringing down sections that wild ungulates may have become habituated to crossing. **Removing fence** may allow unimpeded movement of animals across a formerly established boundary. In the case of wildlife, this movement would likely be beneficial to them. In the case of livestock, they would no longer be under any sort of location control — but it is likely that the fence is no longer needed if it has been scheduled for removal. Removing fence would require vehicles to travel along the fenceline multiple times carrying loads. The impact would be compaction and visible trailing along the line.

**Soils, vegetation and noxious weeds**: Building new fence for resource protection or to improve livestock distribution generally has a positive effect on soil productivity and sensitive plants if placed properly and maintained. Hydrology. Allotment infrastructure generally benefits watershed health creating off-site water, and beneficial fencing. A negative effect may be the trailing associated with fence boundaries, including those established as riparian/stream exclosures. Wildlife. Building new fence can impede big game movement while removing fence when not being used for riparian protection, can have a positive effect on big game.

### Encourage livestock grazing in specified areas.

### Use herding to achieve management objectives.

See answer to “Adjust livestock herding to manage specific areas of concern.” above. Hydrology. Generally, herding improves range conditions and is an effective method for ensuring resource protection.
✓ Adjust pasture or allotment boundaries.

If necessary, these boundaries could be adjusted to include fewer acres than they currently contain. The pastures could be adjusted to make them larger or smaller than they currently are. Existing pastures could be subdivided to create additional pastures for rotation. The effect of adding pastures to the rotation by subdividing existing pastures would be to increase the relative concentration of livestock which would increase competition among individuals and groups for favored forages and broaden diet selectivity. Movement among livestock across the pasture would likely increase as well. Distribution would most likely be improved and longer periods of rest and deferment would allow plants in other areas more growth and energy storage.

Combining pastures would increase the area that livestock have to roam and forage within. This would allow livestock to become choosier in their diets and select only the best forages, remaining in the areas producing those plants to the likely exclusion of other areas. If additional riparian areas are added to the pasture as a result of combining pastures, that means that livestock use and impacts to these areas would be more evenly spread between several riparian habitats, effectively lessening the overall impact on all riparian areas affected by livestock within the combined pastures. The effect of adjusting the current pasture boundaries would have either the effect of relatively concentrating the use, or relatively decreasing the use – both of which have been described above. The effect of changing the current allotment boundary to include fewer acres would be similar to any effects where use is concentrated relative to existing use, except in the case of deleting acres classified as unsuitable. Increasing the size of the allotment by encompassing additional acres is not an option that was included in the proposed action nor analyzed within this document.

Hydrology. This may or may not benefit watershed resources.
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3.2 Soils

Introduction/Background for Soils

Ecological Setting

According to the National Ecological Hierarchy (McNab, 1994b) the Shoshone National Forest is in the Southern Rocky Mountain Steppe - Open Woodland - Coniferous Forest - Alpine Meadow Section - M331. The Forest is further divided into thirteen subsections. These are the Beartooth Mountains M331Ah, North Absaroka Range M331Ag, Bighorn Basin M342Ad, Absaroka Sedimentary Mountains M331Ai, Northern Rocky Mountain Foothills 342Ac, Throughfare Plateau M331Ac, Absaroka Range M331Ad, South Absaroka Range M331Aj, Western Wind River Basin 342Fa, Wind River Mountain Flatirons M331Jb, Wind River Mountains M331Ja, Red Mountains -Liedy Uplands M331Da, and Green River Basin 342Ga. (Figure 1). Geology, climate, vegetation, and generalized soil information of these subsections can be found in Chapman and others (2003). Detailed soils information has been taken from the Shoshone National Forest Soil Survey Area 656 (NRCS 2008). Soil maps and map unit descriptions for each allotment are in the project files.

The allotment boundary determined the project area for the soils analysis.

Affected Environment (Soils)

The ecological setting for each allotment is described below:

Allotment Name: Little Rock

**Little Rock**: The Little Rock allotment is located in subsection M342Ad Bighorn Basin and M331Ah Beartooth Mountains. Soil map units, percent of allotment, soil families, and vegetation types are found in Table 3.2.2.

Table 3.2.2. Soil Map Units, Percent of Allotment, Soil Family, and Vegetation Types.

<table>
<thead>
<tr>
<th>Soil map unit</th>
<th>Percent of Allotment</th>
<th>Dominant Soil Families</th>
<th>Dominant Vegetation Types</th>
</tr>
</thead>
<tbody>
<tr>
<td>248</td>
<td>1.8</td>
<td>Fluvents, Fluvaquents</td>
<td>Riparian</td>
</tr>
<tr>
<td>312</td>
<td>31.5</td>
<td>Eutrocrepts, Haplocryolls, Rock outcrop</td>
<td>Subalpine series</td>
</tr>
<tr>
<td>315</td>
<td>.1</td>
<td>Rock outcrop, Rubble land, Eutrocrepts</td>
<td>Subalpine series</td>
</tr>
<tr>
<td>402</td>
<td>1</td>
<td>Cryofluvents, Cyaquolls, Cyaquuepts</td>
<td>Riparian</td>
</tr>
<tr>
<td>403</td>
<td>24.3</td>
<td>Twinadams, dry Thornburgh</td>
<td>Black Sage / Blue bunch wheatgrass</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Bluebunch wheatgrass / Sandberg’s wheatgrass</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Limber pine series</td>
</tr>
<tr>
<td>404</td>
<td>36.1</td>
<td>Twinadams, Geohrock Thornburgh</td>
<td>Black Sage / Blue bunch wheatgrass</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Wyoming Big Sage / Blue Bunch Wheatgrass</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Limber pine</td>
</tr>
<tr>
<td>405</td>
<td>5.1</td>
<td>Hopdraw, Rock outcrop</td>
<td>Bluebunch wheatgrass / Sandberg’s wheatgrass</td>
</tr>
<tr>
<td>W</td>
<td>.1</td>
<td>Water</td>
<td></td>
</tr>
</tbody>
</table>
**Allotment Name: Sugarloaf**

The Sugarloaf allotment is located in subsection M331Ad - Absaroka Range. Soil map units, percent of allotment, soil families, and vegetation types are found in Table 3.2.3.

*Table 3.2.3. Soil Map Units, Percent of Allotment, Soil Family, and Vegetation Types.*

<table>
<thead>
<tr>
<th>Soil map unit</th>
<th>Percent of Allotment</th>
<th>Dominant Soil Families</th>
<th>Dominant Vegetation Types</th>
</tr>
</thead>
<tbody>
<tr>
<td>102</td>
<td>.6</td>
<td>Cryaquepts, Cryaquolls, Cryofluvents</td>
<td>Graminoid riparian, Willow series, Coniferous riparian</td>
</tr>
<tr>
<td>104</td>
<td>.1</td>
<td>Arrowpeak, Midfork, Poin</td>
<td>Mountain big sage / Idaho fescue, Mountain big sage / Blue bunch wheatgrass, Idaho fescue / Blue bunch wheatgrass</td>
</tr>
<tr>
<td>110</td>
<td>.6</td>
<td>Eutrochrepts, Rock outcrop</td>
<td>Alpine series, Rock outcrop</td>
</tr>
<tr>
<td>111</td>
<td>36.9</td>
<td>Rubbleland, Rock outcrop, Eutrochrepts</td>
<td>Rubbleland, Rock Outcrop, Alpine series</td>
</tr>
<tr>
<td>112</td>
<td>3.6</td>
<td>Telay, Needleton, Shapphire</td>
<td>Subalpine fir / Common juniper, Subalpine fir / Heart leaf arnica</td>
</tr>
<tr>
<td>149</td>
<td>6.1</td>
<td>Guffey, Elena, Shadow</td>
<td>Douglas fir series, Subalpine fir series, Limber pine series</td>
</tr>
<tr>
<td>150</td>
<td>.4</td>
<td>Arrowpeak, Cowood, Sigbird</td>
<td>Mountain big sage / Idaho fescue, Douglas fir series, Limber pine series</td>
</tr>
<tr>
<td>251</td>
<td>8.5</td>
<td>Leavitt, McCort, Spanpeak</td>
<td>Mountain big sage / Idaho fescue</td>
</tr>
<tr>
<td>287</td>
<td>25.8</td>
<td>Hourglass, Kamack</td>
<td>Mountain big sage / Idaho fescue, Limber pine series</td>
</tr>
<tr>
<td>295</td>
<td>17.2</td>
<td>Presa, Garlet, Owl creek</td>
<td>Subalpine fir / Heart leaf arnica, Subalpine fir / Common juniper</td>
</tr>
<tr>
<td>401</td>
<td>.1</td>
<td>Riverwash, Cryofluvents</td>
<td>Tall willow series</td>
</tr>
</tbody>
</table>
Allotment Name: Washakie Needles

The Washakie Needles allotment is located in subsection M331Ad - Absaroka Range. Soil map units, percent of allotment, soil families, and vegetation types are found in Table 3.2.4.

Table 3.2.4. Soil Map Units, Percent of Allotment, Soil Family, and Vegetation Types.

<table>
<thead>
<tr>
<th>Soil map unit</th>
<th>Percent of Allotment</th>
<th>Dominant Soil Families</th>
<th>Dominant Vegetation Types</th>
</tr>
</thead>
<tbody>
<tr>
<td>102</td>
<td>.4</td>
<td>Cryauepts</td>
<td>Graminoid riparian</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Cryaquolls</td>
<td>Willow series</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Cryofluvents</td>
<td>Coniferous riparian</td>
</tr>
<tr>
<td>110</td>
<td>1.0</td>
<td>Eutrochrepts</td>
<td>Alpine series</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Rock outcrop</td>
<td>Rock outcrop</td>
</tr>
<tr>
<td>111</td>
<td>78.5</td>
<td>Rubbleland</td>
<td>Rubbleland</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Rock outcrop</td>
<td>Rock Outcrop</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Eutrocreyps</td>
<td>Alpine series</td>
</tr>
<tr>
<td>113</td>
<td>8</td>
<td>Eutrocreyps</td>
<td>Alpine series</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Humic</td>
<td>Rock outcrop</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Eutrocrepts</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Rock outcrop</td>
<td></td>
</tr>
<tr>
<td>171</td>
<td>1.5</td>
<td>Rock outcrop</td>
<td>Rock outcrop</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Charpeak</td>
<td>Subalpine fir series</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Cowood</td>
<td>Douglas fir series</td>
</tr>
<tr>
<td>190</td>
<td>.3</td>
<td>Cryaquolls</td>
<td>Alpine series</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Cryaquepts</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Eutrocreyps</td>
<td></td>
</tr>
<tr>
<td>295</td>
<td>10.3</td>
<td>Presa</td>
<td>Subalpine fir / Heart leaf arnica</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Garlet</td>
<td>Subalpine fir / Common juniper</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Owlcreek</td>
<td></td>
</tr>
</tbody>
</table>

Allotment Name: Middle Fork

The Middle Fork allotment is located in subsection M331Je Wind River sedimentary Mountains and M331Jd Eastern Wind River Mountains. Soil map units, percent of allotment, soil families, and vegetation types are found in Table 3.2.5.

Table 3.2.5. Soil Map Units, Percent of Allotment, Soil Family, and Vegetation Types.

<table>
<thead>
<tr>
<th>Soil map unit</th>
<th>Percent of Allotment</th>
<th>Dominant Soil Families</th>
<th>Dominant Vegetation Types</th>
</tr>
</thead>
<tbody>
<tr>
<td>12L</td>
<td>4.4</td>
<td>Lolo</td>
<td>Limber pine / Common juniper</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Rock outcrop</td>
<td>Douglas fir / common juniper</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Shumut</td>
<td></td>
</tr>
<tr>
<td>15L</td>
<td>3.5</td>
<td>Winspect</td>
<td>Mountain big sage / Blue bunch wheatgrass</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Kiev</td>
<td>Mountain big sage / Idaho fescue</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Bigsheep</td>
<td>Three tip sage / Blue bunch wheatgrass</td>
</tr>
<tr>
<td>302</td>
<td>.4</td>
<td>Cryaquepts</td>
<td>Riparian</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Cryaquolls</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Cryofluvents</td>
<td></td>
</tr>
<tr>
<td>302L</td>
<td>9.5</td>
<td>Moose River</td>
<td>Willow series</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Elvick</td>
<td></td>
</tr>
<tr>
<td>304L</td>
<td>7.8</td>
<td>Agneston</td>
<td>Alpine series</td>
</tr>
<tr>
<td></td>
<td></td>
<td>McCall</td>
<td>Rubbleland</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Rubbleland</td>
<td></td>
</tr>
</tbody>
</table>
### Allotment Name: Bayer Mountain

The Bayer Mountain allotment is located in subsection M331Je Wind River Sedimentary Mountains. Soil map units, percent of allotment, soil families, and vegetation types are found in Table 3.2.6.

**Table 3.2.6. Soil Map Units, Percent of Allotment, Soil Family, and Vegetation Types.**

<table>
<thead>
<tr>
<th>Soil map unit</th>
<th>Percent of Allotment</th>
<th>Dominant Soil Families</th>
<th>Dominant Vegetation Types</th>
</tr>
</thead>
<tbody>
<tr>
<td>12L</td>
<td>26.5</td>
<td>Lolo Rock outcrop Shamut</td>
<td>Limber pine / Common juniper Douglas fir / Common juniper</td>
</tr>
<tr>
<td>15L</td>
<td>21.3</td>
<td>Winspect Kiev Bigsheep</td>
<td>Mountain big sage / Blue bunch wheatgrass Mountain big sage / Idaho fescue Three tip sage / Blue bunch wheatgrass</td>
</tr>
<tr>
<td>302L</td>
<td>.4</td>
<td>Moose River Elvick</td>
<td>Willow series</td>
</tr>
<tr>
<td>309A</td>
<td>.1</td>
<td>Elwood Como Rock outcrop</td>
<td>Idaho Fescue series White bark pine / Elk sedge</td>
</tr>
<tr>
<td>309L</td>
<td>3.6</td>
<td>Ledgewood Como Targhee</td>
<td>Mountain big sage / Idaho fescue White bark pine / Elk sedge Lodgepole pine / Elk sedge</td>
</tr>
<tr>
<td>402L</td>
<td>2.8</td>
<td>Bullflat Caryville</td>
<td>Aspen / Sticky geranium Aspen / Rocky mountain dogwood</td>
</tr>
<tr>
<td>43L</td>
<td>29</td>
<td>Cloud Peak Redfist Frisco</td>
<td>Douglas fir / Oregon grape Douglas fir / Mountain maple Subalpine fir / Oregon grape</td>
</tr>
<tr>
<td>43LF</td>
<td>15.5</td>
<td>Como Agneston Rock outcrop</td>
<td>Lodgepole pine / Heart leaf arnica Lodgepole pine / Oregon grape Rock outcrop</td>
</tr>
</tbody>
</table>
Soils productivity
The soils of the Forest provide the medium for all plant growth and support base for all activities that go on in the Forest. Soils are products of natural processes and consist of minerals, organic matter, soil organisms, water and air. Principle soil-forming factors include: parent material (the mineral material), climate, landform, living organisms, and time.

In addition to natural processes, soils are affected by changes caused by human activities, such as road and trail construction/use, timber harvest, mining, and livestock grazing. Historically, even before Europeans arrived on the Shoshone Forest, the soil resource was subject to many of the same types of effects as can be found today, except to a lesser degree and less often.

Soil productivity takes into account five considerations; (1) soil compaction or rutting, (2) soil fertility and nutrient removal, (3) soil heating, (4) soil erosion and (5) regeneration potentials.

Regional guidelines for protecting the soil resource (FSH 2509.18-92-1) state that no more that 15% of an land area will be left in a detrimentally compacted, displaced, puddled, severely burned, and/or eroded condition. Of these considerations, compaction, soil erosion, and fertility are related to grazing. Soil heating and regeneration are not discussed further. Regeneration refers to tree seedling success after timber harvest. Soil heating refers to effects from wild and prescribed fire.

Grazing alpine vegetation by cattle is generally not considered desirable. Portions of alpine vegetation in Sugarloaf and Washakie Needles allotments have incidental cattle use.

The soil interpretations for each allotment are described below:

**Little Rock:** There are areas of shallow soils in soil map units 150, 161, and 162 where adequate ground cover needs to be maintained to protect soil productivity and reduce erosion.

**Sugarloaf:** There are areas of shallow soils in soil map units 104, 110, 111, and 150 where adequate ground cover needs to be maintained to protect soil productivity and reduce erosion. Alpine soil map units (110 and 111) are not considered desirable for cattle grazing.

**Washakie Needles:** There are areas of shallow soils in soil map units 110, 111, 113, and 190 where adequate ground cover needs to be maintained to protect soil productivity and reduce erosion. These map units contain areas of alpine soils which are not considered desirable for cattle.

**Middle Fork:** There are areas of shallow soils in soil map units 15L where adequate ground cover needs to be maintained to protect soil productivity and reduce erosion. Alpine soil map unit 304L is not considered desirable for cattle grazing.

**Bayer Mountain:** There are areas of shallow soils in soil map units 15L where adequate ground cover needs to be maintained to protect soil productivity and reduce erosion.

Soil compaction
Soils that contain a major portion of fine clay particles or clay loam can be easily compacted. In addition, water acts as a lubricant, letting soil particles compress together easier. As a result, wet conditions in clay soils cause compaction. Clay soils located in steep areas have slow permeability, causing rapid runoff and higher erosion hazard.
Soil compaction occurs when heavy pressure on the soil reduces pore space and closely packs particles in the soil. Most soil impacts are a result of direct actions on the soil surface. Repeated actions can lead to compacted, displaced, and/or eroded soil conditions. Livestock concentrate around salt blocks, water tanks and fence lines. These communal areas show signs of compaction due to grazing pressures. In order to analyze the effects of grazing on soil compaction, measures of an area of 1 acre around tanks and salt licks and a 15-foot width along fence lines have been considered as areas for detrimental disturbance. These disturbance areas are intentionally over estimated. The total area of estimated disturbance for each of the allotments being studied is less than 1%, which is significantly below the regional standard of 15% allowable detrimental soil disturbance. Analysis of potential compaction is discussed with each specific allotment.

**Soil compaction for each allotment is described below:**

**Little Rock:** The Little Rock allotment has 8.95 miles of fence, 5 water developments, and 7 salt lick areas. The total potential area disturbed is .58 percent of the allotment which is less than the regional standard of 15 percent allowable detrimental disturbance.

**Sugarloaf:** The Sugarloaf allotment has .35 miles of fence, 0 water developments, and 10 salt lick areas. The total potential area disturbed is .04 percent of the allotment which is less than the regional standard of 15 percent allowable detrimental disturbance.

**Washakie Needles:** The Washakie Needles allotment has 3.2 miles of fence, 0 water developments, and 5 salt lick areas. The total potential area disturbed is .13 percent of the allotment which is less than the regional standard of 15 percent allowable detrimental disturbance.

**Middle Fork:** The Middle Fork allotment has 5.7 miles of fence, 4 water developments, and 9 salt lick areas. The total potential area disturbed is .08 percent of the allotment which is less than the regional standard of 15 percent allowable detrimental disturbance.

**Bayer Mountain:** The allotment has .87 miles of fence, 1 water development, and 3 salt lick areas. The total potential area disturbed is .09 percent of the allotment which is less than the regional standard of 15 percent allowable detrimental disturbance.

**Soil erosion hazard**

Soil erosion hazard ratings indicate the risk of soil loss after disturbance activities that expose the soil surface to sheet and rill erosion. Two factors are used in the rating, “slope” and “K” value of the soil. The ratings also assume a 50 to 75 percent exposed roughened mineral surface. A review of the range transect data shows this amount of bare soil is not common on the allotments in this analysis except in areas around salt blocks, water developments, and occasionally fence lines. For these features, the aerial extent is estimated for each allotment. Bare ground for allotment range transects is summarized.

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) and the Revised Universal Soil Loss Equation (RUSLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter and on soil structure and saturated hydraulic conductivity (Ksat). Values of K range from 0.02 to 0.69. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water. "Erosion factor Kw (whole soil)" indicates the erodibility
of the whole soil. Erosion hazard ratings use different slope values for Kw values below and above .35. Kw factor values on the Forest are predominately below .35.

The following slope values are then used to determine the ratings: Slight: 0 to 14 percent slopes; Moderate: 15 to 35 percent slopes; Severe: 36 to 50 percent slopes; Very severe: greater than 50 percent slopes.

Estimates of erosion hazard on the Forest have been mapped using digital elevation models using the slope classes. Percentages of erosion hazard ratings of each allotment are given in individual sections. “No rating” refers to areas that are off Forest. Most livestock use is where slopes are less than 50%.

The soil erosion hazard for each allotment is described below:

**Little Rock:** Erosion hazard rating is approximately 30.3% slight, 38.2% moderate, 11.5% severe, 19.7% very severe, and .3% not rated. Range-transect data show that bare ground averages 7.5%. Most of the grazing use is in areas that have slight to moderate erosion hazard ratings. Adequate ground cover and proper utilization levels will minimize erosion. Effects from the Little Rock fire will continue to be a source rill and sheet erosion until Forest vegetation is reestablished. Cheatgrass may have invaded after the fire.

**Sugarloaf:** Erosion hazard rating is approximately 3.6% slight, 46.3% moderate, 39.1% severe, 10.8% very severe, and .2% not rated. Range-transect data show that bare ground averages 2.4%. Most of the grazing use is in areas that have slight to moderate erosion hazard ratings. Adequate ground cover and proper utilization levels help minimize erosion.

**Washakie Needles:** Erosion hazard rating is approximately 4.3% slight, 45.2% moderate, 34.6% severe, 15.4% very severe, and .5% not rated. Range-transect data show that bare ground averages 14%. Most of the grazing use is in areas that have slight to moderate erosion hazard ratings. Adequate ground cover and proper utilization levels help minimize erosion.

**Middle Fork:** Erosion hazard rating is approximately 23.5% slight, 63.4% moderate, 11% severe and 2.1% very severe. 1977 and 1976 Range-transect data show that bare ground averages 4.1%. Most of the grazing use is in areas that have slight to moderate erosion hazard ratings. Maintaining adequate ground cover and proper utilization levels minimize erosion.

**Bayer Mountain:** Erosion hazard rating is approximately 12.2% slight, 55.4% moderate, 21.5% severe, 10.8% very severe, and .1% not rated. Range-transect data show that bare ground averages 12.5% with erosion pavement averaging 21%. No data is available for combined erosion pavement or bare ground. Most of the grazing is in areas that have slight to moderate erosion hazard ratings. Adequate ground cover and proper utilization levels need monitoring to minimize potential erosion.

**Soil fertility and nutrient removal**

Grazing is a natural part of grassland and shrubland ecosystems. Soil fertility and nutrient removal become a problem when the carrying capacity of these systems is exceeded. On the allotments being analyzed, utilization studies and vegetation trend data show this is not the case. Water quality in regards to grazing is discussed under the hydrology sections.

**Geology/Geologic Hazards**
Geology and geologic hazard GIS layers are part of the Forest spatial data and in analysis project files. Data is from Case 1989 and Love and Christiansen 1985. Geologic formations high in clay form soils that may exhibit compaction. Compaction is discussed under the soils section.

