UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
Lander Field Office
1335 Main Street
Lander, Wyoming

ENVIRONMENTAL ASSESSMENT

Grazing Permit No: 49 3729		EA Number: WY-050-EA09-035
Proposed Action Title/Type: Grazing Permit Renewal – Lander Field Office		
Applicant: Split Rock Holdings, LLC c/o Dallas Horton		
T29-33N	R88-91W	Various (See Attached Map.)

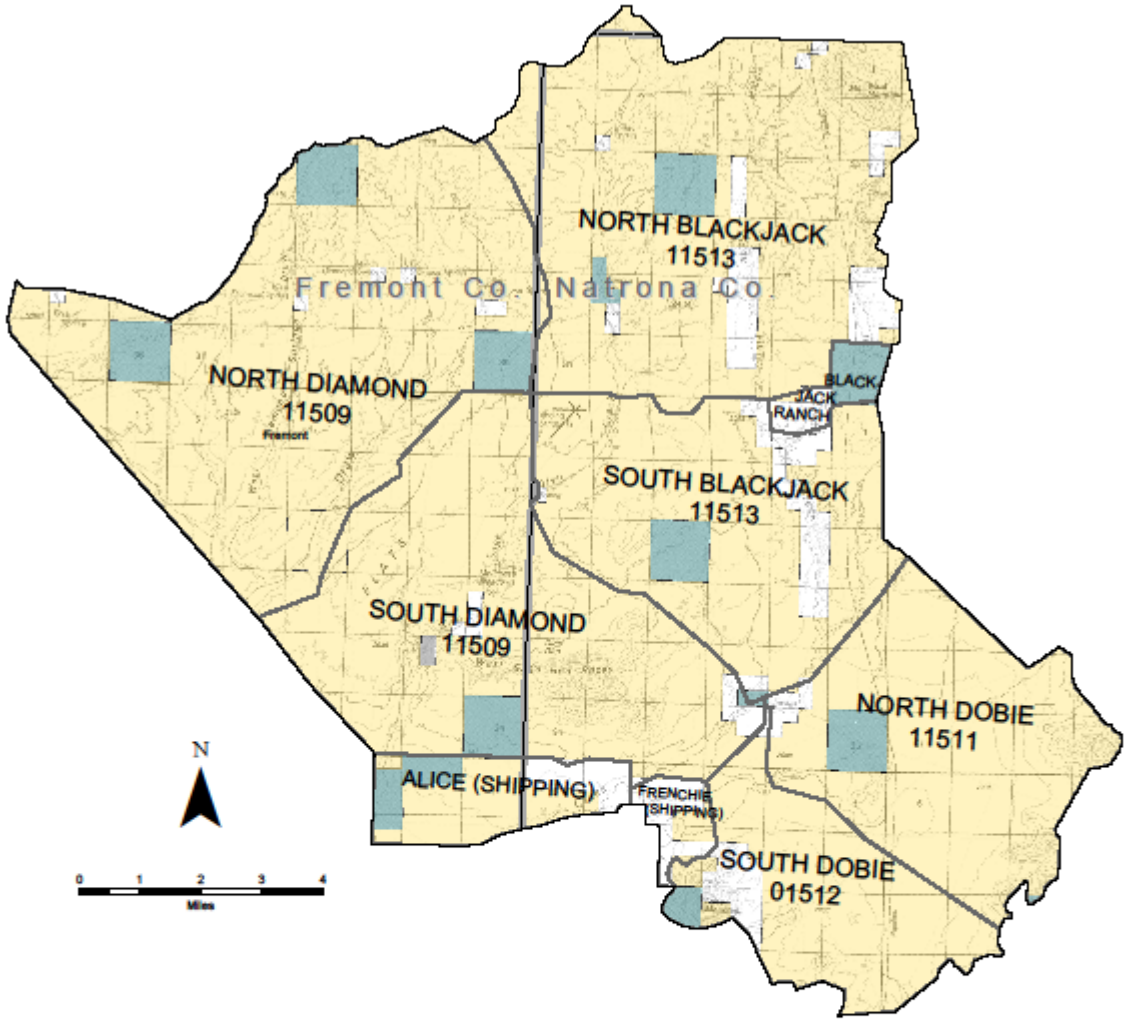
SECTION I: INTRODUCTION

The Split Rock Ranch operation is composed of 10 grazing allotments. This environmental analysis is being conducted on the four largest of these grazing allotments: Diamond Springs (11509), North Dobie Flat (11511), South Dobie Flat (01512), and Blackjack Ranch (11513). Included in the Diamond Springs Allotment are the two fenced pastures known as the Alice and Frenchie Shipping Pastures (see Map 1). Bureau of Land Management-administered public lands comprise 88 percent of these four Spilt Rock Ranch Allotments, which equates to 90,113 acres out of a total of 102,799 acres. Private land accounts for 6,579 acres (6 percent) and Wyoming State leased land is 6,107 acres (6 percent). The Split Rock Ranch (SRR) operation is located along the Fremont County and Natrona County boundary, north of the Sweetwater River. The Bureau of Land Management-administered public lands within the allotments are primarily used for livestock grazing, wildlife habitat, and recreation. There has been some mineral exploration, but no mineral development in these allotments. Several utility rights-of-way also traverse these allotments.

Split Rock Holdings, LLC c/o Mr. Dallas Horton, owns and operates the SRR, which includes these four grazing allotments administered by the Bureau of Land Management (BLM). Outside of these allotments, hay is produced on private ranch land along the Sweetwater River and livestock are wintered primarily on private land along the river. The current permitted season of use runs from May 5 to December 6, for a total of 216 days.

These four allotments have had Rangeland Health Standard (RHS) assessments completed on them; the other SRR allotments have not. In each of these four allotments a portion of the upland acres assessed met the RHS and others did not. None of the riparian or wetland acres assessed on Bureau-administered public lands met the RHS in these allotments. The assessments for these four grazing allotments are available for review at the Lander Field Office located at 1335 Main Street, in Lander, Wyoming. When RHS are not met, and livestock grazing is a causal factor, corrective action is required by federal regulation (43 Code of Federal regulations 4180.2).

Map 1