Geologic hazards that may be affected by grazing include areas that are susceptible to debris flow processes. Debris flow processes are a natural part of landscapes derived from the Absaroka volcanic geology. Loss of ground cover can accentuate these processes. Wildfire on one extreme can result in large areas of bare ground when exposed to summer thunderstorm activity this can result in debris flow conditions. Grazing does have the potential to increase the extent of debris flow activity when the carrying capacity of these systems is exceeded. This effect is minor when compared to wildfire. On the allotments being analyzed utilization studies and vegetation trend data show adequate cover is being maintained.

The geology/geologic hazards for each allotment are described below:

**Little Rock:** Geology in this allotment is dominated by sedimentary, granitic, and volcanic formations. These are complicated by glacial activity, alluvial deposits, and landslide activity. Landslide areas were documented on approximately 27.6 percent of the allotment.

**Sugarloaf:** Geology in this allotment is dominated by volcanic formations. These are complicated by glacial activity and alluvial deposits. No landslide activity was noted.

**Washakie Needles:** Geology in this allotment is dominated by volcanic formations. These are complicated by glacial activity, alluvial deposits, and landslide activity. Landslide areas were documented on approximately 2.8 percent of the allotment.

**Middle Fork:** Geology in this allotment is dominated by sedimentary and granitic formations. These are complicated by glacial activity, alluvial deposits, and minor landslide activity. Landslide areas were documented on approximately .5 percent of the allotment.

**Baye Mountain:** Geology in this allotment is dominated by sedimentary formations. The western edge of the allotment has a small area underlain by granitic formations. These formations are complicated by glacial activity and alluvial deposits.

**Environmental Consequences**

**Effects to Soils-Alternative 1**

**Soils (productivity, compaction, erosion, fertility)**

An end to grazing would likely increase the ground cover initially, reduce erosion (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 will improve most rapidly under the No Grazing alternative. Soil fertility and nutrient removal were identified as not affected and are not discussed her.

**Geology/Geologic Hazards**

An end to domestic livestock grazing would have little if any effect on Forest geologic hazards. Increased ground cover as a result from no domestic livestock grazing would have a minor effect on debris flow initiation and land slump activation.

**Effects to Soils - Alternative 2**

**Soils (productivity, compaction, erosion, fertility)**

The effects of the grazing management/adaptive management options selected for this project and previously identified have various effects to sensitive plants, soils, and invasive plants. For the
most part, the options when correctly applied can benefit sensitive plants, soils, and invasive plant control. Geologic type and landslide hazards and Special Areas and unique habitat are not discussed in terms of adaptive management.

Soil productivity will continue to improve under existing management and stocking levels. Detrimental soil compaction will remain far less than the regional guideline of 15%. Detrimental soil disturbance will improve slower than alternative 1 (no grazing).

Erosion hazard is inherently a function of slope and the amount of exposed bare ground. Erosion hazard varies for each allotment. Areas of high erosion hazard generally tend to be parts of the allotment that are not grazed due to steep slope conditions.

Erosion has greatly decreased from historical grazing levels. Range data support that most allotments are recovering from past high stocking numbers. Range-transect data show the amount of bare ground present has generally decreased since the 1970’s. The continued positive trend indicates that current stocking levels are appropriate and have little overall effect on soil erosion processes. Alpine landscapes utilized by cattle can cause an increase in erosion due to the inherent low productivity of shallow soils and short growing seasons.

Soil fertility and nutrient removal were identified as not affected and are not discussed here.

Effects of adaptive management options on soils are summarized in Table 3.2.6.

<table>
<thead>
<tr>
<th>Management Option</th>
<th>Effects of this Option</th>
</tr>
</thead>
<tbody>
<tr>
<td>Change season of use (length of season not to be extended beyond permitted AUMs).</td>
<td>Soil productivity could negatively be affected by early season of use. If this early in the season is utilized, monitoring soil conditions would be recommended to identify areas of potential concern. Late season or fall use can increase the amount of erosion due to more exposure of bare ground.</td>
</tr>
<tr>
<td>Change Livestock numbers (within permitted AUMs).</td>
<td>Flexibility to current conditions generally has a positive effect on soil productivity.</td>
</tr>
<tr>
<td>Adjust livestock grazing intensity and/or duration (within permitted AUMs).</td>
<td>Increased grazing intensity could have a negative effect on soil productivity if stocking rates are overestimated. Decreased grazing intensity could have a positive effect on soil productivity by increasing plant and litter cover and decreasing bare ground.</td>
</tr>
<tr>
<td>Adjust livestock herding to manage specific areas of concern.</td>
<td>Using herding to achieve proper utilization has a positive effect on soil productivity by keeping livestock out of sensitive areas.</td>
</tr>
<tr>
<td>Rest specific areas from livestock grazing or enact non-use for resource protection.</td>
<td>Resting specific areas for resource protection has a positive on soil productivity by increasing ground cover.</td>
</tr>
<tr>
<td>Create, modify, or remove allotment infrastructure.</td>
<td>Building new fence for resource protection or to improve livestock distribution generally has a positive effect on soil productivity.</td>
</tr>
</tbody>
</table>

**Geology/Geologic Hazards**

Current levels of domestic livestock grazing have little if any effect on Forest geologic hazards. Debris flow initiation and land slump activation is reduced by proper utilization levels and maintaining ground adequate ground cover. These geologic hazards are natural occurring processes where livestock grazing is not the major driver. Grazing adaptive management options would not have an effect on geologic hazards.

### 3.3 Botanical Resources-Sensitive Plants

**Affected Environment**
Upland Vegetation

Upland vegetation types and characteristics are derived from Grassland and Shrubland Plant Associations of the Shoshone National Forest (S.J. Tweit and K.E. Houston (1980); Forest Habitat Types of Eastern Idaho-Western Wyoming (Steele et al., 1983); Riparian and Wetland Plant Community Types of the Shoshone National Forest (Walford et al. 2001); and Ecological Types of the Eastern Slope of the Wind River Range (Wells, 2008). Soil Survey data was used to discuss vegetation spatial distribution in each allotment. Grazing alpine vegetation by cattle is generally not considered desirable. Portions of alpine vegetation in Sugarloaf and Washakie Needles allotments have incidental desirable. Portions of alpine vegetation in Sugarloaf and Washakie Needles allotments have incidental cattle use.

Sensitive Plants

The EA contains a brief summary of sensitive plants, more details are found in the Botany/Soils specialist report. The specialist report contains information on: 1) Forest occurrence; 2) general habitat requirements for each species; 3) soil characteristics; 4) an evaluation of the species potential habitat presence; 5) likelihood of presence; 6) adverse affects on suitable habitat; 7) and determination of effects on proposal. Sensitive plant species occurrence, conditions, and effects are summarized in the specialist report.

The Shoshone Forest has approximately 1340 vascular plant taxa (Scott 2008). Little is known about Forest bryophytes and mycological resources. Of these, 25 Region Two sensitive plant species are documented on the Forest. These plants include roundleaf orchid, lesser panicled sedge, bristly stalked sedge, livid sedge, English sunweld, Hall’s fescue, Chamisso’s cotton grass, slender cotton grass, Kotzebue grass of Parnassus, Greenland primrose, Absaroka beards tongue, Absaroka goldenweed, entire leaf golden weed, tundra buttercup, sageleaf willow, Baratt willow, myrtleleaf willow, Shoshonea, North fork easter daisy, Fremont’s bladderpod, Wyoming tansy musturd, simple bog sedge, *Sphagnum angustifolium*, trianglelobe moonwort, and lesser bladderwort.

Forest R2 sensitive inventory data is maintained by the Wyoming Natural Diversity Database (WYNDD) at the University of Wyoming. Information in this report is derived from this data.

The vegetation types and characteristics for each allotment are described below:

**Little Rock:** Riparian soil map units with forage include 402 and 248. Upland map units with forage include 403, 404, and 405. Vegetation is dominated by the Black sage / Blue bunch wheatgrass / Blue bunch wheatgrass / Sandberg’s bluegrass, and Limber pine series. Table 3.2.2 lists dominant vegetation types with each of these map units.

**Sugarloaf:** Riparian soil map units with forage include 102 and 401. Upland map units with forage include 104, 150, 251, and 287. Vegetation is dominated by the mountain big sage / Idaho fescue, Mountain Big sage / Blue bunch wheatgrass, and Idaho fescue / Blue Bunch wheatgrass types. Alpine portion of the allotment include soil map units 110 and 111. Alpine portions of the allotment are not considered desirable for cattle grazing. Table 3.2.3 lists dominant vegetation types with each of these map units.

**Washakie Needles:** Riparian soil map units with forage include 102. Upland map units with forage include 110, 111, 113, and 190. Vegetation is dominated by alpine plant communities with inclusions of the mountain big sage / Idaho fescue type. The alpine portion of the allotment is not considered desirable for cattle grazing. Table 3.2.4 lists dominant vegetation types with each of these map units.

**Middle Fork:** Riparian soil map units with forage include 302 and 302L. Upland map units with forage include 15L, 351L, 402L, and 44L. Vegetation is dominated by the
mountain big sage / Idaho fescue, Mountain Big sage / Blue bunch wheatgrass / Bitter brush phase and aspen types. A high proportion of soil map unit 351L was burned in prescribed fires in fiscal years 1999 and 2000. Bitterbrush was greatly reduced and there was a type conversion to cheatgrass. These areas are in poor condition because of the amount of cheatgrass. The alpine portion of the allotment includes soil map unit 304L. This portion of the allotment is not considered desirable for cattle grazing. Table 3.2.5 lists dominant vegetation types with each of these map units.

**Bayer Mountain:** Riparian soil map units with forage include 302L. Upland map units with forage include 15L, 309A, 309L, and 402L. Vegetation is dominated by Mountain big sage / Idaho fescue, Mountain big sage / Blue bunch wheatgrass, and Three-tip sage / Blue bunch wheatgrass types. Table 3.2.6 lists dominant vegetation types with each of these map units.
The sensitive plant occurrence and habitat potential for each allotment are described below:

**Little Rock:** None have been documented. Potential habitat exists for Absaroka golden weed, North Fork Easter daisy, and Shoshonea.

**Sugarloaf and Washakie Needles:** Populations of Kotzebue’s grass of Parnassus have been documented in the area. There is potential habitat for Wyoming tansy mustard but it has not documented. These area(s) lack R2 sensitive plant survey data.

**Middle Fork:** Known locations of Fremont’s Bladder pod and Entire Leaf Golden weed occur in this allotment.

**Bayer Mountain:** Soil map unit 15L has potential Fremont Bladder pod habitat on limestone formations.

The special areas and unique habitats for each allotment are described below:

**Little Rock, Sugarloaf, and Washakie Needles:** There are no Research Natural Areas (RNAs), Special Interest Areas (SIAs), or unique habitats within these allotments.

**Middle Fork:** The Middle Fork provides unique habitat for Fremont’s bladder pod and Entire leafed golden weed. Fremont’s bladder pod habitat is shallow, rocky, calcareous soils. Invasion of cheatgrass on its unique habitat is a major concern. Grazing is generally not a factor due to rocky nature and low amounts of forage found on these sites.

There are no RNAs, SIAs within this allotment. Unique habitats are shallow calcareous soils which provide habitat for Fremont’s bladder pod and Entire Leaf Golden weed.

**Bayer Mountain:** There are no RNAs, SIAs, or unique habitats within this allotment.

**Environmental Consequences**

**Effects to Botanical Resources/Sensitive Plants-Alternative 1**

**Vegetation Types and Conditions (upland)**
Under Alternative 1, an end to domestic livestock grazing would allow for plant communities to move towards later seral stages. Wildlife and recreational livestock use would still occur but overall utilization levels would be reduced. There can be positive changes from the removal of grazing pressure on lands in poor conditions but where proper utilization levels occur on lands in good condition this change is less obvious. Range- transects and monitoring data show the majority of the allotments in this analysis are in fair to excellent conditions. Dramatic changes in vegetative condition would not be expected. Range condition on the eastern part of the Middle Fork allotment would still be poor due the cheatgrass and other noxious weed infestations.

**Sensitive Plants**
Under Alternative 1, an end to domestic livestock grazing would have little if any effect on Forest sensitive species. Most of the Forest sensitive plant species grow in habitats where they are not subject to livestock grazing. Fremont’s bladder pod and Entire leafed golden weed habitat in the Middle Fork allotment would potentially have lower levels of disturbance that decrease the potential for cheatgrass spread.

**Special Areas**
Under Alternative 1, an end to domestic livestock grazing would not have any effect on current or proposed Forest RNA’s and SIA’s. Some of the habitat for Fremont’s Bladder pod and Entire leafed golden weed in the Middle Fork allotment would have fewer disturbances that allow for potential cheatgrass spread and leafy spurge introduction.

**Effects to Botanical Resources/Sensitive Plants-Alternative 2**

**Vegetation Types and Conditions (upland)**

Domestic livestock grazing would continue at the current levels. Range- transects and monitoring data show the majority of the allotments in this analysis are in fair to excellent conditions. Dramatic changes in upland vegetative condition from existing conditions would not be expected. Use of alpine vegetation by cattle can lead to changes in composition over time due to inherent low productivity of shallow soils and short growing seasons. Effects of adaptive management options on vegetative types are summarized in Table 3.3.1.

**Sensitive Plants**

Livestock grazing would have little if any affect on Forest sensitive plant species. Most of the Forest sensitive plant species grow in habitats where they are not subject to livestock grazing. This alternative would be a “may impact individuals, but not likely to result in a loss of viability on the planning area nor cause a trend toward federal listing” for the 25 sensitive plant species documented on the Shoshone National Forest.

<table>
<thead>
<tr>
<th>Management Option</th>
<th>Effects of this Option</th>
</tr>
</thead>
<tbody>
<tr>
<td>Change season of use (length of season not to be extended beyond permitted AUMs).</td>
<td>Riparian and alpine vegetation could negatively be affected by early or late seasons of use. Monitoring conditions would be recommended to identify areas of potential concern.</td>
</tr>
<tr>
<td>Change Livestock numbers-(within permitted AUMs).</td>
<td>Flexibility to current conditions generally has a positive effect on vegetation conditions.</td>
</tr>
<tr>
<td>Adjust livestock grazing intensity and/or duration-(within permitted AUMs).</td>
<td>Increased grazing intensity could have a negative effect on soil productivity if stocking rates are overestimated. Decreased grazing intensity could have a positive effect on soil productivity by increasing plant and litter cover and decreasing bare ground.</td>
</tr>
<tr>
<td>Adjust livestock herding to manage specific areas of concern.</td>
<td>Using herding to achieve proper utilization has a positive effect on soil productivity by keeping livestock out of sensitive areas.</td>
</tr>
<tr>
<td>Rest specific areas from livestock grazing or enact non-use for resource protection.</td>
<td>Resting specific areas for resource protection has a positive on soil productivity by increasing ground cover.</td>
</tr>
<tr>
<td>Create, modify, or remove allotment infrastructure.</td>
<td>Building new fence for resource protection or to improve livestock distribution generally has a positive effect on soil productivity.</td>
</tr>
</tbody>
</table>
Effects of adaptive management options on sensitive plants are summarized in Table 3.3.2.

### Table 3.3.2. Specific Effects of Grazing Management Options on Sensitive Plants.

<table>
<thead>
<tr>
<th>Management Option</th>
<th>Effects of this Option</th>
</tr>
</thead>
<tbody>
<tr>
<td>Change season of use (length of season not to be extended beyond permitted AUMs).</td>
<td>Sensitive plants could be negatively affected by early season of use depending on the plant involved. If this early in the season is utilized, monitoring would be recommended to identify areas of potential concern. Late season or fall use can increase the amount of bare ground which</td>
</tr>
<tr>
<td>Change Livestock numbers-(within permitted AUMs).</td>
<td>Increased numbers could have a negative effect if used on soil productivity.</td>
</tr>
<tr>
<td>Adjust livestock grazing intensity and/or duration-(within permitted AUMs).</td>
<td>Increased grazing intensity could have a negative effect on soil productivity if stocking rates are overestimated. Decreased grazing intensity could have a positive effect on soil productivity by increasing plant and litter cover and decreasing bare ground.</td>
</tr>
<tr>
<td>Adjust livestock herding to manage specific areas of concern.</td>
<td>Using herding to achieve proper utilization has a positive effect on sensitive plants by keeping livestock out of critical areas.</td>
</tr>
<tr>
<td>Rest specific areas from livestock grazing or enact non-use for resource protection.</td>
<td>Resting specific areas for resource protection has a positive on sensitive plants by decreasing the amount of potential disturbance.</td>
</tr>
<tr>
<td>Create, modify, or remove allotment infrastructure.</td>
<td>Building new fence or developing a new water source for resource protection or to improve livestock distribution can have a positive effect on sensitive plants if placed properly.</td>
</tr>
</tbody>
</table>

**Special Areas and Unique habitat**

Domestic livestock grazing would not have any effect on current and proposed Forest Research Natural Areas (RNAs) and Special Interest Areas (SIAs). Some areas of unique sensitive plant habitat may be affected.

Grazing adaptive management options would not have an effect on special areas and unique habitat.

### 3.4 Invasive Plant Species

**Affected Environment**

Invasive species can affect land productivity and biodiversity by displacement of native plant communities. Weed treatment is accomplished under the Shoshone National Forest Noxious Weed EA (1999). Current treatment appears to be successful in limiting spread and controlling new infestations.

Weed inventory information collected between 2001 and 2008 show there are approximately 5,000 to 6,000 acres of noxious weeds within the Shoshone National Forest. Weed species of particular concern include spotted knapweed, Dalmatian toadflax, oxeye daisy, leafy spurge, hound’s tongue, white top, Russian knapweed, musk thistle, Canada thistle, and bull thistle. Canada thistle has the most wide spread distribution of these species and was underestimated in the inventory. Weed location maps are in the project files.

One of the five allotments being evaluated has documented invasive plant infestations. The Middle Fork allotment has populations of leafy spurge, hound’s tongue, spotted knapweed, Canada thistle, Musk thistle, bull thistle, sulfur cinquefoil, and white top. Prescribed fire activity on the Middle Fork allotment in 2000 converted 1200 acres of the allotment to cheatgrass. Cheatgrass still dominates the burn area boundaries.

The invasive species for each allotment are described below:
**Little Rock:** Canada thistle is the major weed species found in the Little Rock allotment. Wetland habitats frequently have small patches that have not yet been inventoried. Treatment of Canada thistle is a Forest low priority. Populations of musk thistle, leafy spurge, hound’s tongue, spotted knapweed, and Russian knapweed have been found and treated adjacent to the Little Rock allotment.

**Sugarloaf and Washakie Needles:** Canada thistle is thought to be the major weed species found in these allotments. Wetland habitats frequently have small patches that have not yet been inventoried. Treatment of Canada thistle is a low Forest priority. Weed inventory has not occurred in these allotments.

**Middle Fork:** Canada thistle is the major weed species found in the Middle Fork allotment. Wetland habitats frequently have small patches that have not yet been inventoried. Treatment of Canada thistle is a Forest low priority. Populations of leafy spurge, white top, bull thistle, musk thistle, hound’s tongue, sulfur cinquefoil, spotted knapweed, and Russian knapweed have been found and treated in and adjacent to the Middle Fork allotment. Cheatgrass occurs throughout the analysis area and has exhibited a great potential to dominate growth after prescribed or wild fire. This is especially true where this type occurs on south and southeast exposures.

**Bayer Mountain:** Canada thistle is the major weed species found in the Bayer Mountain allotment. Wetland habitats frequently have small patches that have not yet been inventoried. Treatment of Canada thistle is a Forest low priority. Populations of leafy spurge, musk thistle, hound’s tongue, and white top have been found and treated adjacent to the Bayer mountain allotment.

**Environmental Consequences**

**Effects to Invasive Species-Alternative 1**
Under Alternative 1, an end to domestic livestock grazing could potentially result in the reduction of spread of noxious weeds. Domestic livestock grazing is only one of the many vectors for weed spread. Noxious weed introduction will continue via recreationists, wildlife, road systems, and other disturbances. Current treatment levels would follow the Forest Noxious Weed EA (1999) direction.

**Effects to Invasive Species-Alternative 2**
Domestic livestock grazing would continue being one of the many vectors of spread of noxious weeds. Noxious weed introduction will continue via recreationists, wildlife, road systems, and other disturbances. Current treatment levels would follow the Forest Noxious Weed EA (1999) direction.
Effects of adaptive management options are summarized in Table 3.4.1.

Table 3.4.1. Specific Effects of Grazing Management Options on Invasive Plants.

<table>
<thead>
<tr>
<th>Management Option</th>
<th>Effects of this Option</th>
</tr>
</thead>
<tbody>
<tr>
<td>Change season of use (length of season not to be extended beyond permitted AUMs).</td>
<td>Late season or fall use can increase the amount of bare ground which provides a seed bed for invasive plants. Livestock consume some invasive plants reducing seed development. Livestock can be a source of seed spread of plants such as hounds tongue.</td>
</tr>
<tr>
<td>Adjust livestock grazing intensity and/or duration-(within permitted AUMs).</td>
<td>Increased grazing intensity could have a negative effect on soil productivity if stocking rates are overestimated. Decreased grazing intensity could have a positive effect on soil productivity by increasing plant and litter cover and decreasing bare ground.</td>
</tr>
<tr>
<td>Adjust livestock herding to manage specific areas of concern.</td>
<td>Using herding has a positive effect by keeping livestock out of noxious weed areas.</td>
</tr>
<tr>
<td>Rest specific areas from livestock grazing or enact non-use for resource protection.</td>
<td>Resting specific areas for resource protection has a positive on invasive plants by decreasing the amount of potential disturbance.</td>
</tr>
<tr>
<td>Create, modify, or remove allotment infrastructure.</td>
<td>Building new fence or developing a new water source for resource protection or to improve livestock distribution can have a positive effect on invasive plants if placed properly and maintained.</td>
</tr>
</tbody>
</table>

3.5 Hydrology

Past Assessments and Reports

BMP Reviews. Annual interdisciplinary Best Management Practices (BMPs) reviews of active grazing allotments are conducted to identify implementation and effectiveness of prescribed practices, which are reviewed and scored. Scores are on a scale of 1 to 5, with 5 being the best. More specifically, implementation scores range from ‘gross neglect of practice’ (1) to ‘exceeds practice objectives’ (5); effectiveness scores range from ‘major and prolonged impacts on soil and water’ (1) ‘to improved protection of soil and water over pre-project conditions’ (5). Reviews have occurred on allotments that neighbor or share one of the same watersheds as the selected allotments. The results\(^2\) of one of the Bald Ridge allotment BMPs, which shares a part of the Clarks Fork Yellowstone River – Newmeyer Creek watershed (100700060501) with the Little Rock allotments shows ‘adequate protection of soil and water’ and ‘minor and temporary impacts to soil and water’ (2008). Adaptive management identified to correct this was relocating a water tank out of the water influence zone (WIZ) and fencing the associated water spring water source. The other BMP review was on the Maxon Basin allotment which borders the Bayer Mountain allotment and shares part of the Little Popo Agie River – Canyon Creek watershed (100800030102) and the Little Popo Agie River – Atlantic Creek watershed (100800030101) (2004). The results show ‘adequate protection of soil and water’ for the entire review with no action items listed.

Forest Plan Level Assessments. The Forest completed watershed cumulative effect screens in the early to mid-1990s as part of Oil and Gas Leasing and Allowable Sale Quantity amendments to the Forest Plan. The screens resulted in identification of watersheds of concern due to past activities that had or potentially had negative effects on water quality and designated uses. For this project, no watersheds of concern were identified (USDA 1992, USDA 1994).

This watershed condition effort was later super-ceded by the Inland West Watershed Initiative (IWWI), and again there were no watersheds of concern within the analysis area; there were crucial or damaged stream segments, a critical piece of the IWWI effort, identified (USDA 1997). More recently, the IWWI effort was updated as part of the Forest Plan revision process and

\(^2\) The results discussed reflect only those areas within the BMP reviews that overlap by watershed or area a neighboring allotment. See BMP documents in the project file.
documented in the Comprehensive Evaluation Report. There were some changes made during this process (see Existing Conditions discussion) (USDA 2008).

**Affected Environment**

The analysis area (AA) for direct, indirect, and cumulative effects on water resources are the sixth level hydrologic unit boundaries (HUBs) that bisect each allotment, and each allotment is analyzed based on an individual analysis area. The project area for water resources is the area to be disturbed by the activity, the identified commercial allotments: Little Rock, Sugarloaf, Washakie Needles, Middle Fork, and Bayer Mountain. For the full analysis, refer to the specialist report and supporting documentation in the project file.

The allotments are not generally within one watershed or sub-watershed and are described by their sixth level watershed location in the below table (Table 3.5.1). Five of the sixth level watersheds are entirely within the National Forest boundary: Upper Little Popo Agie River, South Fork Wood River, Upper North Popo Agie River, Upper Middle Popo Agie River, and Middle Popo Agie River. The remaining watersheds extend beyond the forest boundary. In addition, there are private land in-holdings within Little Rock Creek, Clarks Fork Yellowstone River – Newmeyer Creek, and Little Popo Agie River Canyon.

**Table 3.5.1: Acres of each HUB 6 within the allotment, and the percentage of each sixth level watershed that makes up the allotment.**

<table>
<thead>
<tr>
<th>HUB 6</th>
<th>ACRES</th>
<th>% OF HUB 6 IN ALLOTMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Bayer Mountain</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Roaring Fork Creek</td>
<td>&lt;1</td>
<td>&lt;1</td>
</tr>
<tr>
<td>Little Popo Agie River –</td>
<td>5,389</td>
<td>25</td>
</tr>
<tr>
<td>Canyon Creek</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Little Popo Agie River –</td>
<td>256</td>
<td>&lt;1</td>
</tr>
<tr>
<td>Atlantic Creek</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Little Popo Agie River –</td>
<td>&lt;1</td>
<td>&lt;1</td>
</tr>
<tr>
<td>willow Creek</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Middle Fork</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Upper Middle Popo Agie</td>
<td>8,623</td>
<td>28</td>
</tr>
<tr>
<td>River</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Middle Middle Popo Agie</td>
<td>6,260</td>
<td>33</td>
</tr>
<tr>
<td>River</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Upper North Popo Agie</td>
<td>535</td>
<td>2</td>
</tr>
<tr>
<td>River</td>
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<td></td>
</tr>
<tr>
<td>Squaw Creek</td>
<td>1,999</td>
<td>13</td>
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<tr>
<td>Lower Middle Popo Agie</td>
<td>4,376</td>
<td>20</td>
</tr>
<tr>
<td>River</td>
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<td></td>
</tr>
<tr>
<td>Baldwin Creek</td>
<td>605</td>
<td>3</td>
</tr>
<tr>
<td>Middle North Popo Agie</td>
<td>4,124</td>
<td>15</td>
</tr>
<tr>
<td>River</td>
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<td></td>
</tr>
<tr>
<td><strong>Little Rock</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clarks Fork Yellowstone</td>
<td>931</td>
<td>4</td>
</tr>
<tr>
<td>River – Newmeyer Creek</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Littlerock Creek</td>
<td>4,239</td>
<td>12</td>
</tr>
<tr>
<td>Clarks Fork Yellowstone</td>
<td>5</td>
<td>&lt;1</td>
</tr>
<tr>
<td>River – Chapman Bench</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Washakie Needles</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Upper South Fork Owl</td>
<td>7,767</td>
<td>23</td>
</tr>
<tr>
<td>Creek</td>
<td></td>
<td></td>
</tr>
<tr>
<td>South Fork Wood River</td>
<td>&lt;1</td>
<td>&lt;1</td>
</tr>
<tr>
<td><strong>Sugarloaf</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Upper North Fork Owl</td>
<td>11,320</td>
<td>60</td>
</tr>
<tr>
<td>Creek</td>
<td></td>
<td></td>
</tr>
<tr>
<td>South Fork North Owl</td>
<td>434</td>
<td>4</td>
</tr>
<tr>
<td>Creek</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Upper South Fork Owl</td>
<td>7,813</td>
<td>24</td>
</tr>
<tr>
<td>Creek</td>
<td></td>
<td></td>
</tr>
<tr>
<td>South Fork Wood River</td>
<td>10,188</td>
<td>29</td>
</tr>
<tr>
<td>Cottonwood Creek – South</td>
<td>&lt;1</td>
<td>&lt;1</td>
</tr>
<tr>
<td>Fork Cottonwood Creek</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Existing Conditions

**Climate:** Annual precipitation varies with topography and elevation. Annually each of these allotments has a total precipitation that ranges from 10 to 18 inches on Little Rock, 20 to 40 inches on Sugarloaf, 40 to 50 inches on Washakie Needles, 20 to 40 inches on Middle Fork, and 20 to 30 inches on Bayer Mountain. As a general statement, these watersheds are snow dominated with frequent late spring and mid-summer thundershowers.

**Geomorphic Integrity:** The sub-watersheds are classified by the current watershed condition, based on the physical and biological characteristics and processes affecting hydrologic and soil functions. The classification is derived from Shoshone National Forest Watershed Condition Assessment (2008) and addresses the geomorphic integrity of each watershed, relative to its natural potential condition. Ratings are high (1), moderate (2), and low (3) integrity.

In the existing Forest Plan, the Little Rock area was shown as having low watershed sensitivity, and the remaining allotments were described as having sensitivity that ranged from low to high (USDA 1986, J-39, J-103, J-138, J-148, and J-162). During the 2008 Assessment all of the watersheds in the analysis area are shown to have a moderate geomorphic integrity with the exception of Upper North Popo Agie River and the Upper Middle Popo Agie River watersheds which had high geomorphic integrity. Those with a moderate integrity reflect, to varying degrees, past and present activities. These watersheds are generally on an improving trend due to recent and ongoing management actions. Continued recovery will occur naturally or through revised management with minimal capital investment.

**Water Resources:** Within the analysis area for each allotment, ephemeral and intermittent channels dominate the landscape. Wetland and other waterbody type resources are most prominent on the Middle Fork and Bayer Mountain allotments. Washakie Needles is also noted to contain wetlands and riparian ecosystems that are of particular importance for maintaining wilderness character (USDA 1986, J-138). Springs are most frequently found in the Middle Fork analysis area. The project area water resources can best be described in the below table (Table 3.5.2). However, this table reflects only what is known at this time, and discrepancies may exist.

Table 3.5.2: Watershed resources by project area.

<table>
<thead>
<tr>
<th></th>
<th>Bayer Mountain</th>
<th>Little Rock</th>
<th>Middle Fork</th>
<th>Sugarloaf</th>
<th>Washakie Needles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perennial Stream (mi.)</td>
<td>8.3</td>
<td>3.1</td>
<td>34.0</td>
<td>13.9</td>
<td>10.6</td>
</tr>
<tr>
<td>Perennial Stream (% of AA)</td>
<td>11%</td>
<td>5%</td>
<td>14%</td>
<td>25%</td>
<td>26%</td>
</tr>
<tr>
<td>Wetland (acres)</td>
<td>3.8</td>
<td>16.6</td>
<td>1015.0</td>
<td>&lt;1</td>
<td>1.3</td>
</tr>
<tr>
<td>Waterbody (acres)</td>
<td>12.1</td>
<td>5.7</td>
<td>1058</td>
<td>&lt;1</td>
<td>&lt;1</td>
</tr>
<tr>
<td>Springs (count)</td>
<td>4</td>
<td>7</td>
<td>4</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

3 Geomorphic Integrity – High. The watershed has high soil and water integrity relative to its natural potential condition. Disturbance does not compromise soil-hydrologic function or soil/stream resilience.

Geomorphic Integrity – Moderate. The watershed has moderate soil and water integrity relative to its natural potential condition. Disturbance partly compromises soil-hydrologic function or soil/stream resilience. Recovery can occur naturally or through revised management with minimal capital investment.

Geomorphic Integrity – Low. The watershed has low soil and water integrity relative to its natural potential condition. Disturbance widely compromises soil-hydrologic function or soil/stream resilience. Recovery requires capital investments and revised management. Land-disturbing actions are not precluded, but must complement recovery.
**Stream Reach Level Data:**

*Stream Health.* Crucial and damaged stream segments have been identified across the Shoshone National Forest using stream health inventory data, information gathered during general site visits, and professional judgment. Crucial stream segments have especially high resource values, some examples include: outstanding fishery, existing in-stream flow, outstanding recreation value, threatened and endangered species, rare species, and pristine habitat. Damaged stream segments are those in which physical, chemical, or biological impacts have caused any water-related resource value to be seriously degraded. Factors considered in identification of a damaged segment include: bank damage, sediment load, channel modification, and flow disruption.

There were no crucial segments identified in the project area. Within the Middle Fork allotment Shoshone Creek is shown to have 1.7 miles listed for bank damage.

*Stream Types.* Stream types within the allotments are predominantly A and B with C, D, E, F, and G types present as well. Bayer Mountain, Middle Fork, and Sugarloaf contain some C stream types, and Bayer Mountain, Little Rock, and Middle Fork contain segments of E stream type. Several miles of D streams are also noted within the Sugarloaf allotment.

*Reach Surveys.* Stream reach data was collected in 2006 within proximity of Sugarloaf and in 2009 within proximity of Bayer Mountain. Streams surveyed were South Fork Wood River, Atlantic Creek, Fiddlers Creek, Silas Creek, Hidden Creek, and Pass Creek. One of the Pass Creek reaches and the Hidden Creek reach are both within the Bayer Mountain allotment. The South Fork Wood River reach was classified as being in *reference* condition and the 2009 data has not yet been fully analyzed.

**Surface Water Quality:**

*Impaired Waters:* Currently, there are two streams in the analysis area listed in Wyoming’s 2010 305(b) State Water Quality Assessment Report and one on the 2010 303(d) list of waters with Water Quality Impairments. Within proximity of the Middle Fork allotment, Baldwin Creek and Squaw Creek are on the 305(b) report. These two streams have been part of watershed improvement projects and are currently supporting their associated aquatic use values. Tributaries to Baldwin Creek are within allotments. The Middle Fork Popo Agie River, outside the bounds of the allotments, is on the 303(d) list near Lander, Wyoming due to fecal coliform and *E.Coli* exceedances. The sources for this exceedance are being examined.

*Stream Classifications & Use Designations:* Named streams within the project area are classified as 2AB and 3B. Streams classified as 2AB “are those known to support game fish populations or spawning and nursery areas at least seasonally and all their perennial tributaries and adjacent wetlands and where a game fishery and drinking water use is otherwise attainable” (DEQ 2001). Class 2AB waters have designated uses including drinking water supplies, game and non-game fisheries, fish consumption, aquatic life other than fish, primary contact recreation, wildlife, industry, agriculture, and scenic value. Streams classified as 3B waters are defined as “intermittent and ephemeral streams with sufficient hydrology to normally support and sustain communities of aquatic life including invertebrates, amphibians, or other flora and fauna which inhabit waters of the state at some stage of their life cycles” (DEQ 2001). Class 3B designated uses include: aquatic life other than fish, primary contact recreation, wildlife, industry, agriculture and scenic value. The remaining named and unnamed streams, ditches, and channel braids within the project area are not directly classified on the DEQ 2001 list.

A full range of water quality parameters apply to these designated uses. Water quality criteria that are most critical, relative to this assessment, include: dead animals and solid waste; settleable solids; floating and suspended solids; taste, odor and color; human health; protection of aquatic life; turbidity; dissolved oxygen; temperature; pH; fecal coliform bacteria; and biological.
Detailed descriptions of these criteria are found in the Wyoming DEQ water quality rules and regulations (DEQ 2007).

**Water Uses:**

Water uses/rights are both non-consumptive and consumptive within the project areas. Non-consumptive rights are identified by the State as in-stream flows, but the Forest refers to them as quantification points. Consumptive uses are primarily for stock water developments.

There are 11 quantification points identified within the project areas which are a non-consumptive use for the purpose of channel maintenance. There are three with a priority date of May 22, 1902. These points are on North Fork of North Fork Owl Creek, Rock Creek, and South Fork Owl Creek. The following eight quantification points have priority dates of January 29th, 1903: Pass Creek, Squaw Creek, Big or Middle Popo Agie River, Little Rocky Creek, Mountain Creek, North Fork Lake Creek, Shoshone Creek, and Canyon Creek.

The consumptive uses are stock water developments. Within the project area, there are ten water developments with springs as the water source. There is one on Bayer Mountain, five on Little Rock, and four on Middle Fork.

**Environmental Consequences**

*Generalized Direct and Indirect Effects.* This section is a general discussion of potential direct and indirect effects to a watershed from livestock grazing, and illustrates the range of potential direct and indirect effects considered during the effects analysis. The effects listed below are general and are not specific to the project area or analysis area. Effects specific to the project and analysis area are found in subsequent sections.

Meehan (1991), Platts (1991), Fleischner (1994), Rosgen (1996), and Belsky et al. (1999) provide detailed discussions of direct and indirect effects to riparian areas, stream channels, wetlands, and waterbodies that can result from livestock grazing. In review of these sources, two direct and twelve indirect effects to aquatic resources were identified. However, it is also important to recognize that the sensitivity of a stream or its stability threshold vary by stream type (Rosgen 2009).

Potential direct effects could include removal of vegetation and streambank alteration. Removal of vegetation occurs in all areas where livestock graze with the level of removal dependant on multiple factors (e.g., stocking densities and duration). Direct alteration of streambanks occurs through hoof action. Hoof shear and bank trampling are two of the most common methods of direct alteration. Indirect effects could include:

- Channel widening
- Channel aggrading
- Water table elevation changes
- Decreased channel stability
- Flow alteration
- Steambank vegetation composition changes
- Increased in-stream fine sediment
- Riparian area vegetation composition changes
- Changes in timing and duration of runoff
Specific Analysis of Direct and Indirect Effects. The following sections discuss detailed effects specific to each alternative.

Sediment

Most sediment delivered to streams comes from a source zone along streams whose width depends on topography, soils, and ground cover. Connected disturbed areas like roads and other disturbed soils near streams can deliver sediment during runoff events. Sediment deposits in streambeds can harm insect populations and fish reproduction.

Factors associated with stream channel instability are either increased sediment loading or the size of the sediment being beyond the carrying capacity of the river (Rosgen 2009). Livestock grazing has been shown to contribute to in-channel sediment due to increased soil compaction, decrease soil infiltration, and increase soil erosion (Clary and Kinney, 2002). Other indirect results of overgrazing are typically, channel erosion, increased turbidity, streambed siltation, decreased pool depths, and reduced habitat complexity (Saunders & Fausch, 2009; Bengeyfield, 2007).

Effects to Hydrology - Alternative 1

Streambanks would no longer be subject to hoof action, and streambank vegetation would increase in diversity and density, especially where livestock water or trail across streams. As banks revegetate and stabilize, undercut banks and complex stream habitats would begin to develop in areas where degradation may have occurred. Livestock induced in-stream sediment would decrease as a result of the decreased bank trampling and increased sediment filtering capacity. The damaged stream segments on Shoshone Creek within the Middle Fork allotment would begin to recover to either the same stream type or a different morphological form with greater stability resulting in decreased bank damage related erosion (Rosgen 2009).

Effects to Hydrology - Alternative 2

Alternative 2 could result in localized effects at watering and crossing areas, where livestock gather and spend extended periods of time. When compared to no livestock grazing, there would be elevated levels of sedimentation and bacterial contamination to streams, but when compared with current management practices, the levels of sedimentation and correlated bacterial contamination would be decreased from existing allotment conditions due to implemented adaptive management actions and BMPs. Utilization of these management tools could also contribute to improved conditions on the damaged stream segments on Shoshone Creek.

Bed/Bank Stability

Bed and bank stability can be damaged from vehicle impact or degraded bank vegetation. Streams can be made wider and shallower, pools and overhanging banks can be destroyed, and much sediment can be added to streams.

In riparian areas, the interface between terrestrial and aquatic habitats is exceptionally sensitive to vegetation removal and other activities that cause bank erosion and degrade aquatic habitat (Saunders & Fausch, 2009). The sensitivity of stream systems is generally influenced by channel type and channel material. A and B channels are characterized as steep, entrenched to moderately entrenched, high energy channels which typically have stable banks. Streams classified as C and E are typically found in wide valleys with well developed floodplains, are relatively sinuous, and are of the riffle-pool pattern (Rosgen 1996). The sensitivity of most of the A and B stream types in the project area is considered low while for C and E streams, there is increased sensitivity to disturbance (Rosgen 2009). Sensitive areas can be protected by hardening water crossings or
access points as well as imposing barriers such as electric fencing where necessary (Carlson, 2010).

Effects to Hydrology - Alternative 1

Measurable changes in aquatic habitat conditions following removal of livestock grazing are documented in studies such as Meyer and Swanson (1995). Platts (1991) reviewed 21 studies and found 20 of them to show habitat improvement in previously grazed systems when livestock grazing was removed. Streambank stability studies have concluded that bank stability increases at higher rate along ungrazed streams as compared with streams within deferred rotation livestock grazing areas (Meyer and Swanson 1995). Riparian areas in ungrazed areas typically have higher densities of shrub and willow vegetation, and research suggests this difference is due to grazing. The findings of Kovalchik and Elmore (1992) also support this suggestion.

It is expected that the localized, negative effects of livestock grazing would begin to move toward a dynamic equilibrium within one to two years after removal of livestock grazing and continue over the long-term (i.e., greater than 10 years). Vegetation would no longer be removed by livestock, related disturbance to streambanks would cease, fine sediment levels would decrease, and channel stability would improve in localized, previously destabilized reaches. The rate and degree of response to livestock grazing removal would vary across the project area spatially and temporally, depending on the current level of effect and the existing condition of the watershed. The damaged stream segments in the Middle Fork allotment would not be subject to livestock bank trampling, and recovery of these segments would begin to occur.

Effects to Hydrology - Alternative 2

Continuation of livestock grazing may result in localized, discontinuous streambank and riparian vegetation disturbance depending on the timing, intensity, and duration of use by livestock. Design measures incorporated into this alternative, such as grazing guidelines, Forest Plan standards and guidelines, WCPH direction, and adaptive management strategies are expected to provide adequate protection to hydrologic resources throughout the project area, and consequently the expected localized disturbance would be to a lesser degree than current management. The utilization of these practices could improve the damaged bank conditions on Shoshone Creek.

Flow Regimes

*Flow regimes can be altered by major changes in cover type or ground cover, or dense road networks. Water temperature and chemistry, sediment transport, aquatic habitats, and aquatic life cycles can be degraded.*

Belsky et al. (1999) identify several ways that livestock grazing may affect water quantity. Grazing can increase peak flows due to the loss of upland vegetation and soil compaction, which reduces infiltration into soils and increases surface runoff. Increases in surface runoff also limit groundwater recharge and may result in a lowered water table. In turn, groundwater-dependent vegetation may not survive and flows to downstream ecosystems may be reduced during seasons of low flow. Bank trampling also results in changes in stream channel morphology often altering the interface between the channel bank elevations and floodplain elevations which can also alter flow regimes (Benguyfield, 2007).

Flow regimes can also be potentially altered based on consumptive water uses. Water consumption from spring sources has the potential to decrease water necessary to support spring ecosystems, and if the source is not protected, the integrity of the spring can be altered.

Effects to Hydrology - Alternative 1
Areas of increased soil compaction would slowly heal. Stream adjustments would occur as streambanks and vegetation return to pre-disturbance (i.e., domestic livestock disturbance) conditions. It is unlikely that in areas where groundwater elevations have been lowered that water tables would recover to their pre-disturbance condition. More likely floodplain development would occur at a lower elevation with a decreased entrenchment ratio (i.e., bankfull width/floodprone width).

**Effects to Hydrology - Alternative 2**

This alternative also has the potential to alter surface runoff, hydrograph timing, and intensity due to soil compaction and vegetation removal, resulting in changes to infiltration rates. A livestock grazing strategy that incorporates timing, intensity, and duration/frequency, as well as meeting grazing guidelines and Forest Plan standards and guidelines, would provide sufficient vegetative cover and minimize sedimentation, bacterial inputs, and changes in stream flow.

**Water Purity**

*Water purity can be degraded by placing concentrated pollutant sources near water bodies or applying harmful chemicals in or near water bodies. Degraded water purity can impair or destroy use of the water by aquatic biota and humans.*

Livestock grazing can have numerous direct and indirect effects to water quality. Effects can include: increased nutrient concentrations, increased bacteria levels, increased fine sediment load, increased turbidity, and increased water temperatures (Belsky et al. 1999). There are two factors that most impact bacterial water quality, 1) proximity and access to waterbodies, and 2) livestock densities. Non-point sources closer to a waterbody have a higher likelihood to pollute than those farther away due to attenuation and dilution factors (Carlson, 2010). Livestock loafing or walking in streams can introduce fecal pollution, however studies have concluded that a 95% reduction in bacterial loads is possible when the minimum distance from a waterbody is 2.5 meters (8.2 ft) or greater (Agourdis, Workman, Warner, & Jennings, 2005).

Design measures to protect water purity/quality include off-site water, stocking densities, and management that incorporates seasonal forage quality:

- **Off site water** has been shown to reduce the amount of time livestock spend utilizing natural water sources. When off-site water is available, cattle spend less time within close proximity to the stream as well as decrease the amount of time spent in the stream corridor not consuming water (Agourdis, Workman, Warner, & Jennings, 2005). Given that cattle generally do not move far from their water source and actually prefer areas within 656 feet of water and as a generality avoid areas greater than 1,968 feet from water, management that considers this information when planning for the number of off-site water within allotments and locations will best protect natural water sources (Carlson, 2010).

- **Stocking densities** are another option for managing bacterial concentrations and show that significant bacterial concentration increases occurred when stocking densities exceeded 1.75 cow/calf pairs per 2.5 acres (Agourdis, Workman, Warner, & Jennings, 2005).

- **Seasonality** is also a means for protecting water quality and bed/bank stability given that forage quality changes influence preferential use patterns of riparian areas (Carlson, 2010).

**Effects to Hydrology - Alternative 1**
Ceasing livestock grazing would remove a source of bacteria; however, some level of bacteria would remain in the water due to the presence of wildlife and humans.

**Effects to Hydrology - Alternative 2**

Water quality impacts from livestock grazing are associated with the amount, duration, and timing of runoff, erosion and sedimentation, pathogens, nutrients, water temperature, and dissolved solids. Water quality is a function of the ability of riparian vegetation to filter or convert excess nutrients, organic compounds, trace metals, sediment, and chemicals found in water (Preston and Bedford 1988). Grazing standards would provide sufficient vegetative cover in the upland and riparian zones to act as a filter. Residual vegetation would be sufficient to prevent overland runoff, which can transport bacteria directly to the stream or waterbody. This design criterion is included within Alternative 2.