Wyoming Counties

Split Rock Ranch Allotments Surface Management

- Pastures
- Bureau of Land Management
- Private
- State

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On January 3, 2006, the Lander Field Manager signed the RHS determinations which noted that livestock grazing was a causal factor in the failure to meet several of the RHSs. Along with this determination of failure to meet standards, prescribed appropriate actions necessary for improvement and eventual attainment of the RHS were identified. On June 12, 2006 a new BLM Lander Field Manager (FM) rescinded the previous FM's RHS determinations. The FM then directed the BLM staff to take a second look at the RHS assessment, determination of cause for failure, including an independent opinion of rangeland conditions commissioned by the SRR and to, "resubmit any determinations of nonconformance with the fundamentals of rangeland health (where found) with an appropriate level of documentation."

Under a separate request, the Lander FM requested a peer review to be conducted in order to obtain recommendations and validation of the LFO's S&G procedures. The Peer Review Team was made up of technical experts from the BLM's Wyoming State Office in the following disciplines: rangeland management, vegetation, soils and water, riparian and wildlife management. The peer review was conducted on March 7 and 8, 2007. A Peer Review Report was completed concluding:

> "The Lander BLM office used scientifically accepted and well established procedures to assess and characterize the health of the soil and riparian resources. Professional experience and hard data were combined to support the field office's conclusions on the standards assessments. The data includes an extensive amount of site specific soil, range site, and vegetation monitoring information. The vegetation data was collected over an extended period. The assessment of soil health included a comprehensive record of soils and range site data from the Natural Resources Conservation Service, a well-accepted source of soil data and scientific interpretation of soil data." (A file copy of the Peer Review Report is available for review at the Lander Field Office located at 1335 Main Street, in Lander, Wyoming.)

The LFO staff completed its review and resubmitted the determinations of nonconformance with the fundamentals of rangeland health essentially unchanged from the rescinded version. After reviewing the IDT's findings the Lander FM then signed the RHS determinations which noted that livestock grazing was a causal factor in the failure to meet several of the RHSs. The determination was signed on July 20, 2007.

This environmental analysis will analyze the appropriate actions identified from the Guidelines (see Appendix 1) for achieving the Rangeland Health Standards which would be necessary to implement to obtain rangeland health standards.

A monitoring plan that ensures significant progress towards meeting Rangeland Health Standards is being developed as part of this analysis and it will be detailed in the Proposed and Final Decisions for the re-issuance of the grazing permit for Split Rock Holdings, LLC. The decision based on this analysis will serve as the grazing plan for these four allotments.

PURPOSE AND NEED

The purpose of this environmental assessment (EA) is to analyze impacts associated with re-issuing a new 10 year grazing permit for the Diamond Springs, North Dobie Flat, South Dobie Flat, and Blackjack Ranch Allotments. The analysis will also identify the appropriate terms and conditions that should be included as part of these authorizations. This assessment will analyze impacts associated with the proposed grazing on BLM-administered land, obtain recommendations from other resource specialists to avoid any potential resource conflicts, and, if necessary, develop mitigation measures to insure protection of the public lands and resources involved.

The current grazing permit was renewed in 2003; it is a ten year permit. This permit was issued under Public Law 106-291 which allows for authorization of grazing permits until an environmental analysis can be completed. BLM permittees must hold a valid grazing permit in order to graze livestock on public lands. The Bureau of Land Management has authority to renew these grazing permits consistent with the provisions of the Taylor Grazing Act, Federal Land Policy and Management Act, and the Lander Resource Management Plan (RMP) and the grazing regulations in 43 CFR Subpart 4100. Re-issuance of grazing permits for a period of ten years is subject to the provisions of the National Environmental Policy Act (NEPA). The four allotments are adjoining and have issues in common as they occupy similar landscape.

In 2005, a comprehensive rangeland health assessment and evaluation report was completed to determine whether public lands within the Split Rock Ranch Allotments were meeting the six standards for rangeland health (soils, wetland/riparian, vegetation, diverse flora and fauna for T&E species, non-native/invasive species, sensitive/special concern species, water resources, and air resources). The evaluation concluded that four out of the six rangeland health standards were not being met.

Further, BLM Washington Office Instruction Memorandum #2007-137 references 43 CFR Subpart 4180.2 which states:

> "(c) The authorized officer shall take appropriate action as soon as practicable but not later than the start of the next grazing year upon determining that existing grazing management practices or levels of grazing use on public lands are significant factors in failing to achieve the standards and conform with the guidelines that are made effective under this section. Appropriate action means implementing actions pursuant to subparts 4110, 4120, 4130, and 4160 of this part that will result in significant progress toward fulfillment of the standards and significant progress toward conformance with the guidelines. Practices and activities subject to standards and guidelines include the development of grazing-related portions of activity plans, establishment of terms and conditions of permits, leases and other grazing authorizations, and range improvement activities such as vegetation manipulation, fence construction and development of water."

Decision to be made: The BLM will decide whether or not to issue the grazing permit for the North Dobie Flat, South Dobie Flat, Diamond Springs and Blackjack Ranch grazing allotments, and if so, under what terms and conditions.

ISSUES

Issues point to environmental effects; as such, issues can help shape the proposal and alternatives. The issues relevant to this analysis are that rangeland health standards on four of the six standards are not being met and that livestock grazing is a casual factor. The section below provides the reader with a summary of each of the six standards and discusses where the standards are failing.

Rangeland Health Standard Assessment

A comprehensive Rangeland Health Standard (RHS) Assessment was completed in August, 2005 on four of the Split Rock Ranch (SRR) grazing allotments. A summary of the IDT's findings for each of the six RHS's is discussed below.