**Wetlands & Floodplains**

*Wetlands control runoff and water quality, recharge groundwater, and provide special habitats. Actions that may alter their ground cover, soil structure, water budgets, drainage patterns, and long-term plant composition can impair these values. Floodplains are natural escape areas for floods that temper flood stages and velocities.*

Ensuring that wetlands are able to maintain their ecological integrity would be thru maintaining long-term ground cover, soil structure, water budgets and hydrologic flow patterns (FSH 2509.25, WCPH 12.4 Management Measure 6). Rare wetlands such as fens and springs should be given extra attention, to ensure they are not disrupted, as these wetlands typically cannot be replaced in-kind (FSH 2509.25, WCPH 12.4 Management Measure 6, and Design Criteria 1.e.). The effective implementation of BMPs would aid in achieving desired wetland conditions.

A complex interaction of streamflow, sediment, geology, and landform dictate the shape of stream channels, and as such define their morphologic characteristics (i.e., bankfull width, pool to riffle sequences, sinuosity, etc.). Stream channels adjustments are sensitive to the timing and volume of water and sediment/debris characteristics, and these adjustments are often the result of losses of vegetal cover either along the stream or basin. Deep-rooted riparian vegetation is crucial to bank stability in these stream types and the desired condition is to have a mixture of willow and sedge dominated plant communities in the riparian zone. The presence of such vegetation is a critical component to floodplain functionality.

**Effects to Hydrology - Alternative 1**

Wetlands and floodplains would continue to function in their current state. In areas where localized effects have occurred, either natural or based on management decisions, these areas would begin to recover.

**Effects to Hydrology - Alternative 2**

Sensitive areas will continue to have the potential for degradation and, in those allotments where wetlands and waterbodies are most prevalent, the potential is increased. A livestock grazing strategy that incorporates timing, intensity, and duration/frequency, as well as meeting grazing guidelines, Forest Plan standards and guidelines, and incorporates adequate monitoring and adaptive management would provide sufficient protection for these resources.

**Adaptive Management**

*Adaptive management techniques can be used to manage grazing in order to improve riparian area condition. It's based on applying management practices and then monitoring to determine if*
the applied practices are effective. If they are not, adaptive management provides a mechanism for selecting new or revised practices to apply (Carlson, 2010).

Stream responses to imposed changes are not universal, and as such, they likely will not respond universally to changing conditions (Agouridis, Workman, Warner, and Jennings, 2005). However, the implementation of BMPs, when linked with stream hydraulics and geomorphology, are most likely to adequately protect stream water quality (Carlson, 2010).

Adaptive management would allow watershed resources to recover more rapidly than current management, but not as quickly as Alternative 1. The incorporation of adaptive management facilitates increased efficiency for effectively protecting water resources in conjunction with livestock grazing, and provides for enhanced management practices relative to current operations.

With adaptive management, there are adequate design criteria in the Proposed Action to maintain or improve stream health, riparian areas, and wetlands/floodplains. Effects of adaptive management options on hydrology are summarized in Table 3.5.3.

Table 3.5.3: General effects to hydrology based on adaptive management options.

<table>
<thead>
<tr>
<th>Management Option</th>
<th>Effects of this Option</th>
</tr>
</thead>
<tbody>
<tr>
<td>Change season of use (length of season not to be extended beyond permitted AUMs)</td>
<td>As related to forage palatability, riparian areas and streambank stability could be affected.</td>
</tr>
<tr>
<td>Change livestock numbers (within permitted AUMs)</td>
<td>Increasing or decreasing intensity could influence watershed condition, stream stability, flow regimes, sediment, and water quality.</td>
</tr>
<tr>
<td>Change livestock class</td>
<td></td>
</tr>
<tr>
<td>Adjust livestock grazing intensity and/or duration – (within permitted AUMs)</td>
<td>Increasing or decreasing intensity could influence watershed condition, stream stability, flow regimes, sediment, and water quality.</td>
</tr>
<tr>
<td>Adjust livestock herding to manage specific areas of concern.</td>
<td>Livestock herding can minimize stream and riparian impacts at both the reach level and watershed level.</td>
</tr>
<tr>
<td>Rest specified areas from livestock grazing or enact non-use for resource protection</td>
<td>Rest or non-use can improve impaired watershed conditions.</td>
</tr>
<tr>
<td>Restrict livestock grazing in specified areas (does not apply to recreation and outfitter/guide livestock under this analysis).</td>
<td>Restricting use can improve watershed conditions, flow regimes, sediment in-puts, protect water resources, and water quality.</td>
</tr>
<tr>
<td>Use of a pasture.</td>
<td>Pasture use may or may not benefit watershed resources.</td>
</tr>
<tr>
<td>Exclusion of a pasture.</td>
<td>Pasture exclusion may benefit the specific pasture. Exclusion use can improve watershed conditions, flow regimes, sediment in-puts, source waters, and water quality.</td>
</tr>
<tr>
<td>Create, modify, or remove allotment infrastructure.</td>
<td>Allotment infrastructure generally benefits watershed health creating off-site water, and beneficial fencing. A negative effect may be the trailing associated with fence boundaries, including those established as riparian/stream exclosures.</td>
</tr>
<tr>
<td>Encourage livestock grazing in specified areas.</td>
<td>This has the potential to improve watershed conditions.</td>
</tr>
<tr>
<td>Use herding to achieve management objectives.</td>
<td>Generally, herding improves range conditions and is an effective method for ensuring resource protection.</td>
</tr>
<tr>
<td>Adjust pasture or allotment boundaries.</td>
<td>This may or may not benefit watershed resources.</td>
</tr>
</tbody>
</table>
3.6 Aquatic Life and Riparian Ecosystems

**Affected Environment**

**Stream Habitat:** Overall, stream habitat conditions on the Forest are improving or remaining stable and mostly meeting desired conditions. Improved livestock grazing practices, improved road drainage, removing stream crossing barriers to fish passage and implementing stream habitat enhancement projects have all helped improve stream habitat conditions.

**Stream Fisheries:** Historic native trout stream species include Yellowstone Cutthroat Trout (YCT) and mountain whitefish. Yellowstone cutthroat trout have been reduced in numbers and confined to a very small fraction of their original range from introduction of non-native fish species, habitat modification or degradation and past over fishing. Yellowstone cutthroat trout were petitioned for listing as a threatened species under the Endangered Species Act. The U.S. Fish and Wildlife Service conducted a 12-month status review of the species and found listing unwarranted (U.S. Fish and Wildlife Service 2006). The proponents filed a notice of intent to sue which is still pending. Yellowstone cutthroat trout are currently included on the Forest Service Region 2 sensitive species list.

Introduced stream game trout species include rainbow, rainbow-cutthroat hybrids, brook, brown, lake trout and arctic grayling. Game trout are currently the management indicator species for aquatic habitat.

Non-game stream fish species include longnose dace, and white head, longnose, common, and mountain suckers. Mountain suckers are also on the Region 2 sensitive species list. On the Shoshone Forest, mountain suckers are common to abundant. The specialist’s report for aquatics addresses streams and fish species present in more detail.

**Lake Fisheries:** Historically, almost all of the high mountain lakes on the Forest are believed to be barren of fish because they were formed by uplifting and glacial activity. This process isolated high mountain lakes and ponds from lowland streams. Those that were accessible to trout would have been occupied by Yellowstone cutthroat trout. Most of the lakes that have suitable fish habitat have been subsequently stocked, primarily by Wyoming Game and Fish Department (WGFD). Introduced lake game fish species include Yellowstone and Snake River cutthroat, rainbow, rainbow-cutthroat hybrids, brook trout, golden trout, lake trout, splake, and arctic grayling. Non-game lake species include lake chubs and white head, longnose, and mountain suckers. Lake chubs are a Region 2 sensitive fish species that occupy some lakes, ponds and slow moving backwater streams. On the Shoshone National Forest they are common to abundant where suitable habitat exists.

**Riparian Habitat:** In order to determine riparian condition, the Forest used an integrated approach with a cross section of Forest and District resource specialists that were familiar with the ground riparian conditions in 1999. This included fish and wildlife biologists, range conservationists, hydrologists, engineers, and recreation specialists. Available information included detailed surveys, monitoring information or most recent visual observations. Using a mapping exercise, specialists used this information to determine riparian condition for riparian polygons that were greater than about 160 feet wide and intercepted perennial streams on national forest lands. Proper Functioning Condition (PFC) methodology guidelines (USDI BLM, 1998) were used to determine riparian condition. At that time, most riparian habitat was in proper functioning condition with a few localized areas functioning at risk or not functioning (Table 3.3.4). The functioning at risk and non-functioning condition ratings were primarily due to past livestock grazing and poor roading practices. In 2009 and 2010 the allotments addressed in those EAs were reevaluated for riparian condition using the same methodology (Table 3.6.1).
Table 3.6.1. Shoshone National Forest Riparian Condition (2010)

<table>
<thead>
<tr>
<th>Forest Riparian Condition</th>
<th># Polygons</th>
<th>Acres</th>
<th>% Total Acres</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proper Functioning Condition (Good)</td>
<td>4,012</td>
<td>61,062</td>
<td>89.1</td>
</tr>
<tr>
<td>Functioning at Risk (Fair)</td>
<td>316</td>
<td>6,141</td>
<td>9.0</td>
</tr>
<tr>
<td>Non-functioning (Poor)</td>
<td>19</td>
<td>192</td>
<td>0.3</td>
</tr>
<tr>
<td>Unknown (Not sampled)</td>
<td>75</td>
<td>1,124</td>
<td>1.6</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>4,422</strong></td>
<td><strong>68,519</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

Since 1999, riparian and stream habitat conditions on the Forest have further improved or remained stable. These improved conditions were primarily due to improved livestock grazing practices, better dispersal of livestock at campsites, improved road drainage, removing stream crossing barriers to fish passage and implementing stream habitat enhancement projects.

Riparian conditions were reevaluated for the five allotments using the same methods as those in 1999 (Table 3.6.2); overall conditions were found to have improved or remained stable primarily due to improved livestock management, reductions in season or use, and non-use. A few localized high use areas still exist. These high use areas would be addressed through monitoring and adaptive management techniques.
### Table 3.6.2. Riparian Condition for Range Allotments (1999 vs. 2010)

<table>
<thead>
<tr>
<th>Allotment</th>
<th>District</th>
<th>Allotment PFC Condition</th>
<th>1999</th>
<th>2010</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td># of Polygons</td>
<td># of Acres</td>
</tr>
<tr>
<td>Little Rock</td>
<td>CF</td>
<td>PFC</td>
<td>1</td>
<td>9.4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>FAR</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>NF</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>U</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Washakie Needles</td>
<td>GB</td>
<td>PFC</td>
<td>5</td>
<td>56.7</td>
</tr>
<tr>
<td></td>
<td></td>
<td>FAR</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>NF</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>U</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Sugarloaf</td>
<td>GB</td>
<td>PFC</td>
<td>8</td>
<td>93.9</td>
</tr>
<tr>
<td></td>
<td></td>
<td>FAR</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>NF</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>U</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Bayer Mountain</td>
<td>WA</td>
<td>PFC</td>
<td>11</td>
<td>66.7</td>
</tr>
<tr>
<td></td>
<td></td>
<td>FAR</td>
<td>2</td>
<td>11.1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>NF</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>U</td>
<td>2</td>
<td>9.4</td>
</tr>
<tr>
<td>Middle Fork</td>
<td>WA</td>
<td>PFC</td>
<td>63</td>
<td>775.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>FAR</td>
<td>14</td>
<td>337.9</td>
</tr>
<tr>
<td></td>
<td></td>
<td>NF</td>
<td>1</td>
<td>18.7</td>
</tr>
<tr>
<td></td>
<td></td>
<td>U</td>
<td>2</td>
<td>4.2</td>
</tr>
</tbody>
</table>

**PFC = Proper Functioning Condition**  
**FAR = Functioning at Risk**  
**NF = Non-functioning**
Little Rock Allotment: An interdisciplinary team estimated there was one polygon 9.4 acres in size with riparian habitat greater than about 160 feet wide that intercepted Rock Creek on national forest lands within the allotment. This riparian polygon was rated as proper functioning condition.

The Little Rock Creek allotment currently contains about 3.4 miles of streams with fish in Little Rock Creek. In general order of dominance, fish species include brook trout and rainbow trout that were originally planted but now maintain self sustaining populations. There are no conservation populations of Yellowstone cutthroat trout (YCT), a Region 2 sensitive fish species. There are no mountain suckers or lake chubs (Region 2 sensitive fish species) in the allotment. There are no lakes with fish within the allotment.

Sugarloaf Allotment: Within the allotment, there were eight riparian polygons greater than 160 feet wide comprising about 94 acres. They were all rated as proper functioning condition.

Within the Sugarloaf allotment there are no known streams with fish due to the high elevation and small streams. There are no lakes with fish in the allotment.

Washakie Needles Allotment: An interdisciplinary team estimated there were five polygons comprising about 57 acres of riparian habitat greater than about 160 feet wide that intercept perennial streams on national forest lands within the allotment. All of the polygons were rated as proper functioning condition.

The allotment contains two streams with fish including YCT conservation populations. Rock Creek contains about 1.2 miles and South Fork Owl Creek contains about 1.8 miles of stream habitat. Rock Creek also contains mountain suckers, another Region 2 sensitive fish species.

Middle Fork Allotment: An interdisciplinary team estimated there were about 1,136 acres of riparian habitat greater than about 160 feet wide that intercepts perennial streams on national forest lands within the allotment. About 83 percent of the riparian acres were in proper functioning condition, about 16 percent were functioning at risk, and 0.4 percent were unknown.

The allotment contains nine streams with fish comprising about 32 miles of stream habitat including the Middle Popo Agie River and its tributaries. A variety of fish species are found including some mountain suckers and lake chubs (R-2 sensitive) where suitable habitat exists. Slough Creek contains about 1 mile of YCT conservation population habitat.

Bayer Mountain Allotment: An interdisciplinary team estimated that there were 15 polygons comprising 87 acres of riparian habitat greater than about 160 feet wide that intercept perennial streams on national forest lands within the allotment. About 98 percent of the riparian acres were in proper functioning condition and 2.2 percent were unknown.

The allotment contains about 3.5 miles of the Little Popo Agie River that contains a variety of fish species including mountain suckers (R-2 sensitive). Canyon Creek contains about 6.2 miles of stream habitat with brook trout. Spring Creek contains 0.1 miles of rainbow trout habitat. There are no streams with Yellowstone cutthroat trout conservation populations within the allotment. There are no lakes with fish in the allotment.
There are five lakes with fish within the Middle Fork allotment. They all contain only non-native brook trout.

**Table 3.6.3. Allotment Wyoming Game and Fish Department (WGFD) Streams and Lakes With Fish**

### Streams

<table>
<thead>
<tr>
<th>Allotment Name</th>
<th>District</th>
<th>WGFD Stream Name</th>
<th>Miles WGFD Str. 2007</th>
<th>Species Present</th>
<th>Miles Yellowstone Cutthroat Trout Conservation Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Little Rock</td>
<td>CF</td>
<td>Little Rock Creek</td>
<td>3.4</td>
<td>BKT, RBT</td>
<td>0</td>
</tr>
<tr>
<td>Washakie Needs</td>
<td>GB</td>
<td>Rock Creek</td>
<td>1.2</td>
<td>RBT, SRC, YSC</td>
<td>1.2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>South Fork Owl Creek</td>
<td>1.8</td>
<td>BKT, LND, MTS, RBT, SRC, YSC</td>
<td>1.8</td>
</tr>
<tr>
<td>Sugarloaf</td>
<td>GB</td>
<td>No streams with fish</td>
<td>0</td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>Bayer Mountain</td>
<td>WA</td>
<td>Little Popo Agie River</td>
<td>3.5</td>
<td>BKT, BNT, FRB, GDT, LKC, LND, LNS, MTS, RBT, SRC</td>
<td>0</td>
</tr>
<tr>
<td>Canyon Creek</td>
<td></td>
<td></td>
<td>6.2</td>
<td>BKT</td>
<td>0</td>
</tr>
<tr>
<td>Spring Creek</td>
<td></td>
<td></td>
<td>0.1</td>
<td>RBT</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td>9.8</td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>Middle Fork</td>
<td>WA</td>
<td>Middle Popo Agie River</td>
<td>15.7</td>
<td>BKT, BNT, CRP, FRB, LKC, LND, MTS, MWF, RBT, WHS</td>
<td>0</td>
</tr>
<tr>
<td>Stough Creek</td>
<td></td>
<td></td>
<td>1.1</td>
<td>BKT, CUT</td>
<td>1.1</td>
</tr>
<tr>
<td>Deep Creek</td>
<td></td>
<td></td>
<td>3.9</td>
<td>BKT, GDT</td>
<td>0</td>
</tr>
<tr>
<td>Pinto Creek</td>
<td></td>
<td></td>
<td>1.7</td>
<td>BKT</td>
<td>0</td>
</tr>
<tr>
<td>Ice Creek</td>
<td></td>
<td></td>
<td>0.8</td>
<td>BKT, GDT</td>
<td>0</td>
</tr>
<tr>
<td>South Fork Squaw Creek</td>
<td>3.8</td>
<td>BKT</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Squaw Creek</td>
<td></td>
<td></td>
<td>1</td>
<td>BNT, CRP, LND, LNS, MTS, RBT, WHS</td>
<td>0</td>
</tr>
<tr>
<td>Shoshone Creek</td>
<td></td>
<td></td>
<td>3.2</td>
<td>BKT</td>
<td>0</td>
</tr>
<tr>
<td>Baer Creek</td>
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<td>1.2</td>
<td>BKT</td>
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<tr>
<td>Total</td>
<td></td>
<td></td>
<td>32.4</td>
<td></td>
<td>1.1</td>
</tr>
</tbody>
</table>

BKT-Brook Trout, RBT-Rainbow Trout, SRC-Snake River Cutthroat trout, YSC-Yellowstone Cutthroat trout, LND-longnose dace, MTS-mountain sucker, GDT-golden trout, LNS-longnose sucker, MWF-mountain whitefish, WHS-white head sucker, FRB-Fall rainbow trout, LKC-lake chub, CRP-carp, CUT-cutthroat.
### Lakes

<table>
<thead>
<tr>
<th>Allotment Name</th>
<th>District</th>
<th>WGFD Lake Name</th>
<th>Acres of WGFD Lakes</th>
<th>Species Present</th>
</tr>
</thead>
<tbody>
<tr>
<td>Middle Fork</td>
<td>WA</td>
<td>Heart Lake</td>
<td>6</td>
<td>BKT</td>
</tr>
<tr>
<td>Park Lake</td>
<td></td>
<td></td>
<td>15.4</td>
<td>BKT</td>
</tr>
<tr>
<td>Pinto Lake</td>
<td></td>
<td></td>
<td>10.4</td>
<td>BKT</td>
</tr>
<tr>
<td>East Twin Lake (Buss Lake)</td>
<td></td>
<td></td>
<td>9</td>
<td>BKT</td>
</tr>
<tr>
<td>West Twin Lake</td>
<td></td>
<td></td>
<td>6.1</td>
<td>BKT</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td>46.9</td>
<td></td>
</tr>
</tbody>
</table>

### Environmental Consequences

#### Aquatic Life and Riparian Ecosystems
Most sediment delivered to streams comes from a source zone along streams whose width depends on topography, soils, and ground cover. Connected disturbed areas like roads and other disturbed soils near streams can deliver sediment during runoff events. Sediment deposits in streambeds can harm insect populations and fish reproduction.

Aquatic life can be degraded by migration barriers, changed flow regimes, riparian damage, or big sediment or chemical loads.

Riparian ecosystems provide shade, bank stability, fish cover, and woody debris to aquatic ecosystems. They also provide key wildlife habitat, migration corridors, sediment storage and release, and surface-groundwater interactions. Composition and structure of riparian vegetation can be changed by actions that remove certain species and age classes.

#### Grazing Management/Adaptive Management Options Effects

Generally, the effects of the Adaptive Management Options should have positive effects to stream, riparian habitat and the aquatic organisms that use them with proper administration and compliance. Temporary and permanent fences need to be maintained and repaired in order to produce the desired positive effects.

#### Effects to Aquatic Life and Riparian Ecosystems - Alternative 1

This alternative would improve aquatic life habitat and have a “beneficial” impact to sensitive species (Yellowstone cutthroat trout, mountain suckers, and lake chubs). Stream banks would not sustain trampling, browsing, or grazing from cattle. Without livestock grazing, riparian areas would improve, providing more improved habitat for the species. There would also be less human and cattle disturbance in riparian areas.

#### Effects to Aquatic Life and Riparian Ecosystems - Alternative 2

General effects of grazing options (adaptive management) summarized in Table 3.1.11 are applicable to aquatic life and riparian ecosystems.
This alternative would be a “may impact individuals, but not likely to result in a loss of viability on the planning area nor cause a trend toward federal listing” for the Yellowstone cutthroat trout, mountain suckers and lake chubs.

### 3.7 Wildlife and Wildlife Habitat

#### Affected Environment

##### General Existing Conditions for Wildlife Habitat

Trend and monitoring data have shown that habitat in these range allotments (Little Rock, Sugar Loaf, Washakie Needles, Bayer Mountain and Middle Fork) is meeting or moving towards desired conditions. Desired conditions include healthy and functioning streams and riparian habitats, sufficient forage production for both cattle and wildlife, and a high level of species diversity of grasses and forbs. There are some specific areas of concern where changes in management would be required to improve habitat conditions. Many of these problem areas are riparian areas where stream bank conditions do not have sufficient levels of vegetative cover and the deciduous vegetation is not as abundant as desired. These areas are discussed more in detail in the Aquatic Life and Riparian Ecosystem Section 3.6.

Effects to wildlife habitats in these allotments are discussed through analysis of the following sections.

##### Threatened and Endangered Species

All endangered and threatened species that occur or could occur (based on habitat presence) on the Shoshone were considered in this analysis (See Table 3.7.1). No proposed species are known to occur on the Forest. Effects analysis was completed for any species that occurs or could occur in the action area. Any species determined unlikely to occur in the action area was not carried forward in the analysis and given a no effect determination. A review of existing information relating to the distribution of habitats on the Forest, observations of species on the Forest and known areas of occupancy were used to prepare this report. Sources of information include Forest Service records and files, the Wyoming Natural Diversity Database, Wyoming Game and Fish Department and other federal wildlife agency information, and published research.

<table>
<thead>
<tr>
<th>Species</th>
<th>Status</th>
<th>Species occurrence on Forest</th>
<th>General habitat</th>
<th>Suitable habitat present in action area</th>
<th>Likelihood of species occurring in action area</th>
<th>Carry forward in analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Black-footed ferret (Mustela nigripes)</td>
<td>Endangered</td>
<td>No</td>
<td>Prairie dog towns</td>
<td>No</td>
<td>None</td>
<td>No</td>
</tr>
<tr>
<td>Gray wolf (Canis lupus)</td>
<td>Non-essential, experimental</td>
<td>Yes</td>
<td>Variable</td>
<td>Yes</td>
<td>Likely</td>
<td>Yes</td>
</tr>
<tr>
<td>Canada lynx (Lynx Canadensis)</td>
<td>Threatened</td>
<td>Yes</td>
<td>Mature forest</td>
<td>Yes</td>
<td>Not Likely</td>
<td>Yes</td>
</tr>
<tr>
<td>Grizzly bear (Ursus arctos horribilis)</td>
<td>Threatened</td>
<td>Yes</td>
<td>Variable</td>
<td>Yes</td>
<td>Habitat relationship and field knowledge</td>
<td>Yes</td>
</tr>
</tbody>
</table>

**Gray Wolf**

The gray wolf is federally listed as a non-essential experimental population in the Yellowstone ecosystem. The species was reintroduced into Yellowstone National Park in 1995 and began
dispersing onto the Shoshone in 1999. The Shoshone lies within the Greater Yellowstone Wolf Recovery Area. Concentrations of available prey occur on many areas of the Shoshone; thirteen (13) wolf packs (Beartooth, Hoodoo, Sunlight, Absaroka, Pahaska, South Fork, Elk Fork Creek, Carter Mtn., Butte Creek, Greybull River, Gooseberry, Washakie and East Fork) have home ranges that overlap National Forest System land on the Shoshone (Jimenez et al. 2010), and many of these home ranges include portions of the allotments in this analysis. Den sites for several of these packs have traditionally occurred on the Forest. The availability of stable prey base is the primary habitat requirement for this species. Available prey does exist in these allotments as many of these areas function as ungulate winter range.