Rangeland Health Standard Number One (Soils)

Soils were assessed under RHS Number One. The upland acres meeting this standard ranged between 24 and 36 percent between all four allotments. Conversely, between 64 and 76 percent of the upland acres did not meet this RHS. This is a unique situation compared to the average grazing allotment in the field office; in most allotments, a majority of the acreage is not serviced by livestock watering locations, which results in much of the uplands being under-utilized and they commonly possess sufficient vegetation and ground cover. This was not the case with the SRR allotments assessed in that they all had major acreages with insufficient ground cover, large patches of bare ground, accelerated wind erosion, accelerated water erosion in transitional zones to riparian areas, and small amounts of litter to protect the soil surface and eventually become soil organic matter. Compacted soils associated with water developments, salt locations, livestock trails, and grazing use prior to range readiness were also causal factors for not meeting Standard One. The RHS assessments did examine the history of this area to explain this situation. Past grazing practices such as sheep vs. cattle use, earlier horse use, and winter use by antelope were among the reasons as to why these allotments are in their current state.

There were also non-livestock related reasons for failure to meet this RHS, that were due primarily to limited road maintenance leading to accelerated erosion and sediment deposition in water channels.

Rangeland Health Standard Number Two (Riparian)

Riparian/wetland acres were assessed under RHS Number Two. No BLM-administered acres were found to be meeting the RHS for riparian/wetland areas in any of the allotments where they existed; South Dobie Flat Allotment was found not to possess riparian /wetland resources on BLM-administered public lands. Riparian/wetland acres in the remaining allotments are as follows: North Dobie Flat Allotment contains 7 acres; Diamond Springs Allotment contains 30 acres, and Blackjack Ranch Allotment contains 22 acres. As with standard number one, there were also non-livestock related reasons for failure to meet this standard that were due to inadequate road maintenance that lead to accelerated erosion and sediment deposition.

Rangeland Health Standard Number Three (Upland Vegetation)

Vegetation resources were assessed under RHS Number Three. The acres meeting/not meeting this RHS were the same as those reported under RHS Number One, the soils standard, with the exception of South Dobie Flat Allotment where RHS Number One states 36 percent of this allotment meets that standard and RHS Number Three which indicates that 78 percent of this allotment meets the standard. For the soils standard, the bare ground amounts were too great and litter amounts too low, as well as evident wide spread accelerated wind erosion. RHS Number Three was based primarily on 78 percent of the allotment being rated in good to excellent ecological site condition and having a rather high *similarity index* (66 to 80 percent) to the historic plant community. The similarity index to the historic plant community is defined as: *The present state of vegetation on an ecological site in relation to the historic climax plant community for the site* (USDA NRCS National Range and Pasture Handbook, October, 2003).

Rangeland Health Standard Number Four (Diverse Species Habitat)

RHS Number Four assessed the diversity of flora and fauna; T&E species, sensitive/special concern species, and their habitats; and invasive, non-native species. According to the RHS assessments for these four allotments, wildlife habitats were not meeting this standard for the conditions described under Standards two (riparian/wetland) and three (vegetation). Though no acreage figure is given for not meeting this standard, the acreage figures referenced under standards two and three are assumed to also represent unsatisfactory acres for this RHS too. The unsatisfactory acres reported under standard one is also mentioned as another deficient wildlife habitat parameter. The decline or loss of viable fisheries that were thriving several decades ago is further rationale for the failure to meet this standard.

Rangeland Health Standard Number Five (Water Quality)

RHS Number Five evaluates whether State of Wyoming water quality standards are being met/maintained for water quality. In all four allotments the water quality is "unknown". Assessment methodology is described in Wyoming BLM Instruction Memoranda WY- 2001-054, Wyoming Rangeland Monitoring Protocol and WY-98-061, Guidance for Water Quality Assessment and Monitoring for the Implementation of Standard Number five of the Wyoming Standards for Healthy Rangelands and Guidelines for Livestock Grazing. This standard assesses whether streams in a grazing allotment appear on the State of Wyoming's list of water quality impaired water bodies and whether a part of a watershed of an impaired water body occurs in an allotment. There have been no streams removed from the impaired water body list that occur in these allotments, nor any others which have been monitored by the Wyoming Department of Environmental Quality (WDEQ) as to whether water quality is adequate.

In 2003 BLM submitted a list of water bodies in the Sweetwater River watershed, including Sage Hen Creek, to the WDEQ for consideration in their monitoring schedule. Proper Functioning Condition (PFC) inventory data was used to identify possible stream impairment warranting further monitoring.

Rangeland Health Standard Number Six (Air Quality)

RHS Number Six concerns air quality. For all four of these allotments, this RHS was met as no known violations of state air quality standards occurred according to written communication with WDEQ. See the letter from the Wyoming Department of Environmental Quality's Bill Schick in Appendix 2.

Conformance with Applicable Land Use Plan

The alternatives considered in this analysis are in conformance with the 1987 *Lander Resource Management Plan (RMP) and Record of Decision*. Management direction also is provided in the *Grazing Supplement to the Final Resource Management Plan/Environmental Impact Statement for the Lander Resource Area, Lander, Wyoming* (1987). The RMP states: "Management decisions affecting grazing use will be made when monitoring data are sufficient to support those decisions and may include changing livestock numbers, periods of use, or a combination of both."

PUBLIC PARTICIPATION (SCOPING) AND CONSULTATION

The BLM decision-making process is conducted in accordance with the requirements of the Council on Environmental Quality (CEQ) regulations implementing the National Environmental Policy Act (NEPA), and the United States Department of Interior (USDI) and BLM policies and procedures implementing NEPA. NEPA and the associated regulatory and policy framework require federal agencies to involve the interested public in their decision-making.

This Environmental Assessment (EA) has been developed following consultation and coordination with the grazing permittee, other federal, state and local agency personnel, the University of Wyoming Extension office, other affected parties, and interested members of the public. A chronology of public participation and consultation is available for review at the BLM's Lander Field Office.

Relationship to Statutes, Regulations, or Other Authorizing Actions

This EA has been prepared in accordance with the National Environmental Policy Act of 1969, as amended. The authority for the proposed action includes The Taylor Grazing Act of 1934, the Public Rangelands Improvement Act of 1978 and the Federal Land Policy and Management Act of 1976. The principal permitting regulations for grazing are found in 43 CFR 4100.

SECTION II: THE ALTERNATIVES

Introduction & Alternative Formulation

This environmental assessment (EA) evaluates three resource management alternatives identified by the numbers One, Two, and Three. The No Action Alternative represents the continuation of current management direction. The No Action Alternative however, was not carried forward for further analysis, for the reasons described in Section II of this document; that is that current

management will not address the resource issues identified in the assessments. The BLM developed the alternatives through consultation, coordination and public meetings. Alternative Three was submitted by the SRR for analysis by the BLM's Interdisciplinary Team (IDT). The alternatives were developed to resolve resource issues and provide for the management of livestock grazing, consistent with BLM policy and applicable laws and regulations.

Reasonable Foreseeable Development and Reasonable Foreseeable Action Scenarios

There are several proposed uranium projects in the area. The Power Resources Gas Hills Project, in-situ mining, will be analyzed for environmental impact in a separate document. Its southern boundary occurs along the top of Beaver Rim and runs to the north, bordering and running slightly into Blackjack Ranch and Diamond Springs Allotments. The South Black Mountain Project has seen exploration activity only to this point and is located in north central Blackjack Ranch Allotment. Numerous mining claims for uranium occur in the Diamond Springs and Blackjack Ranch Allotments.

The following projects are known to occur within the area of analysis:

Pipelines: Kansas-Nebraska Natural Gas Company pipeline traversing the North Dobie Flat, South Dobie Flat, and Blackjack Ranch Allotments. No other pipelines are currently in the planning stage for this area and this area is not a designated utility corridor.

Power lines: Pacific Power & Light power line runs east and west and bisects McIntosh Meadow in the South Diamond Pasture. No other power lines are currently in the planning stage for this area and this area is not a designated utility corridor.

Management Actions Common to All Alternatives

<u>Pasture Rotation/Utilization Indicators</u>
A minimum height of riparian vegetation left after grazing, or utilization level, will be used as a guideline for determining when the movement of livestock is necessary. There are minimum vegetation height requirements for the uplands that are intended to ensure sufficient herbaceous upland vegetation for suitable sage-grouse habitat is left after the grazing period is over. Table 1 describes the site, species and rotation indicator to be used.