Environmental Consequences

Effects to Gray Wolf - All Alternatives

When wolves were listed under the Endangered Species Act, the language included the statement “there are no conflicts envisioned with any current or anticipated management actions of the Forest Service” Federal Register (Vol 59, No. 244). Even with livestock grazing as a part of the Forest Service management, it was not foreseen that grazing, or any other management, would impact wolf populations enough to preclude recovery.

The wolf population met its recovery goals in 2002, and wolves continue to increase in number and distribution. The species has been proposed for de-listing. The biggest impact to wolves at this point is management removals due to livestock conflicts, both on public and private land.

The Shoshone grazing program contributes indirectly to these management removals, by providing the livestock that wolves are attached to as prey. None of the five allotments in this analysis have had any measurable conflicts that resulted in management removal of wolves (Hicks and Russell, 2010). Mike Jimenez, wolf biologist with U.S. Fish and Wildlife Service, has worked with the Forest Service and the permittees to reduce these conflicts as much as possible. He does not believe that there are any additional practices that could be implemented to further reduce the conflicts (Jimenez, 2009). Generally on the Shoshone, when wolves are removed, they are replaced quickly with offspring dispersing from other packs, so the removals are not leading to overall population decline. This is a short term population reduction as recruitment fills in the voids. These removals because of livestock depredation are a minor effect to total wolf population.

Therefore, this action including the grazing management options are not likely to jeopardize the wolf.

With no livestock present (Alternative 1), there would be no effect to the wolf.

Lynx

The U.S. Fish and Wildlife Service (FWS) published a Final Rule in the Federal Register for March 24, 2000 listing the North American lynx population in the contiguous United States as threatened, pursuant to the Endangered Species Act (USDI Fish and Wildlife Service 2000). At that time, consultation with FWS was done on livestock grazing on the Shoshone as well as other ongoing activities. The national forests in the Northern Rocky Mountains, including the Shoshone, recently completed a forest plan amendment (USDA Forest Service 2007a) that incorporates standards and guidelines for lynx based on the Canada Lynx Conservation Assessment and Strategy (USDA Forest Service et al. 2000).
The primary habitat for Canada lynx is subalpine fir, Engelman spruce, and lodgepole pine. Secondary foraging habitats are aspen, willow, and moist, cool Douglas-fir stands. Prey availability, especially snowshoe hare, appears to be a limiting factor for lynx in the Northern Rockies. Snowshoe hares require habitat of dense understory vegetation. Lynx will also use other habitats to travel through, such as grassland and sage habitats.

The Sugarloaf allotment is the only allotment that occurs within a Lynx Analysis Unit (LAU #20). This allotment is approximately 21,944 acres in size but only 3,999 acres are considered suitable for livestock grazing.

**Environmental Consequences**

**Effects to Lynx-All Alternatives**

Forested areas that lynx rely on are generally not impacted by livestock grazing. The Environmental Impact Statement for Northern Rockies Lynx Management Direction states that “the Fish and Wildlife Service, using the best scientific and commercial data presently available, has no information to indicate that grazing is a threat to lynx at this time.” Therefore, no standards were developed in the new direction for livestock grazing. Four guidelines were developed:

GRAZING GUIDELINE (G1): In fire- and harvest-created openings, livestock grazing should be managed so impacts do not prevent shrubs and trees from regenerating.

GRAZING GUIDELINE (G2): In aspen stands, livestock grazing should be managed to contribute to the long-term health and sustainability of aspen.

GRAZING GUIDELINE (G3): In riparian areas, and willow carrs, livestock grazing should be managed to contribute to maintaining or achieving a preponderance of mid- or late-seral stages, similar to conditions that would have occurred under historic disturbance regimes.

GRAZING GUIDELINE (G4): In shrub-steppe habitats, livestock grazing should be managed in the elevation ranges of forested lynx habitat in LAUs, to contribute to maintaining or achieving a preponderance of mid- or late-seral stages, similar to conditions that would have occurred under historic disturbance regimes.

None of the alternatives or grazing management options will violate these four guidelines. As the Shoshone continues to manage the grazing program and range conditions continue towards desired conditions (which would occur under either of these alternatives), these guidelines will continue to be followed. The No Action alternative would have no direct or indirect impacts on lynx. The action alternative would meet the above guidelines. Currently, there are no barriers to lynx movement through these allotments, and that would continue to be the case under either of these alternatives. Therefore, under any of these alternatives, impacts to lynx from any of the alternatives including the grazing management options will be immeasurable, and result in a No Effect determination.

**Lynx Critical Habitat**

Lynx Critical Habitat was designated on February 27, 2009. The Greater Yellowstone unit includes areas of the Shoshone. None of the allotments being analyzed are within the designated critical habitat area. The proposal then would have a No Effect determination on lynx critical habitat.
**Grizzly bear**

The Yellowstone grizzly bear population was removed from the threatened species list in April of 2007, after the population had exceeded recovery goals for several years. Grizzlies became re-listed as a federally threatened species in September of 2009 after successful legal challenge to the delisting process. Grizzlies are still expanding in number and distribution throughout the ecosystem. The Grizzly Bear Conservation Strategy was completed in 2003 in preparation for delisting, and although it is not Forest Service policy at this time, it represents the best available science for grizzly bear conservation and therefore is considered to be the standard used for grizzly bear management.

Grizzlies have variable habitat, and eat everything from carcasses to moths to whitebark pine seeds to garbage. The most important elements needed to stabilize grizzly bear populations are minimizing bear/human conflicts and protecting key food sources, such as whitebark pine and moth sites. Grizzlies occur across most of the Shoshone and may occur in all five of these allotments, but with a less chance of occurrence on the Middle Fork and Bayer Mountain allotments on the Washakie District. None of the five allotments in his analysis are within the Primary Conservation Area, where bears are of particular concern.

In 2003, a Biological Assessment (BA) was completed for the Shoshone grazing program. The determination was that the grazing program had an adverse effect on grizzlies as mortalities, mostly in the form of management removals, are associated with livestock grazing. The Shoshone entered into formal consultation with US Fish and Wildlife Service, and a Biological Opinion (BO) and Take Statement were issued by the Service. Recommendations from this document have been incorporated into the grazing program.

**Environmental Consequences**

**Effects to grizzly bear-Alternative 1**

With no livestock present, there would be no direct effects on grizzlies. The bears in these allotment areas would switch their diets to more natural foods and the risk of mortality from management removals due to conflicts with livestock would be eliminated. This alternative would have a “may affect, not likely to adversely affect” because of the beneficial effect of this action on grizzly bears.

**Effects to grizzly bears-Alternative 2**

When livestock graze on the Forest, there is always the possibility for conflicts with grizzly bears. Grizzly predation has not occurred in the last six years in any of the five allotments (Schwartz et.al., 2008, Bruscino, 2010 personal communication). Full time riders can be an effective tool limiting losses from bears that are observed regularly in allotment areas.

The analysis in the 2003 Biological Assessment (BA) concludes that livestock grazing has direct and indirect negative effects on grizzlies. Mortality occurs from illegal, accidental, self-defense kills and management removals associated with grizzly bear conflicts with livestock. When bears are successful at depredating on cattle, this conditions them to more conflicts with livestock and humans. Bears that are relocated because of predation issues are affected in their social and behavior patterns and may lose reproductive potential.

The recommendations developed in the Biological Opinion (BO) have been followed since it was received. The Shoshone is also complying with Grizzly Bear Conservation Strategy that requires monitoring of allotments with livestock conflicts, and recommends that allotments with recurring
conflicts be recommended for retiring if the permit is willing. The grazing management options incorporated into the grazing program will enable the Forest Service to react more quickly to developing problems than under current management.

This alternative including the grazing management options would be a “may affect, likely to adversely affect” for grizzly bears, as livestock grazing is inherently problematic for grizzlies.

**Regional Wildlife Sensitive Species**

All regionally designated sensitive species that occur or could occur (based on habitat presence) on the SNF were considered in this analysis (Harper, Joe. 2010). Effects analysis is completed for any species that occur or could occur within the project area. Any species determined unlikely to occur in the project area was not carried forward in the analysis and given a “no impact” determination. A pre-field review was conducted of available information to assemble species occurrence records for the area, describe habitat needs and ecological requirements, compare the habitat requirements of the species with the habitat present in the action area, and determine whether field reconnaissance was needed to complete this analysis. Also incorporated was a review of information relating to the distribution of habitats on the Forest, observations of the species on the Forest, known areas of occupancy, and fieldwork over the past several years. Sources of information included Forest Service records and files, the Wyoming Natural Diversity Database, Wyoming Game and Fish Department and other federal wildlife agency information, and published research.

A determination of “no impact,” “beneficial impact,” “may adversely impact individuals, but not likely to result in a loss of viability on the planning area, nor cause a trend to federal listing or a loss of species viability rangewide,” or “likely to result in a loss of viability on the planning area, a trend to federal listing, or a loss of species viability rangewide” is made for each sensitive species carried forward in the analysis.

Since these allotments occur across the forest and include most habitat types on the forest, most sensitive species that we know occur on the forest are included for analysis. These species will be grouped by habitat types for this analysis.

Some of these sensitive species are also management indicator species (MIS) for the Shoshone. If these species are chosen as a MIS for this proposal, additional analysis on forestwide habitat and population trends are provided. All MIS analysis tiers to the MIS Report, Version 7 produced by the Shoshone in 2007.

**Forest Species**

Sensitive species that utilize forested habitats are fringed myotis, Townsend’s big-eared bat, American marten, North American wolverine, northern goshawk, boreal owl, black-backed and three-toed woodpeckers, and olive-sided flycatcher. These species generally inhabit mature conifer or mixed conifer forests.

**Environmental Consequences**

**Effects to Forested Species—All Alternatives**

The No Action alternative would also have no direct or indirect effects on the forested environment. Therefore, the No Action alternative would be a “no impact” to these nine species.

While these species may be present in forested portions of these allotments, there are no direct or indirect impacts to forested habitats from livestock grazing. A few of these species (fringed myotis, Townsend’s big-eared bat, marten, goshawk, boreal owl) occasionally hunt in grassland and other open areas, but grazing would have an immeasurable effect on this infrequent behavior. If anything, grazing could increase hunting success for these predators by reducing forage cover.
The action alternative including the grazing management options (Alternative 2) would be a “no impact” on these nine sensitive species.

**Grassland/Sagebrush Species**

Sensitive species that utilize grassland and sagebrush habitats are Rocky Mountain bighorn sheep, ferruginous hawk, brewer’s sparrow, and Greater sage grouse. These species key in on different important features of the grass/sage habitat. Bighorn sheep require adequate forage, particularly in winter. Ferruginous hawks utilize this habitat for hunting small prey that require a plentiful mix of grasses and forbs. Sage grouse and brewer’s sparrow prefer a mosaic of sage and grass and forbs for seed and insect production.

Bighorn sheep is also an MIS for this project. Many bighorn sheep herds throughout the west have been struggling with diseases that are influencing population trends. Much of this problem is likely from contact with domestic livestock that can carry pathogens that bighorn sheep immune systems cannot battle. The Shoshone has no domestic sheep grazing allotments within core bighorn sheep range (defined by the Wyoming Game and Fish Department) but there is some recreational domestic goat use. Several of these allotments contain bighorn sheep winter range: Washakie Needles, Middle Fork and Bayer Mountain.
**Environmental Consequences**

**Effects to Sensitive Species (Grasslands/sagebrush)-Alternative 1**

In the short term, all these species would benefit from this alternative. There would be no competition for forage for bighorn sheep. Prey for ferruginous hawks would have plentiful seed and vegetation sources. Both brewer’s sparrow and sage grouse would benefit from a more natural sage/grass/forb diversity. Without some level of grazing however, either ungulate or livestock, in the long term, range vegetation may slowly become less vigorous and therefore less suitable for these species. The No Action alternative would be a “beneficial impact” to these four sensitive species, at least in the short term.

**Effects to Sensitive Species (Grasslands/sagebrush)-Alternative 2**

Range conditions are generally meeting or trending towards desired conditions in these allotments with current grazing practices. There are most likely some direct impacts from livestock on brewer’s sparrows in terms of cattle directly disturbing or destroying nests. There are some local areas where competition for forage exists between cattle and wintering bighorn sheep. Effects of this alternative would be similar to current management except there are more tools for managers to use to move more quickly toward desired conditions. This would be more beneficial for these species in the long term. This alternative including the grazing management options would be a “may impact individuals, but not likely to result in a loss of viability on the planning area nor cause a trend toward federal listing” for these four species.

Currently, most populations of bighorn sheep on the Forest have a stable trend, although several herds are well below objectives (2009 Shoshone monitoring report). In particular, bighorn sheep populations within the Middle Fork and Bayer Mtn. allotments are very low according to WGFD. None of these alternatives would measurably change the amount of quality of forage forest wide. In comparison, the No Action alternative would be the most beneficial for bighorn sheep as it would relieve the competition for forage, but that effect may not be measurable. None of the five allotments authorize the use of domestic sheep. Therefore, the habitat and population trends would remain the same under any of these alternatives.

Brewer’s sparrow is an MIS for this project. Current population trends on the Forest are stable (2009 Shoshone monitoring report). The No Action alternative could increase habitat forestwide and could result in a slight increase in population trends. Alternative 2 due to grazing management options allows for quicker changes if grass/sage areas are moving away from desired conditions. The action alternative would not result in habitat or populations trending downward. Overall, none of these alternatives would be likely to change current habitat and population trends for this species.

**Riparian species**

Sensitive species that use riparian habitats are water vole, river otter, trumpeter swan, harlequin duck, boreal toad, Columbia spotted frog, and northern leopard frog. Past water vole surveys show a known occurrence in one of these allotments, the Washakie Needles allotment. Past surveys for harlequin ducks occurred in 2002, 2007 and 2008. No harlequin ducks were observed in any of the five allotments. Amphibian surveys were done on the Shoshone in 2003, 2008 and 2009. Northern leopard frogs were found in the Middle Fork allotment in 2003.

While riparian conditions are generally good and improving, some localized areas exhibit effects of past intensive grazing levels. These effects may be trampled banks and low levels of
vegetation cover. Cattle trampling could cause mortality for boreal toad, Columbia spotted frog and water voles. Harlequin ducks are also sensitive to disturbance during their nesting season, so cattle (and riders) in allotments between late May and mid August may impact nesting.

**Environmental Consequences**

**Effects to Riparian Species-Alternative 1**

This alternative would not have any direct or indirect impacts on riparian species. Streambanks would not sustain trampling or browsing from cattle. Without livestock grazing, riparian areas impacted by cattle grazing would recover, providing better habitat for these species. This alternative would be a “beneficial impact” to these seven species.

**Effects to Riparian Species-Alternative 2**

Under this alternative, riparian areas may be able to recover from current or past problems by providing additional water sources to relieve pressure on the stream or other grazing options. There would still be the potential for direct impacts to some of these species, such as the amphibians and water voles. Overall, there would be more tools with which to improve problem riparian areas and prevent new impacts from occurring. This alternative including the grazing management options would be a “may impact individuals, but not likely to result in a loss of viability on the planning are nor cause a trend toward federal listing” for these seven species.

**Management Indicator Species**

Management indicator species (MIS) are wildlife species that help indicate habitat suitability for other species with similar habitat needs. MIS are used as planning tools to guide and monitor wildlife diversity on National Forest land. Seventeen wildlife species, and game trout, were selected during the forest planning process to be management indicator species (See Wildlife Specialist Report). Methods used to select indicator species or groups of species are explained in detail in the planning records for the Forest Land and Resource Management Plan. MIS habitat relationships were revalidated in 2002; the final report (November 27, 2002) is available at the Supervisor’s Office. Information regarding population trends is found in the 2009 Shoshone Monitoring Report.

Potential effects of this proposal were considered for all MIS whose habitat is present and that occur in the allotments analyzed, and that may be affected by livestock grazing activities. For this analysis, habitat exists for 14 species, but only 10 species could potentially be affected by livestock grazing in the analyzed allotments. Four of these species have already been analyzed in the sensitive species section, leaving six MIS to analyze here.

MIS analysis includes how this proposal affects the amount and quality of habitat in these allotments, habitat distribution and trends within the allotments and forestwide, and any changes the proposal may have on population trends.

**Elk/mule deer - Habitat/trend**

Elk and mule deer habitats are very similar and so these species were grouped for this analysis. These species utilize early successional forest and grassland/sage types. Elk and mule deer inhabit most portions of the Forest during some part of the year. Both species use three of the five allotments as winter range, they are Washakie Needles, Middle Fork and Bayer Mountain. Both the Sugarloaf and Washakie Needles allotments provide calving areas and summer range for elk.
In general, trends for elk herds across the Forest are stable and most are above objective (2009 Shoshone monitoring report). Mule deer herds for the most part are stable but are still below objectives, compared to the slight increases in recent years.

**Environmental Consequences**

**Effects to elk/mule deer-Alternative 1**

The lack of livestock grazing would improve forage quantity in these allotments as livestock would not be utilizing summer forage, and therefore more forage would be available for ungulates in the winter. Therefore, habitat quality would increase forestwide. In the long term, however, unless there is sufficient ungulate grazing pressure, plant vigor may decrease and grassland conditions may worsen over time therefore reducing available habitat across the forest.

**Effects to elk/mule deer-Alternative 2**

Currently these allotments are meeting or trending towards desired conditions. In some areas, there will still be competition for forage between cattle and elk (particularly in portions of the Sugarloaf allotment near the confluence of Slaughter Creek and the East Fork of the Wood River) (WGFD, 2010 Scoping Comment Letter), but overall forage levels are sufficient with current livestock use to maintain population levels above objective. Continuing livestock grazing with grazing management options would be more beneficial for elk and deer, as it allows more opportunities to fix problem areas and maintain better forage conditions. Habitat may improve somewhat at local levels but not measurable at the Forest scale, and population trends would be likely remain stable, although elk and deer numbers would continue to be heavily influenced by hunting seasons and regulations and increased predation.

**Moose - Habitat/trend**

Moose were selected for this analysis because they require deciduous riparian vegetation and aspen types that may be impacted by livestock grazing. Moose also use coniferous forest and shrubby browse species such as willow. Moose winter range occurs in the Middle Fork and Bayer Mtn. allotments.

Currently moose populations are in decline due to several years of drought, loss of habitat, increased predation and disease (2009 Shoshone monitoring report). Increased quality of riparian and aspen habitat could help.

**Environmental Consequences**

**Effects to moose-Alternative 1**

As discussed in the previous riparian habitat analyses, without livestock grazing, the health of riparian areas would improve. Willow and other deciduous plants would not be impacted by cattle and increase in vigor and number. This would result in better habitat for moose forestwide and in the long term, an upward trend in populations.

**Effects to moose-Alternative 2**

Utilizing grazing management options with current grazing management will allow better recovery of riparian areas and reduce the likelihood of new impacts to riparian resources. This
would result in better moose habitat throughout these allotments. An increase in riparian deciduous vegetation would not be enough to contribute to an upward trend in moose population.

**Beaver - Habitat/trend**

Beavers were selected for this analysis because of their dependence on deciduous riparian and aspen types that may be impacted by livestock grazing. Beavers inhabit permanent sources of water, preferring low gradient streams with adjacent willow communities. Beavers have declined over time due to drought, lack of dominant deciduous vegetation in riparian areas, and perhaps trapping (2009 Shoshone monitoring report). Habitat for this species is somewhat limited across the forest, especially in the Absarokas.

The Washakie District provides the most aspen communities and the most beaver habitat. In fall of 2007, forest wide beaver surveys were conducted. Of the five allotments analyzed for this report, the Middle Fork and Bayer Mtn. allotments showed the most signs of beaver activity.

**Environmental Consequences**

**Effects to beavers-Alternative 1**

Lack of livestock grazing would be beneficial to beavers. Without grazing, there would be no direct or indirect effects to beavers and their habitats. This alternative would allow currently impacted riparian areas to recover and ensure that no new impacts would occur. Willow communities and other deciduous vegetation favored by beavers would increase. Habitat in the allotments and therefore forestwide would increase resulting in a likely increase in beaver populations.

**Effects to beavers-Alternative 2**

Current grazing practices, with the addition of grazing management options, will continue to allow some riparian recovery and increase in willow, but some areas will still be impacted by grazing and not able to provide good beaver habitat. Livestock grazing also presents some direct effects to beavers such as trampling of beaver dams. Under this alternative, habitat and population trends for beaver would remain as they are currently.

**Ruffed Grouse - Habitat/trend**

Ruffed grouse were selected for this analysis because they require aspen types that may be impacted by livestock grazing. Ruffed grouse prefer dense forest with some deciduous trees, especially early seral stages dominated by aspen. They also utilize deciduous shrub types and riparian habitat. Grouse habitat is limited forestwide especially in the Absarokas when aspen in a limited cover type. There has been some increase in aspen recently as this has been a management focus.

**Environmental Consequences**

**Effects to ruffed grouse-Alternative 1**

This alternative would benefit grouse, as without grazing, the aspen communities would be relieved of browsing pressure and most likely increase to provide more habitat for grouse. Also, there would be no direct effects from livestock disturbing or destroying grouse nests. Habitat and population trends forestwide would likely increase slightly.

**Effects to ruffed grouse-Alternative 2**
This alternative would result in some browse on aspen, thereby maintaining less potential grouse habitat than would be possible without grazing. However, over time grazing management options may allow more flexibility to relieve some pressure on aspen. Also, livestock may have the direct effects of disturbing or destroying grouse nests. Habitat and population trends for grouse forestwide would not change from present under this alternative.

**Management Indicator Species Summary of Effects**

Both alternatives provide for meeting Forest Plan standards and guidelines for MIS. In particular, either alternative would continue to provide habitat for each species at the level of 40 percent of potential. The habitat acres presented in the Table 8 in the Shoshone National Forest Management Indicator Species Report, Version 7 (2007) for each species are over 40% of the potential that the Forest has for these habitat types.

**Priority birds**

Both the Wyoming Partners in Flight (PIF) group and the United States Fish and Wildlife Service (USFWS) have created lists of priority bird species for this area. The highest priority birds (conservation action) on the PIF list that occur on the Shoshone are Brewer’s sparrow, northern goshawk, peregrine falcon, and bald eagle, all of which have been addressed in the sensitive species section in this document.

The Shoshone is engaged in bird surveys as a part of the Monitoring Wyoming Birds project so is continuing to collect data and information about many of these birds and their occurrences on the Shoshone National Forest.