Table 1. Forage Utilization Levels Common to all Alternatives

Pasture	Site	Species	Rotation Indicator**
South Blackjack Ranch	Upland	STCO/AGSP	4-6" residual herbaceous cover on key areas number 1 and 6
	Riparian	CANE/DECA	6" greenline stubble height in fall
		JUBA	4" first terrace stubble height in fall
		Willow	30% of current year's leader growth
North Blackjack Ranch	Upland	STCO/AGSP	4-6" residual herbaceous cover on key areas number 2, 3, and 7
		CANE/DECA	6" greenline stubble height in fall
		JUBA	4" first terrace stubble height in fall
		Willow	30% of current year's leader growth
North Diamond Springs	Upland	STCO/AGSP	4-6" residual herbaceous cover on key area number 6
	Riparian	CANE/DECA	6" greenline stubble height in fall
		JUBA	3-4" stubble height in fall
South Diamond Springs	Upland	STCO/AGSP	4-6" residual herbaceous cover on key areas number 7 and 10
	Riparian	CANE/DECA/JUBA	3-4" stubble height in fall
North Dobie Flat	Upland	STCO/ORHY	4-6" residual herbaceous cover on key areas number 1 and 2
	Riparian	CANE/DECA/JUBA	3-4" stubble height in fall
South Dobie Flat	Upland	STCO/ORHY	4-6" residual herbaceous cover on key areas number 1 and 2

** Stubble height monitoring would be conducted during the grazing season and again after livestock are removed from their respective allotments. During the time livestock are in the first two pastures of the rotation schedule, stubble height monitoring would not be used as a move indicator. If livestock are in either of the last two pastures of the rotation sequence, and stubble height monitoring indicates the utilization standard has been reached, livestock would be moved to the last pasture of the rotation schedule or off the allotment if in the last pasture.

Diamond Springs and Blackjack Ranch Division Fences

Beginning in the late 1990's temporary electric fences were employed to facilitate livestock handling, substitute for herding to keep livestock from over using riparian areas, and to achieve better utilization on some of the uplands. In practice however, the fences proved impractical to operate and maintain. In 2006 and 2007 the Diamond Springs and Blackjack Ranch Allotments were divided with permanent barbed wire fences to break these large allotments into more manageable pastures to facilitate timely pasture and allotment moves within the grazing rotation strategy. These fences would also reduce the time spent on the riparian areas of these

allotments. These two large allotments can now be used as four pastures in a grazing rotation that includes the North and South Dobie Flat Allotments.

Beaver Rim Road Realignment

Road maintenance problems have occurred within the BLM's Beaver Rim Road (#2401) through the Diamond Springs Allotment. The problems were typically related to wet road conditions and channel erosion from spring runoff in the vicinity of the several springs that the road crosses. At several of the springs, the roadbed forms a small dike impounding water behind it which is not conducive to maintaining a dry, stable roadbed. The soils at the springs are high in silt, clay and soluble salts making them easily erodible and subject to rutting from vehicle traffic when moist. Also, in several locations, the public road traverses private land parcels of SRR with no easement or access agreement for the public. To remedy these maintenance problems and to secure legal access to the road by the public, it is necessary for the road to be relocated around these private parcels on drier ground. A separate EA will be written to analyze the Beaver Rim Road realignment.

Cold Spring Exclosure

In previous field meetings with the SRR, there was general agreement on the need to protect the wetland/riparian resources at Cold Spring which is located on private land. BLM will seek to work cooperatively with the SRR to develop protection measures for this sensitive riparian area.

Salt, Mineral Placement, and Supplemental Feeding

For all alternatives, salt and mineral supplements would be located at least 0.5 mile from water sources to promote better livestock distribution and discourage livestock from concentrating near water sources. Supplements or salt would not be placed within 0.6 mile of all known sage-grouse strutting grounds unless the location is agreed to by the BLM.

The use of only certified weed-free forage, as an emergency supplemental feed for livestock on public lands, would be common to all alternatives.