**Grazing Management/Adaptive Management Options Effects**

The effects of the adaptive management options selected for this project and previously identified have various effects to wildlife and their habitat. For the most part, the options can have be a benefit for wildlife when options are used to improve the vegetative condition of the allotment. Specific options and their effects on wildlife are addressed in Table 3.7.4.
Table 3.7.4. Specific Effects of Grazing Management Options on wildlife.

<table>
<thead>
<tr>
<th>Management Option</th>
<th>Effects of this Option</th>
</tr>
</thead>
<tbody>
<tr>
<td>Change season of use (length of season not to be extended beyond permitted AUMs).</td>
<td>Ground nesting birds could negatively be affected if season of use is too early. If this early in the season is utilized, spring bird surveys would be recommended to identify areas of potential conflict. Late season or fall use could increase the chance of bear/livestock conflicts as grizzly bears prepare for winter hibernation by looking for high protein food sources.</td>
</tr>
<tr>
<td>Change Livestock numbers-(within permitted AUMs).</td>
<td>Increased numbers could have a negative effect if used on areas that provide winter range for big game.</td>
</tr>
<tr>
<td>Change livestock class.</td>
<td>Switching to yearlings could increase the chances of bear/livestock conflicts as this age segment of the livestock population tends to lack the knowledge to avoid conflict that older cows acquire.</td>
</tr>
<tr>
<td>Adjust livestock grazing intensity and/or duration-(within permitted AUMs).</td>
<td>Increased grazing intensity could have a negative effect if used on areas that provide winter range for big game. Decreased grazing intensity would have a positive effect if used on areas that provide winter range for big game.</td>
</tr>
<tr>
<td>Adjust livestock herding to manage specific areas of concern.</td>
<td>Using herding can have a positive effect on grizzly bears as human presence can deter bears from preying on livestock.</td>
</tr>
<tr>
<td>Rest specific areas from livestock grazing or enact non-use for resource protection.</td>
<td>This would have the same, but short-term effect as discussed in the effects analysis for Alternative 1.</td>
</tr>
<tr>
<td>Create, modify, or remove allotment infrastructure.</td>
<td>Building new fence can impede big game movement while removing fence when not being used for riparian protection, can have a positive effect on big game.</td>
</tr>
</tbody>
</table>

3.8 Goods and Services/Environmental Justice

Affected Environment

Goods and services provided by or derived from the five affected allotments, including beneficial water uses and animal unit months for commercial livestock grazing; contribute to social, economic, and/or ecological sustainability. These goods and services provide important contributions to the sustainability and growth of local communities.

Forest management policies, direction, activities, and opportunities are important to the social and economic sustainability of local communities. The majority of lands in the counties surrounding the Shoshone National Forest (SNF) are federal or tribal lands. Water originating on the Shoshone is vitally important to downstream communities for both consumptive and non-consumptive uses. Commercial livestock grazing on the Shoshone sustains ranches and maintains open working private landscapes and wildlife habitat.

In 2007, 62,569 animal unit months of commercial livestock grazing were permitted on the SNF. The total economic impact estimates for Shoshone livestock grazing range from 52 to 158 jobs and $1.7 to $5.3 million in labor earnings (Taylor et al. 2008). Which of these values is the most relevant depends on a number of factors, including the individual ranch’s level of dependency on Forest Service grazing, the magnitude of the change in grazing, the financial solvency of the ranch, the availability of alternative sources of forage, and the desire of the rancher to remain in ranching. For small changes in permitted grazing, the lower numbers may be the most appropriate. For larger changes where the economic viability of the ranching operation is uncertain, the larger number may be the most appropriate.

For the North Zone of the SNF, communities in Park and Hot Springs Counties that are affected the most by livestock grazing on the SNF and the Proposed Action or alternatives include Big Horn Basin communities: Cody, Powell, Meeteetse, Clark, Emblem, Worland and Thermopolis. These are the communities where existing permittees live, recreate, socialize, and purchase food.
and supplies. There are several small communities, such as Meeteetse and Clark, with particularly pronounced cultural ties to traditional land users, including livestock grazing on Forest lands. These communities may be more vulnerable to cultural disruption due to changes in Forest Service permits than other communities.

For the South Zone of the SNF, communities in Fremont County affected by livestock grazing on the SNF include Riverton, Lander, Fort Washakie, Dubois, Kinnear, Crowheart and Lysite. There are several small communities, such as Dubois, Fort Washakie, Kinnear, Crowheart and Lysite, with particularly pronounced cultural ties to traditional land uses, including livestock grazing on Forest lands. These communities may be more vulnerable to cultural disruption due to changes in Forest Service permits than other communities.

**Environmental Justice**

Executive Order (EO) 12898 (February 11, 1994) directs Federal agencies to focus attention on the human health and environmental conditions in minority communities and low-income communities. The purpose of EO 12898 is to identify and address, as appropriate, disproportionately high and adverse human health or environmental effects on minority populations and low-income populations.

Table 3.8.1 shows the minority characteristics of the three counties compared to Wyoming state statistics. Table 3.8.2 shows county and state poverty statistics, percent of individuals living below the poverty level, as defined by the U.S. Census Bureau. Because none of the counties in the project area contain low-income or minority populations as defined by EO 12898, no additional outreach or analysis has been completed. Low-income populations exist if 20% or more of the total population is at or below the poverty level, and a minority population exists if 50% or more of the total population is considered minority. Any management actions taken on the Shoshone National Forest would affect the surrounding population in a similar way – the potential impact would be felt proportionally by the total population surrounding the Shoshone.

**Environmental Consequences**

**Effects to Goods and Services-Alternative 1**

There would be no permit(s) issued for commercial livestock grazing.

The No Action alternative would impact ranching and goods and services the most; affecting the social and economic sustainability of local communities. Commercial livestock grazing on the Shoshone sustains ranches and maintains open working private landscapes and wildlife habitat, Alternative 1 would increase the risk of loss of open space and wildlife habitat on private ranches. The communities listed in the affected environment would be vulnerable to cultural disruption due to any changes in Forest Service permits, small ranching communities would experience
increased negative socio-economic impacts if existing permittees that live, recreate, socialize, and purchase food and supplies in those communities go out of the livestock business.

Since permittees and individual ranches depend to varying degree on Forest Service grazing, the magnitude of the change in grazing, the financial solvency of the ranch, the availability of alternative sources of forage, and the desire of the rancher to remain in ranching are all factors concerning the economic viability of the ranching operation. For minor changes in permitted grazing, the impact may be small. For larger changes or the elimination of grazing permits under Alternative 1, the impact to ranchers and local communities may be large depending on the factors above and the economic viability of the ranching operation may be at risk.

Other factors such as the rise of decline of cattle prices, increasing lands prices, increasing subdivision and sale of agricultural land, shortage of private land available for grazing leases, and the uncertainty concerning potential changes in fees and stocking rates on federal land may also directly or indirectly affect economic viability.

Given that no minority or low-income populations are identified in the affected area, there would be no disproportionate effect from any alternative on such populations regarding environmental justice concerns or factors.

The extent of local dependence on federal grazing has opposing views and the debate over public land grazing and its economic importance has proved to be very controversial. Alternative 1 has more potential than Alternative 2 to affect grazing permittees, the ranching industry, and local communities, see Alternative 2 discussion below.

**Effects to Goods and Services-Alternative 2**

The Proposed Action alternative would impact ranching and goods and services substantially less than Alternative 1; grazing permits and grazing management would continue and help to sustain the local communities’ social and economic viability. Commercial livestock grazing on the SNF sustains ranches and maintains open working private landscapes and wildlife habitat; therefore, Alternative 2 would decrease the risk of loss of open space and wildlife habitat on private ranches.

Other factors such as the rise of decline of cattle prices, increasing lands prices, increasing subdivision and sale of agricultural land, shortage of private land available for grazing leases, and the uncertainty concerning potential changes in fees and stocking rates on federal land may also directly or indirectly affect economic viability. The actions discussed in this document have little or no influence on cattle or land prices. Alternative 1 may contribute to the loss of open space; the extent to which livestock grazing continues under Alternative 2 may have a positive influence on reducing potential loss of open space from the sale of agricultural land.

The communities listed in the affected environment would be vulnerable to cultural disruption due to any changes in Forest Service permits, small ranching communities would experience increased negative socio-economic impacts if existing permittees that live, recreate, socialize, and purchase food and supplies in those communities go out of the livestock business. This disruption would be aggravated should Alternative 1 (No Action) be the selected decision and livestock grazing eliminated.

Since permittees and individual ranches depend to varying degree on Forest Service grazing, the magnitude of the change in grazing, the financial solvency of the ranch, the availability of alternative sources of forage, and the desire of the rancher to remain in ranching are all factors concerning the economic viability of the ranching operation. For minor changes in permitted grazing, the impact may be small and the economic viability of the ranching operation may not be at risk. For bigger changes or the elimination of grazing permits as under Alternative 1, the
impact to ranchers and local communities may be large depending on the factors above and the economic viability of the ranching operation may be at risk.

Given that no minority or low-income populations are identified in the affected area, there would be no disproportionate effect from any alternative on such populations regarding environmental justice concerns or factors.

In Wyoming and on the SNF, Forest allotments are important to the economic viability of ranch operations as part of multiple pasture rotation. Many cattle ranches depend on summer pasture off the ranch in order to raise winter feed for the livestock.

The extent of local dependence on federal grazing has opposing views and the debate over public land grazing and its economic importance has proved to be very controversial. Differences in opinions exist, some argue that the loss of grazing privileges on public land leading to ranchland development and subdivisions and the loss of open space is a perceived connection with little factual basis (Wuerthner, G). Some argue that the economy of the West is changing, and that employment and income is less dependent on agriculture and ranching (Sonoran Institute, 2003). There is little agreement on the economic importance of grazing on federal lands, and it remains an emotional issue in the West and an ongoing public land policy issue (Powers, T.).

3.9 Heritage Resources

Affected Environment

As of the year 2007, approximately 8% of the SNF has been surveyed for heritage resources. Nearly 1,100 cultural sites have been recorded. Data collected from these inventories and sites provides a basis for estimating where sites may or may not occur, the types of physical evidence that remains on these sites, and an important contribution to our understanding of past human land use and settlement patterns. Cultural resources on the Shoshone National Forest include one National Historic Landmark (NHL) and six sites listed on the National Register of Historic Places (NRHP). The Forest also has identified eight Priority Heritage Assets (PHA), some of which are National Register-listed properties.

Field Surveys

All allotments associated with this EA will be surveyed for Section 106 compliance with the National Historic Preservation Act (NHPA). Results of the Section 106 review will be incorporated into the Final environmental assessment. Surveys are to be completed during the 2010 field season.

All field surveys are conducted in accordance with the Programmatic Agreement Among the U.S.D.A. Forest Service, Wyoming Forests, Wyoming State Historic Preservation Officer, and Advisory Council on Historic Preservation Regarding Compliance with the National Historic Preservation Act on the National Forests and Grasslands of Wyoming (PA) (Region 2 Agreement # 09-MU-11020000-003).

Entire grazing allotments are not surveyed; rather, intensive survey focused on areas where high cattle-use zones overlap with areas of high site probability. High cattle-use zones were provided by forest range personnel, and high site probability zones were identified by the forest heritage program leader. Specific criteria for selecting Class III survey areas are outlined in the MOU and PA. All survey blocks are surveyed to Wyoming State Class III standards. Previously recorded historic properties situated within the high cattle-use zones and high site probability areas will be relocated during the field surveys to assess grazing impacts. Sites listed as unevaluated for the National Register of Historic Places (NRHP) and situated within overlap areas also will be relocated, evaluated, and inspected for grazing impacts.
The field survey results will be reported to the State Historic Preservation Officer (SHPO) and SHPO concurrence obtained for the affected allotments to determine that grazing impacts do not constitute an adverse effect at historic properties in these grazing allotments.

**Environmental Consequences**

**Effects to Heritage Resources-Alternative 1**

Direct effects associated with the No Grazing Alternative include decreased trampling and cattle trail incision, which would eliminate artifact displacement, breakage and archaeological deposit disruption directly related to cattle presence.

It is possible that artifact collection practices would decrease if fewer members of the public were exposed to archaeological materials in these allotments (e.g., permittees, herders, etc.).

Under Alternative 1 there would be a reduction in the number and type of future federal undertakings (e.g., permit issuance, stock tank installation, fencing, etc). The reduction of future undertakings under Alternative 1 would reduce National Historic Preservation Act (NHPA) Section 106 compliance-related cultural resource surveys. This may result in fewer cultural resource discoveries and recordings. However, non-Section 106 related historic and archaeological inventories and research would not be prohibited or reduced as a result of the “No Grazing” alternative.

**Effects to Heritage Resources-Alternative 2**

Direct effects from grazing can include: artifact breakage or displacement from trampling, sediment and archaeological deposit damage from trampling and cattle trails, artifact exposure and displacement from loss of vegetation and erosion, and damage from cattle rubbing against rock art, features, or structures (e.g., cairns, traps, cabins, petroglyph/pictograph panels).

Direct effects from grazing include trampling, which can result in artifact displacement, breakage, and/or loss, and the disturbance of sediments and archaeological deposits. Studies have documented the effect of artifact displacement due to trampling (Burger et al. 2008). A study by Burger et al. (2008) showed an average artifact horizontal displacement of 60cm in high cattle use test plots (Burger et al. 2008). Burger et al. (2008:224) have documented a 54% loss rate of recorded surface artifacts in highly trampled survey plots.

Imprints from trampling can also affect vertical context of archaeological deposits. Hoof imprints averaging 17.1 mm in depth have been recorded in previously burned areas lacking vegetative cover (Todd 2009:9). In un-burned areas, where vegetation cover is present, hoof imprints average 13.3 mm in depth (Todd 2009) Effects from trampling are enhanced in areas that have been previously burned.

Loss of vegetated cover in areas of high cattle congregation occurrence (e.g., stock tanks, salting areas), can have direct effect upon cultural resources. The loss of vegetation can increase erosion, which can lead to artifact displacement/loss. Also, the loss of vegetative cover increases artifact exposure, which may increase the frequency of unauthorized artifact collection.

Indirect effects from grazing include those effects associated with the human or public aspect. Public presence (e.g., permittees, ranchers) at historic sites and archaeological resources is increased over the no action alternative. Increased public presence can often result in increased vandalism, such as artifact collection.

Indirect evidence of artifact collection has been documented within grazing allotments on the Shoshone National Forest. Forest partners conducting archaeological site monitoring (Todd and
Burnett 2009:22) have reported encounters with surface collectors, the presence of “collector’s piles”, and artifact loss. Artifact collection is more prominent in previously burned areas, where artifact exposure is enhanced due to lack of vegetative cover (Todd 2009). Increasing human activity in high site density areas, particularly those areas that have been recently burned and have high ground visibility/artifact exposure, increases impacts to cultural resources in the form of artifact collection.

**Direct and Indirect Effects to Individual Allotments**

Once completed, field surveys for this environmental assessment may reveal sites in individual allotments and more site-specific impacts. Results of the Section 106 review will be incorporated into the Final environmental assessment.

**All Allotments**

To reduce indirect effects from artifact collection, and increase resource protection awareness, all grazing permits would include Archaeological Resource Protection Act (ARPA) and Code of Federal Regulation (CFR) specific language as discussed in the project design (EA, Section 2.4).

**3.10 Recreation**

**Affected Environment**

Recreation was not identified as an issue or concern during scoping and will only be briefly discussed here. As identified in the range affected environment section, the Middle Fork allotment is a major corridor for recreationists to access much of the high country and specifically the Cirque of the Towers. The grazing permittee is well aware of the high visibility and grazes the allotment with these people in mind to minimize resource conflicts. There have been no documented negative confrontations or problems since 2004 when the current permittee started using the allotment. Livestock are kept out of Sinks Canyon during the “One Shot” sight-in during September.

As identified in the range affected environment section, for the Bayer Mountain allotment the only conflict with other users that has surfaced in recent years is the increased ATV use. Gates have been left open, particularly during hunting season, allowing livestock into units already grazed. These situations are usually corrected within 24 hours due to the range rider on site daily.

**Environmental Consequences**

**Effects to Recreation-Alternative 1**

There would be no permit(s) issued for commercial livestock grazing.

This alternative would eliminate any conflicts that exist between recreationists and commercial livestock grazing that may exist. Recreationists who object to livestock grazing, potential impacts to aesthetics, or occurrences such as cattle on roadways or getting into campgrounds, etc. would be reduced or eliminated.

**Effects to Recreation-Alternative 2**

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. Off-highway vehicles, primarily ATVs and motorcycle have increased and use potentially impacts livestock distribution and environmental conditions in many riparian areas.

There are also developed trail systems used by horse riding and packing, hikers, and in non-wilderness areas, mountain bikers that may impact rangeland health 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 consumed forage that should be available later in the season.

Increased ATV use is occurring across the SNF. The Forest implemented travel management planning and a Motor Vehicle Use Map (MVUM) in January 2010. This restricts all motorized use to open roads and would have a beneficial effect on limiting illegal motorized use and environmental conditions such as off-road use in riparian areas, including all five allotments in the project area, and specifically the Middle Fork allotment and Bayer Mountain allotment.

3.11 Cumulative Effects

Temporal and Spatial Scope: This section considers the effects on the environment resulting from incremental impact of the alternatives analyzed in detail, when added to other past, present, and reasonably foreseeable action and trends. Where no cumulative effects have been identified, such is noted.

Unless otherwise stated, the spatial and temporal scales are the affected 6th order watersheds and 20 years into the future.

3.11.1 Past, Present, and Reasonably Foreseeable Future Actions

Past and present actions include both human and natural disturbances that have an effect on vegetation composition and structure. Past and present actions include human and natural disturbances that have had an effect on vegetation. Human activities with the most influence on vegetation in the analysis area include the introduction of non-native species and livestock grazing. Other human activities, including fire suppression and recreational uses have also impacted vegetation composition and structure. Natural disturbances include, but are not limited to, insects and disease outbreaks, wind events, fire, landslides, floods, and ice and freeze damage. Below are the main past and present actions considered in the cumulative effects analysis:

- Livestock grazing
- Recreation use
- The Forest implemented travel management planning and a Motor Vehicle Use Map (MVUM) in January 2010.
- Prescribed burning
- Past human-caused or natural ignited fires with fire suppression
- Invasive or noxious weeds/weed control efforts
- Timber harvest
- Beetle infestation of forested areas

Below are reasonably foreseeable future actions anticipated to occur in the next 20 years in the analysis areas that could affect vegetation or other uses.

- Continued livestock grazing
- Invasive or noxious weeds/weed control efforts
- Increased recreation use
- Continued fire suppression
- Continued prescribed burning
- Naturally ignited fires managed as fire use fires
- Land exchanges or acquisitions
- Timber harvest
- Ongoing beetle infestation
• Ongoing and future actions in the Bayer Mountain allotment includes fuels reduction work: Past actions include mechanically treating 1030 acres north of Forest Road 352 in 2007 and 2008 and burning the activity fuel created by the mechanical treatment; future action includes approximately 400 acres remaining to burn to complete this project. Past actions also include a completed unit of 1450 acres that has been mechanically treated and burned (North of Canyon Creek).

3.11.2 Cumulative Effects Related to Resources

Cumulative Effects to Rangeland Resources
Cumulative effects were analyzed for the project area. Private lands within or near allotment boundaries were also considered.
In considering the past 50 years of grazing management, management has continuously improved and evolved, addressing issues such as rangeland condition, wildlife habitat needs, watershed and riparian health, and other resource user needs. Likewise, resource conditions have generally improved as stocking rates have been adjusted to more closely reflect carrying capacity and multiple use demands.
Today, the combination of historic grazing practices and present grazing practices has resulted in the current conditions in the project area today. Alternative 1, No Action, removes permitted livestock grazing, but grazing by recreational livestock and grazing by big game would still be occurring. Grazing by wildlife and the expected increase in recreational use would still affect vegetation.
In considering past, present and reasonably foreseeable future actions:
Some adjacent private lands have been developed into ranchettes. Some property owners graze livestock (primarily horses) on their property. Some overgrazing on private land does occur, which has the same impact of reducing the vegetation cover, increasing the amount of sediment transported into the streams, and increasing the likelihood of noxious weed infestations.
Population growth in and around some of 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 horse riding and packing, hikers, and in non-wilderness areas, mountain bikers. Recreation can have adverse effects on range conditions and livestock grazing. 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 cuts, cuts and unvegetated areas across portions of upland, transition and riparian zones. Some recreationists also leave gates open. 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.
In the future, grazing management will continue to address issues such as rangeland condition, wildlife habitat needs, watershed and riparian health, and other resource user needs. Alternative 2 provides the flexibility for management to evolve and improve.

Cumulative Effects to Wildlife Resources
Cumulative effects on threatened and endangered species would be from past timber sales and fuels treatments, and decades of fire suppression on federal as well as state and private lands. These activities have resulted in some areas of the landscape being outside of the range of natural
conditions. Past intense levels of livestock grazing have also left lasting effects that changed conditions from natural regimes. More recently, insects and disease are changing forested landscapes and creating more dead trees and will soon be adding down wood to the forest floor. Human development of private land is affecting habitat availability for wolves and lynx and will continue to have these effects in the future. None of the alternatives in this proposal will add any measurable effects to these threatened and endangered species.

Several factors are currently having effects on sensitive species habitats. In forested environments, past and future planned timber harvest and fuels treatments have changed and will change the character of some areas. Insects and disease are causing high levels of tree mortality currently in many areas of the Forest. Past intensive livestock grazing resulted in lasting changes in plant composition in some grassland and riparian environments. In some forested habitat types, decades of fire suppression has caused areas to be outside of natural conditions, which means mostly areas of conifer encroachment to grassland or riparian areas. Human developments are continuing to increase on private lands outside the Forest boundary. This results in less available habitat for many species, and problems with connectivity between areas of suitable habitats.

The effects from any of these alternatives on these sensitive species are small and would not have any cumulative effects.

**Cumulative Effects to Soils**

Detrimental soil disturbance caused by grazing for each allotment was analyzed under the existing conditions section. All allotments were estimated to have detrimental soil disturbance below 1%. These estimates took in to account trailing along the fence lines and drainages as well as impacts from water developments and salt licks. Past, present, and reasonably foreseeable actions such as permitted domestic livestock grazing, recreational livestock, and timber activities could affect soil compaction. Under Alternative 2, these actions could have a small cumulative impact to soil compaction because livestock would continue to graze. This is particularly a concern for areas of alpine soils which have inherent low productivity due to shallow soils and short growing seasons.

None of the alternatives would increase detrimental disturbance over existing conditions. Alternative 1 would improve soil conditions over time by removing all permitted livestock. Alternative 2 does not increase stocking rates above existing levels. As discussed in direct and indirect effect sections, the expected detrimental soil compaction is less than 1% of the allotment. There may be a very small addition to the allotments from building new fences and water tanks. These detrimental effects would be offset by the positive effects of better livestock distribution and forage utilization. Adding impacts from permitted grazing, recreational livestock, and timber activities, the cumulative effects to soil productivity from soil compaction is expected to be within regional guidelines and will not exceed 15%.

For erosion hazard, it is expected that the amount of bare ground within the allotments to remain static or decreased based on the alternative selected. According to range transects data, the allotments in this analysis generally have bare ground that is generally decreasing. Range transects under current management generally show that range conditions have been steadily improving over the last 30 years. Erosion hazard will continue to decrease as range condition and trend continue to improve.

No negative cumulative effects for soils are expected under any alternative. Alpine soils are the exception because of their inherent low productivity due to shallow soils and short growing seasons. Use over time by cattle use may cause a decline in soil productivity.
Conditions that effect geologic hazards will remain constant under both alternatives. Cumulative effects of grazing on geologic hazards will be minor.

**Cumulative Effects to Botanical Resources**

Past, present, and reasonably foreseeable actions in the five allotments in this analysis include, mining, grazing, timber sales, wild fires, prescribed fires, fire suppression, noxious weed treatment, water developments, road building, and recreation. Soil disturbance, introduction of invasive species, increased fuel loading, competition from non-native species, and changes in micro site moisture and hydrologic regimes may negatively affect sensitive plant habitat over time.

For upland vegetation, under Alternative 2 grazing will continue at the current levels. Range transect data show that range condition and trend have improved over the last 30 years. Adaptive management practices under Alternative 2 would be used to address allotment upland vegetation conditions. No negative cumulative effects for upland vegetation are expected under either alternative. Alpine vegetation is the exception because of their inherent low productivity due to shallow soils and short growing seasons. Excessive cattle use over time cattle may cause a change in vegetative composition.

Under Alternative 1 (no grazing) current livestock grazing management would continue for at least one to three years after which time livestock grazing in on the allotments would be discontinued. Since there would be little or no direct or indirect effects from the cessation of livestock grazing it would mean that cumulative effects would also be negligible.

Under Alternative 2, Timely monitoring and implementation of appropriate adaptive management methods when unacceptable impacts are discovered is essential in order to keep these negative impacts to a minimum. The cumulative effects of livestock grazing would continue under Alternative 2. Adaptive management strategies may decrease overall grazing intensity in areas of sensitive plant habitat.

For special areas and unique habitat, domestic livestock grazing under these alternatives and any future range NEPA will not have any cumulative effects on current and proposed Forest Research Natural Areas and Special Interest Areas. Under all alternatives and future projects there might be minor cumulative effects on unique sensitive plant habitat.

**Cumulative Effects to Invasive Plant Species**

Domestic livestock grazing would continue being one of the many vectors of spread of noxious weeds. Noxious weed introduction will continue via recreationists, wildlife, road systems, and other disturbances. Under both alternatives and any future projects there will be a cumulative potential for further noxious weed spread.

**Cumulative Effects to Watershed Resources**

Cumulative effects to watershed resources include environmental effects associated with all past, present, and future activities occurring within a sixth-level analysis area watershed. Past, present, and reasonably foreseeable activities that may affect watershed resources were integrated into the cumulative effects analysis and discussion. Activities considered include: livestock grazing, recreation, fire suppression, prescribed burning, landscape scale vegetation shifts, private land inholdings, outfitter camps, structural improvement maintenance, and timber harvest.

Potential cumulative effects for aquatic resources include degradation to water quality through increases in fine sediment deposition, pollutants, and bacterial contamination. Livestock grazing and recreation activities augment streambank erosion, sediment deposition, and bacteria concentrations. Recreation use and timber harvest increase the potential for fine sediment and pollutants to enter streams and lakes. And fires have the potential to promote sediment delivery and increase nutrient availability. Together, these activities add cumulatively to current livestock
grazing and increase the susceptibility of a watershed to receive damage from a natural event or human cause.

Alternative 1 (no grazing) would improve aquatic resources within and downstream of the project area, as livestock grazing would cease and would not add cumulatively to impacts from any past, current, or reasonable foreseeable actions. Hydrologic conditions, such as in-stream erosion and sedimentation, would improve following the removal of livestock, and in response, the effects of other activities would lessen and contribute to improved watershed health. Alternative 2 (adaptive management) poses a risk for localized negative cumulative effects to occur to aquatic resources, as livestock grazing continues. BMPs and standards and guidelines would be met, which provide adequate protection for hydrologic and watershed resources within the allotment boundaries. With adequate protection, measurable incremental effects would not occur; therefore, implementing Alternative 2 would not add cumulatively to past, current, or reasonable foreseeable actions.

Cumulative Effects to Goods and Services/Environmental Justice

A specific consideration of equity and fairness in resource decision-making is encompassed in the issue of environmental justice. As required by law and Title VI, all federal actions will consider potentially disproportionate negative impacts on minority or low-income communities. No disproportionate negative effect on or changes to low-income or minority communities associated with the project/analysis area due to the Proposed Action and alternatives were identified.

Socio-economics in the planning area is based on farm/ranch agriculture being a major industry. Recreation and tourism and associated services and oil and gas are also major contributors to the overall economy in the region. Goods and services, including commercial livestock grazing and animal unit months, provided by or derived from the SNF contribute to social, economic, and/or ecological sustainability. These goods and services provide important contributions to the sustainability and growth of local communities. When considered collectively with the current economic slowdown, Alternative 1 would contribute to joblessness and a decline in sustainability and growth of local communities and the possible loss of open space. Conversely, the cumulative effect of Alternative 2 would contribute toward community sustainability and growth and the preservation of open space.

Local residents and other public land users exhibit attitudes and values typical of a rural farm/ranch oriented society in the western United States. Residents value the rural character of the area, wide-open spaces, naturalness and solitude. Positive aspects of the area include the independence and industriousness of the local people, lack of urban problems, relaxed pace, and personal freedom. Residents have a strong sense of heritage.

Farms/ranches are predominately family operations with a long history in the area. Many of these ranches have grazing leases/permits. Changes that potentially can incrementally affect these ranches include increasing recreation in the area and implementation of changes in federal grazing policies, fees, and permits.

Local communities would be vulnerable to cultural disruption due to any changes in Forest Service permits, small ranching communities such as Meeteetse would experience increased negative socio-economic impacts if existing permittees that live, recreate, socialize, and purchase food and supplies in those communities go out of the livestock business. This disruption would be aggravated should Alternative 1 be the selected decision and livestock grazing eliminated through this range analyses or any future Forest Service range analyses or changes in potential fees and stocking rates for grazing on federal land.
Implementation of Alternative 2—the Proposed Action would create beneficial impacts to affected resources. The positive cumulative impacts would result from making progress toward achieving desired conditions. Long-term stability of the livestock industry would be supported through the authorized use of NFS lands. Allotment monitoring and evaluation would ensure that if resource conditions change on allotments, appropriate management actions (adaptive management) would be taken to ensure that progress toward desired conditions is being made.

Alternative 2 could create short-term economic impact on permittees with allotments not meeting desired conditions. The Forest Service would require grazing management changes or range improvements to maintain, meet, or move toward desired conditions. In the long-term, proposed changes and adaptive management would lead to healthy rangelands and sustainable livestock grazing.

**Cumulative Effects to Heritage Resources**

For the No Action Alternative, past, future and foreseeable activities within the allotments include vegetative and fuels management activities (e.g., timber harvest, prescribed burns), road construction, and outfitter guide and recreation activities. All of these activities may have cumulative effect on heritage resources in the form of increased ground disturbance and exposure, and increased visitor use and traffic which may lead to vandalism. Many grazing related impacts are enhanced in post-burn areas, including soil erosion, ground exposure, artifact collection, and trampling. These impacts, specific to grazing and the permitting process will not exist if no grazing occurs.

Cumulative effects from not grazing vegetation may lead to more intense burning in the event of a wild land fire. Intense wildland fire can affect both historic and prehistoric properties. Fire effects lead to increased ground visibility and artifact exposure, which leads to more impacts from artifact collection. Although increased vegetation cover may lead to more intense wild land fires, post-fire impacts associated with grazing will not exist if there is no grazing permitted.

For the Proposed Action, past, future and foreseeable activities within the allotments include vegetative and fuels management activities (e.g., timber harvest, prescribed burns), road construction, grazing and associated range improvements, and outfitter guide and recreation activities. All of these activities may have cumulative effects on heritage resources in the form of increased ground disturbance and exposure, increased soil erosion and trampling, and increased visitor use and traffic which may lead to vandalism. Many effects are enhanced in post-burn areas, including soil erosion, ground exposure, artifact collection, and trampling.

Grazing or range-related projects that do not have specific plans in this EA will require further consultation when specific information is available. Effects related to proposed undertakings will require further consultation and possible mitigation, and will be addressed in a new cultural resource compliance report. Consultation with all appropriate historic preservation and tribal offices will be initiated pursuant to Section 106 of the NHPA. If additional site elements or new discoveries are found during project actions (i.e., inadvertent discoveries), the new resources must be assessed according to the guidelines established in 36 CFR 800.

**Cumulative Effects to Recreation Resources and Other Resources**

The ID Team considered past, present and reasonably foreseeable future actions, combined with the action alternatives and did not identify any recreation, climate change, transportation, land uses and scenery cumulative effects.
List of Preparers:

Rangeland Management-Joe Hicks, Brad Russell
Soil and Plants-Kent Houston
Hydrology- Karri Cary
Aquatic Ecosystems-Ray Zubik
Wildlife- Joe Harper
Climate Change-Mary Maj
GIS-Olga Troxel, Ken Ostrom
NEPA Coordinator-Marty Sharp
Cultural Resources/Archeology-Molly Westby
4.1 Appendix A. References

Sources Cited / References and Data Sources

Not a bibliography in the classic sense, but rather a listing of resources and best available science used to for analysis and conclusions, scientific information such as papers, reports, literature reviews, review citations, peer reviews, professional data and standards, field inventories and ground-based observations, monitoring, research, persons/organizations/agencies consulted, GIS data, web sites, et cetera.

Cited Forest Service Manuals (FSM), code of Federal Register (CFR) and Executive Order direction can be found electronically at: www.fsweb.fs.us/directives


Burns, Allan 2009a Class III Cultural Resource Inventory of Shoshone National Forest Lake Creek Grazing Allotment; Report #TF09-4. Compliance report prepared by Terra Alta Archaeology, FS # R2009021400017. See SHPO File # 0809JRD012

Burns, Allan 2009b Class III Cultural Resource Inventory of Shoshone National Forest Fish Lake, Salt Creek, and Squaw Creek Grazing Allotments; Report #TF09-3. Compliance report prepared by Terra Alta Archaeology, FS # R2009021400016. See SHPO File # SHPO File #0909NAW006


Cited Forest Service Manuals (FSM), code of Federal Register (CFR) and Executive Order direction can be found electronically at: www.fsweb.fs.us/directives


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Executive Order 11988-Floodplain Management
Executive Order 11990-Protection of Wetlands

Federal legislation can be viewed at the Library of Congress web site at http://thomas.loc.gov

Federal Registers can be viewed from http://www.qaccess.gpo.gov/su_docs/aces/aces140.html


Forest Service Manuals and Handbooks. For electronic access to the Forest Service Directives System, use this link: http://www.fs.fed.us/r2/shohone/business/directives/index.html


High Country Archaeology. 2009b. Class III Cultural Resource Inventory of Shoshone National Forest, Carter Creek, Rennerberg, and Valley-Boulder Grazing Allotments, Park County, Wyoming. Compliance report prepared by High Country Archaeology, FS # R2009021400020. See SHPO File # 0809JPL005


Manier, D.J. and N.T. Hobbs. 2007 large herbivores in sagebrush steppe ecosystems: Livestock and wild ungulates influence structure and function.


Powers, T. Taking Stock of Public Lands Grazing An Economic Analysis.

Public Law National Environmental Policy Act (NEPA)
Public Law 104-19 (Rescission Bill, signed 7/27/95)


Rocky Mountain Herbarium. Laramie, Wyoming website: http://www.rmh.uwyo.edu/


Terra Alta Archaeology. 2009b Class III Cultural Resource Inventory of Shoshone National Forest Fish Lake, Salt Creek, and Squaw Creek Grazing Allotments; Report #TF09-3. Compliance report prepared by Terra Alta Archaeology, FS # R2009021400016. See SHPO File # SHPO File #0909NAW006


USDA Forest Service. 2007. Northern Rockies Lynx Management Direction, Record of Decision. Missoula, MT. 67 pages


Wambolt, C. L., editor. Symposium on Ecology and Management of Riparian Shrub Communities. USDA, Forest Service, Intermountain Research Station, Sun Valley, ID.
Wuerthner, G. Cows of Condos A False Choice Between Public Lands Ranching and Sprawl.
WGFD, Wyoming Game and Fish Department. 2010 Scoping Comment Letter
4.2 Appendix B. Scoping Comment Summary

Within this appendix, we present a summary of the scoping comments that we received and considered in the development of this EA. Comments are identified by commenter. IDT members paraphrased the comments; the intent was to capture the main intent of the comment. Comments that were used in describing a particular issue are noted in the issue column. The type column is one that we used to help us sort the comments. The disposition column briefly indicates how the comment is addressed in the analysis. How a comment is categorized is not important; our focus is ensuring that the comment is addressed.

Table 1. Type Code Descriptions

<table>
<thead>
<tr>
<th>Type code</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALT</td>
<td>Alternative Development</td>
<td>Comments that could provide an alternative to the Proposed Action.</td>
</tr>
<tr>
<td>C</td>
<td>Concerns</td>
<td>These comments would be responded to by discussion in the comment disposition, project file, the EA, or in an appendix to the EA.</td>
</tr>
<tr>
<td>GS</td>
<td>General Statement</td>
<td>Comments expressing a statement and do not require a response.</td>
</tr>
<tr>
<td>OS</td>
<td>Outside Scope</td>
<td>Comments where a decision has already been made or is beyond the scope of the Proposed Action.</td>
</tr>
<tr>
<td>R</td>
<td>Request</td>
<td>Comment requests information or clarification. Does not necessarily indicate an issue or concern. Items requesting specific activities are coded with RA.</td>
</tr>
<tr>
<td>RD</td>
<td>Recommend Decision</td>
<td>These comments express a preference for a final decision, or an aspect of the decision. They would not generally be responded to in the analysis, but would be considered by the decision maker. These tend to be more general in nature than those items under RA.</td>
</tr>
<tr>
<td>RA</td>
<td>Recommend Other</td>
<td>These comments make recommendation related to specific Proposed Actions other than the decision.</td>
</tr>
</tbody>
</table>

Table 2. Comment Summary

<table>
<thead>
<tr>
<th>Source</th>
<th>#</th>
<th>Comment (paraphrased)</th>
<th>Issue or Concern</th>
<th>Type</th>
<th>Disposition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fremont County Commissioners</td>
<td></td>
<td>Fremont County has a Natural Resource Land Use Plan in place. It supports the continuation of existing levels of grazing within Fremont County. We expect any proposed change from this level, such as change of class of livestock, season of use, restrictions on range improvement maintenance, use, or new construction, to be fully coordinated with the Natural Resource Planning Committee and our County Commission.</td>
<td>Changes to Livestock Grazing</td>
<td>RD</td>
<td>Fremont County will be kept informed/involved throughout the NEPA process.</td>
</tr>
<tr>
<td>Hot Springs Conservation District</td>
<td></td>
<td>The District supports the action proposed by the Forest to continue to permit livestock grazing management of all five allotments.</td>
<td>Permit Issuance</td>
<td>GS</td>
<td>Thank you for the comment.</td>
</tr>
<tr>
<td>David Morneau</td>
<td></td>
<td>The Bayer Mountain allotment is essential to our operation as part of a multiple pasture rotation. Our cow/calf operation six miles south of Lander depends on summer pasture off the ranch.</td>
<td>Grazing operations</td>
<td>GS</td>
<td>Thank you for the comment.</td>
</tr>
</tbody>
</table>
in order to raise winter feed for the cattle.

The WDA support the continuation of livestock grazing by incorporating adaptive management techniques in order to meet Forest Plan direction. Grazing on public lands represents a vital economic value to agricultural producers and to local communities. Impacts on this economic activity need to be included in the EA. In addition to its economic impacts, livestock grazing represents irreplaceable environmental and social values. Management prescriptions in the EA must reflect multiple use resource use principles.

These values contribute irreplaceable wildlife habitat, open spaces, ranchland buffers between federal lands and developments, scenic vistas, visual beauty, and the traditional image and heritage of the historic rural landscapes of Wyoming and the West. Losses of these essential environmental, historic, and social values of livestock grazing to users and visitors of the area and residents of impacted communities should be included in the scope of the EA.

Decisions in the proposed plan should allow SNF officials, grazing permittees and private landowners the opportunity to work cooperatively. This EA should also allow flexibility to make the best site-specific, case-by-case decisions that are in the best interests of the affected resources and citizens. WE strongly encourage SNF staff to work closely and consistently with all affected grazing permittees, including joint cooperative monitoring.

The WDA does not support a no grazing alternative.

We recommend that forage allocations for elk continue to be considered. Based on our summer observations of these areas, it appears forage production is sufficient for supporting both livestock and elk. One area of concern has been the confluence of Slaughter Creek and the East Fork of the Sugarloaf allotment, based on our summer observations in 2007 and 2008, livestock forage use was heavy in this area.

We support the Forest in its efforts to improve resource

<table>
<thead>
<tr>
<th>Source</th>
<th>Comment (paraphrased)</th>
<th>Issue or Concern</th>
<th>Type</th>
<th>Disposition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wyoming Department of Agriculture</td>
<td>The WDA support the continuation of livestock grazing by incorporating adaptive management techniques in order to meet Forest Plan direction. Grazing on public lands represents a vital economic value to agricultural producers and to local communities. Impacts on this economic activity need to be included in the EA. In addition to its economic impacts, livestock grazing represents irreplaceable environmental and social values. Management prescriptions in the EA must reflect multiple use resource use principles. These values contribute irreplaceable wildlife habitat, open spaces, ranchland buffers between federal lands and developments, scenic vistas, visual beauty, and the traditional image and heritage of the historic rural landscapes of Wyoming and the West. Losses of these essential environmental, historic, and social values of livestock grazing to users and visitors of the area and residents of impacted communities should be included in the scope of the EA.</td>
<td>Local economy and the sustainability of existing agriculture</td>
<td>R</td>
<td>From scoping, socio-economic considerations were identified as an issue (Goods and Services) and were carried forward in the EA.</td>
</tr>
<tr>
<td>Wyoming Department of Agriculture</td>
<td>Decisions in the proposed plan should allow SNF officials, grazing permittees and private landowners the opportunity to work cooperatively. This EA should also allow flexibility to make the best site-specific, case-by-case decisions that are in the best interests of the affected resources and citizens. WE strongly encourage SNF staff to work closely and consistently with all affected grazing permittees, including joint cooperative monitoring.</td>
<td>Flexibility in decision making</td>
<td>R</td>
<td>This is standard procedure and part of the Proposed Action. The flexibility requested is facilitated by adaptive management.</td>
</tr>
<tr>
<td>Wyoming Department of Agriculture</td>
<td>The WDA does not support a no grazing alternative.</td>
<td>GS</td>
<td>RD</td>
<td>Express a preference for a final Decision and will be taken into consideration.</td>
</tr>
<tr>
<td>Wyoming Game and Fish Dept.</td>
<td>We recommend that forage allocations for elk continue to be considered. Based on our summer observations of these areas, it appears forage production is sufficient for supporting both livestock and elk. One area of concern has been the confluence of Slaughter Creek and the East Fork of the Sugarloaf allotment, based on our summer observations in 2007 and 2008, livestock forage use was heavy in this area.</td>
<td>Forage and browse utilization</td>
<td>R</td>
<td>Your concern was considered in the development of the EA.</td>
</tr>
<tr>
<td>Wyoming</td>
<td>We support the Forest in its efforts to improve resource</td>
<td>Grazing</td>
<td>RD</td>
<td>Your concern was considered in the development of the EA.</td>
</tr>
<tr>
<td>Source</td>
<td>#</td>
<td>Comment (paraphrased)</td>
<td>Issue or Concern</td>
<td>Type</td>
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</tr>
<tr>
<td>Game and Fish Dept.</td>
<td></td>
<td>conditions through careful monitoring and potential adjustment of grazing use to reduce potential impacts. If adjustments are made, we recommend they be made to season of use and/or utilization rates that will result in improved opportunity for vegetation re-growth following grazing. We recommend the EA stress the importance of best grazing practices in all allotments but particularly those that encompass South Fork Owl Creek and Rock Creek that have been found to contain Yellowstone cutthroat trout.</td>
<td>practices</td>
<td></td>
</tr>
<tr>
<td>Western Watersheds Project</td>
<td></td>
<td>Requested that we consider previously comments, articles, research, and grazing management guides were submitted by WWP for the previous scoping and Range NEPA analysis.</td>
<td>Commercial livestock grazing on public lands</td>
<td>GS</td>
</tr>
</tbody>
</table>
4.3 Appendix C. Watershed Conservation Practices Review

The following table tracks whether the Watershed Conservation Practices Handbook (WCPH) design criteria are adopted. It is based on the May 5, 2006 WCPH (FSH 2509.25, Chapter 10). The WCPH is applicable to all project-level decisions on the Shoshone National Forest. However, in some cases, WCPH design criteria are either not applicable, the Forest Plan has other direction, or the project-level NEPA decision includes other site-specific direction. The WCPH can be found in its entirety at: Watershed Conservation Practices Handbook 2509.25.