Drought Planning

Wyoming BLM has implemented a drought policy that addresses drought conditions on a case-by-case basis (Instruction Memorandum No. WY-2004-020: Drought Management). BLM would meet with the grazing permittee prior to livestock turn-out to consider proposed grazing plans and contingencies and would review range conditions with the permittee on the ground, as necessary. During emergency conditions related to drought, insect infestations, or wildfire, the BLM would close pastures or the allotment to livestock grazing.

BLM's Instruction Memorandum No. WY-2004-020 goes on to state:

> "As we manage through [a] drought, the main focus of our actions should be to maintain the long-term health and productivity of Wyoming's public rangelands. We also need to keep in mind that every action taken may place a hardship on those who use, or rely on, the public lands for their livelihood. It is critically important that we communicate early and often with the permittees during these challenging times.

The importance of maintaining rangeland health cannot be over emphasized as consideration is given to returning uses to rangelands following the end of a drought."

Predator Control

Predator control by the grazing permittee would be limited as follows: The permittee/lessee and/or his/her employees would not use or place poison or M-44 devices for prairie dog or predator control on BLM-administered public lands. Predation control actions would be carried out by the Animal and Plant Health and Inspection Service (APHIS), Wildlife Services (WS), or the Wyoming Game and Fish Department, or whoever has the responsibility for the offending species.

Sage-grouse Guidelines

Based on the most recent research concerning the seasonal habitat needs of the greater sage-grouse and its response to disturbance, the following vegetation management objectives and restrictions would be applied to livestock management within the SRR:

- No surface occupancy or surface disturbance within 0.6 mile radius of the identified perimeter of a lek.

- No placement of salt or mineral supplements within 0.6 mile radius of the identified perimeter of a lek unless location is agreed to by the BLM.

- No disruptive activity within 0.6 mile radius of the identified perimeter of a lek between one hour before sunset to one hour after sunrise from March 1 to May 15 (this restriction does not include casual use as described by the Code of Federal Regulations).

- No surface disturbing or disruptive activities within a three-mile radius of the perimeter of an identified lek or in identified sage-grouse nesting/early brood-rearing habitat outside the 3 mile radius from March 15 to July 15 (this restriction does not include casual use as described by the Code of Federal Regulations).

- Range improvement projects should not be located in areas that are detrimental to nesting/early brood rearing habitat. If this is not possible, these projects should be located in areas that are deemed to be the least detrimental to these habitats.

- Range improvement projects located inside suitable sage-grouse nesting/early brood-rearing habitat must be mitigated to prevent excessive predation on breeding or nesting/brood rearing sage-grouse from perching raptors.

- No vegetation manipulation within 0.6 miles radius of the identified perimeter of a lek or in identified winter concentration areas, unless the action would benefit greater sage-grouse habitat.

- No surface disturbing and/or disruptive activities in identified winter concentration areas from November 15 to March 14 (this restriction does not include casual use as described by the Code of Federal Regulations).

Monitoring

Any monitoring occurring under the alternatives would be conducted in accordance with BLM standard operating procedures and policy. Existing range condition and trend studies would continue to be monitored under all three alternatives. A cooperative effort with the active participation of the affected interests would be encouraged, or required as a grazing permit condition (actual use reports), to accomplish the necessary monitoring. The following items apply:

1. The BLM Manual, Wyoming State Office Supplement Handbook H-4423-1, Section 4423.56 would be used as a general guide in developing range condition trend-monitoring procedures. Plant frequency, density, production and utilization, and ground cover would be sampled to evaluate vegetation and soil erosion trends. Other parameters, such as canopy cover, seedling or shrub characteristics would be considered as needed on unique areas such as riparian zones, aspen stands, and bitterbrush or other mountain shrub thickets.

2. During and after the grazing of each pasture, forage utilization would be measured by the height-weight method or the key forage plant method described in BLM Manual, Wyoming State Office Supplement Handbook H-4423-1, Section 4423.47. This would aid in determining whether existing stocking levels are providing proper use and what adjustments in the present management, if any, would be needed. These studies would also help determine a schedule for seasonal use within a grazing system.