<table>
<thead>
<tr>
<th>WCPH Description</th>
<th>WCPH Design Criteria</th>
<th>Adopted</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>11 - Hydrologic Function</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11.1 - Manage land treatments to conserve site moisture and to protect stream health from damage by increased runoff.</td>
<td>a. 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%. b. Design the size, orientation, and surface roughness of forest openings to prevent scour and site desiccation.</td>
<td>a. Yes b. No</td>
<td>a. No new roads will be constructed. Vegetation utilization will be managed using SNF grazing guidelines. b. More applicable to timber sales.</td>
</tr>
<tr>
<td>11.2 - Manage land treatments to maintain enough organic ground cover to prevent harmful increased runoff.</td>
<td>a. Maintain the organic ground cover of each activity area so that pedestals, rills, and surface runoff from the activity are not increased. b. Restore the organic ground cover of degraded activity areas within the next plan period.</td>
<td>a. Yes b. Yes</td>
<td>a. Meeting grazing standards will maintain the organic ground cover so that pedestals, rills and surface runoff will not be increased. b. Any restoration of organic ground cover will use certified weed free local plants.</td>
</tr>
<tr>
<td><strong>12 - Riparian Areas and Wetlands</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12.1 - In the water influence zone next to perennial and intermittent streams, lakes, and wetlands, allow only those actions that maintain or improve long-term health and riparian ecosystem condition.</td>
<td>a. Allow no action that will cause long-term change to a lower stream health class in any stream reach. b. Allow no action that will cause long-term change away from desired condition in any riparian or wetland vegetation community. c. Keep heavy equipment out of streams, swales, and lakes, except to cross at designated points, build crossings, or do restoration work, or if protected by at least 1 foot of packed snow or 2 inches of frozen soil. d. Ensure at least one-end log suspension in the WIZ. Fell trees in a way that protects vegetation in the WIZ from damage. Keep log landings and skid trails out of the WIZ, including swales.</td>
<td>a. Yes b. Yes c. Yes d. No e. Yes f. Yes g. Yes h. Yes i. Yes j. Yes k. Yes l. Yes m. Yes</td>
<td>a, b. Monitor streambeds and banks, aquatic habitat and biota, soil structure, and riparian vegetation composition and structure. c. This is most applicable to maintenance activities on improvements. d. More applicable to timber sales. e. Concentrated use sites (e.g., salt, temporary corrals) f. The Proposed Action incorporates timing, intensity, and duration/frequency of livestock. Monitoring stubble height will allow managers to assess condition of riparian areas and trigger the relocation of livestock when necessary. g. Range improvements will be kept out of the WIZ.</td>
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<td>WCPH Description</td>
<td>WCPH Design Criteria</td>
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| e. Locate new concentrated-use sites outside the WIZ and outside riparian areas and wetlands. Armor or reclaim existing sites in the WIZ to prevent detrimental soil and bank erosion.  
  f. Manage livestock use through control of time/timing, intensity, and duration/frequency of use in riparian areas and wetlands to maintain or improve long-term stream health. Exclude commercial livestock from riparian areas and wetlands that are not meeting or moving toward desired condition objectives where monitoring information shows continued commercial livestock grazing would prevent attainment of those objectives.  
  g. Keep stock tanks, salt supplements, and similar features out of the WIZ and out of riparian areas and wetlands always. Keep stock driveways out of the WIIZ except to cross at designated points. Armor water gaps and designated stock crossings where needed and feasible.  
  h. Manage dry meadow and upland plant communities, including Kentucky bluegrass types that have invaded into wetland / riparian areas in a manner that will contribute to their replacement over time by more mesic native plant communities.  
  i. Do not allow any livestock grazing through an entire growing season in pastures that contain riparian areas and wetlands.  
  j. Design grazing systems to limit utilization of woody species.  
  k. 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.  
  l. Adjust management in riparian areas and wetlands to improve detrimental soil compaction whenever it occurs. | n. No  
  h, i, j. A grazing strategy suitable for these allotments was developed by the range conservationist and included in the Proposed Action.  
  k. Meeting riparian grazing standards (stubble height) are expected to maintain bank stability.  
  l. Photo point monitoring, as well as site visits, by will note if soil resources are deteriorating as evidenced by hummocking or platy surface structure.  
  m. If range improvements are constructed, no excavation will occur from, and material will not be stored in, any stream, swale, lake, wetland, or WIZ.  
  n. Stream restoration will not occur. |
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<tr>
<th>WCPH Description</th>
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<th>Comments</th>
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</thead>
</table>
| 12.2 - Design and construct all stream crossings and other instream structures to provide for passage of flow and sediment, withstand expected flood flows, and allow free movement of resident aquatic life. | m. Do not excavate earth material from, or store excavated earth material, in any stream, swale, lake, wetland, or WIZ.  
 n. Emphasize natural stabilization processes consistent with the stream type and capability when restoring damaged stream banks. | No design criteria are applicable. | These design criteria apply to new or reconstruction of existing crossings, which are not a part of this decision. |
| 12.3 - Conduct actions so that stream pattern, geometry, and habitats maintain or improve long-term stream health. | a. Install stream crossings to meet Corps of Engineers and State permits, pass normal flows, and be armored to withstand design flows.  
b. Size culverts and bridges to pass debris.  
c. Install stream crossings on straight and resilient stream reaches, as perpendicular to flow, and to provide passage of fish and other aquatic life.  
d. Install stream crossings to sustain bankfull dimensions of width, depth, and slope and keep streambeds and banks resilient.  
e. Install or maintain fish migration barriers only if needed to protect endangered, threatened, sensitive, or unique native aquatic populations. | No design criteria are applicable. | No materials will be added to channels or lakes, and no stream channel will be relocated. |
| 12.4 - Maintain long-term ground cover, soil structure, water budgets, and flow patterns of wetlands to sustain their ecological function. | a. Keep ground vehicles out of wetlands unless protected by at least 1 foot of packed snow or 2 inches of frozen soil. Do not disrupt water supply or drainage patterns into wetlands.  
b. Keep roads and trails out of wetlands.  
c. Avoid long-term reduction in organic ground cover and organic soil layers in any wetland.  
d. Keep buried utility and pipelines out of wetlands if possible. | a. Yes  
b. Yes  
c. Yes  
d. Yes  
e. Yes  
f. No | a. This is most applicable to maintenance related access for improvements (including temporary improvements).  
b. This is most applicable to improvement related maintenance access.  
c. Under the Proposed Action, the long-term reduction in organic ground cover or organic soils related to wetlands will not occur.  
d. Under the Proposed Action, there will not be any... |
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<tbody>
<tr>
<td>e. Avoid any loss of rare wetlands such as fens and springs. f. Do not build fire lines in or around wetlands unless needed to protect life, property, or wetlands. Use hand lines with minimum feasible soil disturbance. Use wetland features as fire lines if practicable.</td>
<td>new stock-watering pipelines buried in wetlands. e. The loss of fens or springs is not expected to occur through livestock grazing under this decision. f. Prescribed fire is not part of this Proposed Action. However, if the construction of fire lines occurs, they will not be built in or around wetlands unless needed to protect life, property or the wetland. If construction is necessary, hand line is preferred over mechanical line construction.</td>
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<tr>
<td>a. Cooperate with water users and other interested parties to evaluate how to operate existing water use facilities to meet resource goals. b. Obtain in-stream flows under appropriate federal, state, legal, and regulatory authorities to protect stream processes, aquatic and riparian habitats and communities, and recreation and aesthetic values. c. Upon issuances of special use authorizations for new or existing water use facilities, include permit conditions at the point of diversion or storage, if needed to minimize impacts to water dependent resources and values. d. Obtain water rights under federal and state law to protect stream processes, aquatic and riparian habitats and communities, and recreation and aesthetic values.</td>
<td>No design criteria are applicable. This decision will not affect water diversions/water rights and no new water use facilities are proposed.</td>
<td></td>
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<tr>
<td>a. Design all ditches, canals, and pipes with at least an 80% chance of passing high flows and remaining stable during their life. b. Do not flush or deposit sediment from behind diversion structures into the stream below. c. Mitigate water imports and water disposal (including reservoir releases) so that the extent of stable banks, channel pattern, profile, and dimensions maintain or improve long-term stream health in each receiving stream reach. d. Maintain and operate water conveyance ditches and pipelines to carry their design volumes of water with</td>
<td>No design criteria are applicable. These design criteria address water use facilities and this decision does not affect those facilities.</td>
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<td>WCPH Description</td>
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| 12 - Snow | appropriate freeboard.  
e. Conduct snow management, including snowmaking and snow-farming, in such a manner that prevents slope failures and gully erosion on hillslopes and prevents adverse impacts, such as bank erosion and excessive sediment, in receiving streams. | No design criteria are applicable. | These design criteria apply to roads, trails, skid trails, landings, OHV routes, and associated features. No new travel routes are being proposed. |
| 13 - Sediment Control | a. Construct roads on ridge tops, stable upper slopes, or wide valley terraces. Stabilize soils onsite. End-haul soil if full-bench construction is used. Avoid slopes steeper than 70%.  
b. Avoid soil-disturbing actions during periods of heavy rain or wet soils. Apply travel restrictions if necessary.  
c. Install cross drains to disperse runoff into filter strips and minimize connected disturbed areas. Make cuts, fills, and road surfaces strongly resistant to erosion between each stream crossing and at least the nearest cross drain. Construct roads with outslope and rolling grades instead of ditches and culverts.  
e. Retain stabilizing vegetation on unstable soils. Avoid new roads or heavy equipment use on unstable or highly erodible soils.  
f. Use existing roads unless other options will produce less long-term sediment. Reconstruct for long-term soil and drainage stability.  
g. Avoid ground skidding on sustained slopes steeper than 40% and on moderate to severely burned sustained slopes greater than 30%.  
h. Designate, construct, and maintain recreational travelways for proper drainage and armor their stream crossings to control sediment.  
i. During and following operations and outsloped roads, retain drainage and remove berms on the outside edge except those intentionally constructed for protection of road grade fills. | No design criteria are applicable. | These design criteria apply to roads, trails, skid trails, landings, OHV routes, and associated features. No new travel routes are being proposed. |
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<tr>
<td>j.</td>
<td>j. Locate and construct log landings in such a way to minimize the amount of excavation needed and to reduce the potential for soil erosion.</td>
<td>No design criteria are applicable.</td>
<td>These design criteria applies to road construction.</td>
</tr>
</tbody>
</table>
| 13.2 - Construct roads and other disturbed sites to minimize sediment discharge into streams, lakes, and wetlands. | a. Design all roads, trails, and other soil disturbances to the minimum standard for their use and to “roll” with the terrain as feasible.  
b. Use filter strips and sediment traps if needed, to keep all sand sized sediment on the land and disconnect disturbed soil from streams, lakes, and wetlands.  
c. Key sediment traps into the ground. Clean them out when 50% full.  
d. Keep heavy equipment out of filter strips except to do restoration work or build armored stream or lake approaches.  
e. Build fire lines outside filter strips unless tied into a stream, lake, or wetland as a firebreak with minimal disturbed soil.  
f. Design road ditches and cross drains to limit flow to ditch capacity and prevent ditch erosion and failure. | No design criteria are applicable. | These design criteria applies to road construction. |
| 13.3 - Stabilize and maintain roads and other disturbed sites during and after construction to control erosion. | a. Do not encroach fills or introduce soil into streams, swales, lakes, or wetlands.  
b. Properly compact fills and keep woody debris out of them. Revegetate cuts and fills upon final shaping to restore ground cover.  
c. Do not disturb ditches during maintenance unless needed to restore drainage capacity or repair damage. Do not undercut the cut slope.  
d. Space cross drains according to road grade and soil type.  
e. Empty cross drains onto stable slopes that disperse runoff into filter strips. On soils that may gully, armor outlets to disperse runoff. Tighten cross drain spacing so gullies are not created.  
f. Armor rolling dips as needed to prevent rutting damage to the function of the rolling dips. Ensure that road | No design criteria are applicable. | This decision addresses livestock grazing not travel management. |
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<td>maintenance provides stable surfaces and drainage.</td>
<td>g. Where berms must be used, construct and maintain them to protect the road surface, drainage features, and slope integrity while also providing for user safety.</td>
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<tr>
<td>g. Where berms must be used, construct and maintain them to protect the road surface, drainage features, and slope integrity while also providing for user safety.</td>
<td>h. Build fire lines with rolling grades and minimum downhill convergence. Outslope or backblade, permanently drain, and revegetate fire lines immediately after the burn.</td>
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<tr>
<td>h. Build fire lines with rolling grades and minimum downhill convergence. Outslope or backblade, permanently drain, and revegetate fire lines immediately after the burn.</td>
<td>i. Use the minimum amount of sand, salt, and/or other de-icing substances as necessary to provide safe winter travel conditions.</td>
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<tr>
<td>i. Use the minimum amount of sand, salt, and/or other de-icing substances as necessary to provide safe winter travel conditions.</td>
<td>j. During winter operations, maintain roads as needed to keep the road surface drained during thaws and break-ups. Do not use riparian areas, wetlands, or streams for snow storage or disposal.</td>
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<tr>
<td>j. During winter operations, maintain roads as needed to keep the road surface drained during thaws and break-ups. Do not use riparian areas, wetlands, or streams for snow storage or disposal.</td>
<td>k. On roads with high/heavy traffic use, require maintenance agreements and/or use of road surface stabilization practices and dust abatement supplements.</td>
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<tr>
<td>k. On roads with high/heavy traffic use, require maintenance agreements and/or use of road surface stabilization practices and dust abatement supplements.</td>
<td>l. Site prepare, drain, decompact, revegetate, and close temporary and intermittent use roads and other disturbed sites within one year after use ends. Stockpile topsoil to be used in site restoration.</td>
<td>No design criteria are applicable.</td>
<td>This decision addresses livestock grazing not travel management.</td>
</tr>
<tr>
<td>l. Site prepare, drain, decompact, revegetate, and close temporary and intermittent use roads and other disturbed sites within one year after use ends. Stockpile topsoil to be used in site restoration.</td>
<td>b. Remove all temporary stream crossings (including all fill material in the active channel), restore the channel geometry, and revegetate the channel banks native plants.</td>
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<tr>
<td>b. Remove all temporary stream crossings (including all fill material in the active channel), restore the channel geometry, and revegetate the channel banks native plants.</td>
<td>c. Restore cuts and fills to the original slope contours and as opportunities arise to re-establish subsurface pathways. Obtain stormwater (402) discharge permits as required.</td>
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<td>c. Restore cuts and fills to the original slope contours and as opportunities arise to re-establish subsurface pathways. Obtain stormwater (402) discharge permits as required.</td>
<td>d. Establish ground cover on disturbed sites to prevent accelerated on-site soil loss and sediment delivery to streams. Restore ground cover using native plants.</td>
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<tr>
<td>d. Establish ground cover on disturbed sites to prevent accelerated on-site soil loss and sediment delivery to streams. Restore ground cover using native plants.</td>
<td>14 - Soil Quality</td>
<td>a. Yes</td>
<td>a. Soil disturbances will occur both on suitable and unsuitable grazing areas. Soil disturbance will be highest at concentrated use areas such as watering</td>
</tr>
<tr>
<td>14 - Soil Quality</td>
<td>a. Restrict roads, landings, skid trails, concentrated-use sites, and similar soil disturbances to designated sites.</td>
<td>b. No</td>
<td></td>
</tr>
<tr>
<td>a. Restrict roads, landings, skid trails, concentrated-use sites, and similar soil disturbances to designated sites.</td>
<td>b. Operate heavy equipment for land treatments only</td>
<td>c. No</td>
<td></td>
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<tr>
<td>b. Operate heavy equipment for land treatments only</td>
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<tr>
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<td>WCPH Design Criteria</td>
<td>Adopted</td>
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<td>burned soil and detrimentally compacted, eroded, and displaced soil to no more than 15% of any activity area.</td>
<td>burned soil and detrimentally compacted, eroded, and displaced soil to no more than 15% of any activity area. when soil moisture is below the plastic limit, or protected by at least 1 foot of packed snow or 2 inches of frozen soil. c. Conduct prescribed fires to minimize the residence time on the soil while meeting the burn objectives. d. Allow dispersed winter motorized recreation when snow depths are sufficient to protect soils. Specify a minimum unpacked snow depth of 12 inches unless a site-specific analysis shows a different snow depth is adequate to protect soils. Allow use of snowcats or grooming machines when unpacked snow depths equal or exceed 18 inches.</td>
<td>d. No</td>
<td>areas, along trails between suitable grazing areas and at collection areas (corrals, fence gates, salting areas). Meeting grazing strategies and standards will help to reduce soil disturbances. The activity area is considered the project area boundary.  b. Heavy equipment, prescribed fire, and dispersed winter recreation are not authorized under this decision.</td>
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<tr>
<td>14.2 - Maintain or improve long-term levels of organic matter and nutrients on all lands.</td>
<td>a. On soils with surface soil (A-horizon) thinner than 1 inch, topsoil organic matter less than 2%, or effective rooting depth less than 15 inches, retain 80 - 90% of the fine (less than 3 inches in diameter) post treatment logging slash in the stand after each clearcut and seed-tree harvest. Consider need for retention of coarse woody debris slash in each activity area to balance soil quality requirements and fuel loading concerns. b. If machine piling of slash is done, conduct piling to leave topsoil in place and to avoid displacing soil into piles or windrows.</td>
<td>No design criteria are applicable.</td>
<td>These design criteria are more applicable to timber sales.</td>
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<th>15 - Water Purity</th>
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<tr>
<td>15.1 - Place new sources of chemical and pathogenic pollutants where such pollutants will not reach surface or ground water.</td>
<td>a. Locate pack and riding stock sites (for example corrals and loading areas), sanitary sites, and well drill-pads outside the water influence zone (WIZ). b. Locate vehicle service and fuel areas, chemical storage and use areas, and waste dumps and areas on gentle upland sites. Dispose of chemicals and containers in State-certified disposal areas. c. Locate temporary labor, spike, logging and fire camps such that surface and subsurface water resources are protected. Consideration should be given to disposal of all waste.</td>
<td>a. Yes</td>
<td>a. This pertains to temporary corrals for loading and unloading. b. No vehicle service and chemical storage areas exist within project area. c. This criterion does not apply to the Proposed Action</td>
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<td>WCPH Description</td>
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| 15.2 - Apply runoff controls to disconnect new pollutant sources from surface and ground water. | a. Install contour berms and trenches around vehicle service and refueling areas, chemical storage and use areas, and waste dumps to fully contain spills. Use liners as needed to prevent seepage to ground water. Prepare Spill Prevention Control and Countermeasure Plan per the requirements of 40 CFR 112.  
b. Reclaim each mine waste dump when its use ends. Stabilize waste dumps and tailings in non-use periods to prevent wind and water erosion. If non-use will exceed one year, perform concurrent reclamation. Require removal or encapsulation of waste material as necessary to prevent contamination of nearby water bodies before operator abandons site or reclamation is accepted as final.  
c. Prevent contaminated runoff from waste dumps and/or tailings from reaching surface and/or ground water. Potential techniques include use of lined ponds to catch runoff, diversion ditches or other runoff controls to divert runoff around waste dumps/tailings piles, capping or treating waste piles on site or off-site disposal of waste as appropriate. If ponds are used, build tailings dams with a 95% chance of containing floods (100-year event) over their design life. Permanently stabilize dams at final shaping.  
d. Clean wastewater from concrete batching and aggregate operations before returning the water to streams, lakes, or wetlands.  
e. Inspect equipment used for transportation, storage or application of chemicals daily during use period for leaks. If leaks or spills occur, report them and install emergency traps to contain them and clean them up.  
f. Report spills and take appropriate clean-up action in accordance with applicable state and federal laws, rules and regulations. Contaminated soil and other material shall be removed from NFS lands and disposed of in a manner according to state and federal laws, rules and regulations. | No design criteria are applicable. | No such operations exist within project area, or are authorized in this decision. There should be no chemical spills associated with livestock grazing. |
To meet the intent of the WCPH, the following activities are included in the Proposed Action:

- Meet established grazing stubble height standards in upland and riparian areas to maintain organic ground cover.
- Restoration of organic ground cover will use certified weed free local plants as practicable.
- Develop a grazing strategy that incorporates timing, intensity, and duration/frequency, as well as grazing stubble height, to provide for the protection and maintenance of upland and riparian areas.
- Exclude commercial livestock from riparian areas and wetlands that are not meeting or moving toward desired condition objectives where monitoring information shows continued commercial livestock grazing would prevent attainment of those objectives.
- Keep stock tanks, salt supplements, and similar features out of the water influence zone (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.
- Do not allow livestock grazing through an entire growing season in pastures that contain riparian areas and wetlands.
- 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.
- Adjust management in riparian areas and wetlands to improve detrimental soil compaction whenever it occurs.
- Avoid any loss of rare wetlands such as fens and springs.
- Pesticides will be used for intended purposes and applied according to label direction.
4.4 Appendix D. Allotment Specific Monitoring Tables and Maps

Shoshone National Forest
Allotment Location Map for 2010 Rangeland NEPA

Location Map. Livestock Grazing Permit Issuance: The five commercial livestock grazing allotments comprising the project area are located on the Clark Forks, Greybull, and Washakie districts of the Shoshone National Forest.
<table>
<thead>
<tr>
<th>Number of Monitoring Sites</th>
<th>Resource to be Monitored</th>
<th>Purpose of Monitoring</th>
<th>Monitoring Method(s)</th>
<th>Planned Schedule of Monitoring</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>Upland</td>
<td>Annual Utilization and Movement Indicator</td>
<td>Landscape Appearance, Upland</td>
<td>Every three years</td>
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<tr>
<td>3</td>
<td>Browse</td>
<td>Annual Utilization and Movement Indicator</td>
<td>Landscape Appearance, Browse</td>
<td>Every three years</td>
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<tr>
<td>7</td>
<td>Rangeland</td>
<td>Long Term Trend and Condition</td>
<td>Parker 3-Step, Cover Frequency, Photo Point, Sample Point, Photo Transect or Cover by Life Form.</td>
<td>Every ten years</td>
</tr>
<tr>
<td>Allotment Wide</td>
<td>Rangelands, Improvements, Compliance</td>
<td>General Rangeland Conditions and AMP Compliance</td>
<td>Allotment Inspection</td>
<td>Every other year</td>
</tr>
<tr>
<td>14</td>
<td>Structural Improvements</td>
<td>Inventory and condition.</td>
<td>Observation and Photograph</td>
<td>Every ten years</td>
</tr>
<tr>
<td>Allotment Wide</td>
<td>Predetermined Areas of Interest</td>
<td>Implementation of AMP</td>
<td>Best Management Practices Interdisciplinary Team Review</td>
<td>Every ten years</td>
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Little Rock Creek
Key Monitoring and Trend Transect Locations
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<th>Number of Monitoring Sites</th>
<th>Resource to be Monitored</th>
<th>Purpose of Monitoring</th>
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<td>8</td>
<td>Upland</td>
<td>Annual Utilization and Movement Indicator</td>
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<td>Every three years</td>
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<tr>
<td>5</td>
<td>Browse</td>
<td>Annual Utilization and Movement Indicator</td>
<td>Landscape Appearance, Browse</td>
<td>Every three years</td>
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<tr>
<td>10</td>
<td>Rangeland</td>
<td>Long Term Trend and Condition</td>
<td>Parker 3-Step, Cover Frequency, Photo Point, Sample Point, Photo Transect or Cover by Life Form.</td>
<td>Every ten years</td>
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<td>Rangelands, Improvements, Compliance</td>
<td>General Rangeland Conditions and AMP Compliance</td>
<td>Allotment Inspection</td>
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<td>.5</td>
<td>Structural Improvements</td>
<td>Inventory and condition.</td>
<td>Observation and Photograph</td>
<td>Every ten years</td>
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<td>6</td>
<td>Upland</td>
<td>Annual Utilization and Movement Indicator</td>
<td>Landscape Appearance, Upland</td>
<td>Every three years</td>
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<tr>
<td>3</td>
<td>Wildlife Winter Range</td>
<td>Annual Utilization and Movement Indicator</td>
<td>Stubble Height or Herbage Left Ungrazed</td>
<td>Every three years</td>
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<td>2</td>
<td>Browse</td>
<td>Annual Utilization and Movement Indicator</td>
<td>Landscape Appearance, Browse</td>
<td>Every three years</td>
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<tr>
<td>7</td>
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4.5 Appendix E. Range Readiness Indicators

**RANGE READINESS INDICATORS FOR SHOSHONE NATIONAL FOREST**

The following range readiness indicators will be used on the Shoshone National Forest. In every case the dominant perennial grass species should have reached the stage of development listed:

**GRASSES**

- Western Wheatgrass (*Agvs*) 8" or more in height.
- Bluebunch Wheatgrass (*Agsp*) 3 or more spikelets extended above the boot.
- Idaho Fescue (*Fecid*) Headed Out.
- Junegrass (*Kocr*) Headed Out.
- Alpine Timothy (*Phal*) 5" or more in height, headed out.
- Muttongrass (*Pole*) Plant maturing, seed in dough stage.
- Kentucky Bluegrass (*Popr*) Panicle fully opened.
- Sandberg Bluegrass (*Pose*) Plants maturing.
- Needlegrass (*Stco*) 6" or more in height and completely headed out.

**GRASSLIKE**

- Sedges (*CAR*) Seed formed.

**FORBS**

- Balsamroot (*BAL*) Past full bloom.
- Lupine (*LUP*) Close to full bloom.
- Clinquefoil (*POT*) Full bloom.
- Western Yarrow (*ACH*) Bud stage.

**BROWSE**

- Aspen (*POP*) Leaves dark green.
- Shrubby Cinquefoil (*Pofr*) Buds developed.
- Willow (*SLX*) Fully leafed (bush has green appearance).

A transect of 10 paces for height measurements will be made in the area that the animals would normally graze during the first part of the grazing season. All information regarding range readiness will be recorded on Form R2-2200-13.