3. Selected key areas (meadows and riparian areas) would be monitored to determine impacts from grazing as described in the BLM Manual, Wyoming State Office Supplement Handbook H-4423-1, Section 4423.56C; Marlow and Clary (1996); and BLM Technical Reference TR 1737-3, Inventory and Monitoring of Riparian Areas.

4. Existing rain gauges within or adjacent to the SRR allotments would continue to be used to measure precipitation to help interpret vegetative production variations resulting from climatic changes. Currently, there are three rain gauges that the BLM is actively monitoring that are within or adjacent to the analysis area.

5. Soil quality monitoring would utilize data that is being collected as part of other monitoring efforts in this allotment. Soil cover will be of primary concern to discern how well the monitored sites would be protected from erosion under the chosen management scenario. This data can then be used to compare existing cover to that expected to be present on a particular ecological site.

6. Actual use information would be required to evaluate the future use levels of the allotments. Direct and indirect methods (according to the guidelines in BLM Manual 4400.23A, Wyoming State Office Supplement Handbook H-4423-1, Section 4423.3) would be used to collect this information.

7. The approval and use of rangeland monitoring data collected by non-BLM entities will comply with existing Wyoming State Office policy. The BLM may approve and utilize monitoring data collected on public land by parties other than BLM; however, the acceptance of this data by the BLM is not automatic. The BLM will have the final decision authority

concerning the planning, collection, and interpretation of monitoring data that is used to make resource management decisions. The BLM will take advantage of these offers of monitoring data from non-BLM entities to the extent feasible, and will honor the concept of public involvement and stewardship in the management of the public rangelands.

Climate Change

Earlier assessments and evaluations did not consider the impacts of climate change. There is substantial scientific evidence that increased atmospheric concentrations of green house gases (GHGs) as well as land-use changes are contributing to an increase in average global temperature, sometimes called global warming.

Given the observed and anticipated long-term dynamic of climate change, the alternatives considered in this environmental assessment analyze climate change-related impacts on the resources within the SRR, to the degree practicable and reasonably foreseeable.

ALTERNATIVES CONSIDERED BUT NOT ANALYZED IN DETAIL

Alternatives and proposals described in this section were considered but not carried forward for a full, detailed analysis because: (1) they did not fulfill requirements of the Federal Land Policy and Management Act (FLPMA - 43 United States Code 1701 et seq.) or other existing laws and regulations; or (2) they did not meet the Purpose and Need as described in Section I; or (3) they were already part of an existing plan, policy, or administrative function; or (4) they did not fall within the limits of the planning criteria; or (5) they contain components that are part of alternatives that were carried forward; or (6) they were not technically or economically feasible or presented unacceptable impacts to other resource values.

No Action Alternative

An alternative to continue with the current grazing management strategy was considered but not analyzed. The current management is detrimental to the riparian zones and wetlands as stated in the Standards for Healthy Rangelands assessments. Soil erosion in areas transitional to uplands exhibit the effects of accelerated water erosion and some areas in the uplands have insufficient amounts of soil cover and exhibit accelerated wind erosion. Current stocking levels exceed the carrying capacity of the utilized portions of the allotments, thereby inhibiting improvement of resources and the degrading of adjoining areas that still are producing an appropriate plant community and maintaining acceptable rates of soil erosion. Authorizing grazing use that exceeds the carrying capacity of the allotment(s) would be a violation of 43 CFR 4130.3-1(c). Additionally, 43 CFR 4180.2(c) (1) requires appropriate action be taken to meet rangeland health standards or to conform to the applicable guidelines.

No Grazing Alternative

A no grazing alternative was considered, but not analyzed. According to the 1987 Lander Resource Area RMP:

> "The elimination of livestock grazing from all public lands in the resource area was considered as one management action for resolving the range management issues.

However, after reviewing vegetative data, categorizing allotments, conducting public meetings, BLM concluded that eliminating livestock grazing from all public lands would not be a viable or necessary option. Resource conditions, including range vegetation, watershed, and wildlife habitat would not benefit additionally from an area-wide prohibition of livestock grazing. Furthermore, public comments received during the issue identification and criteria development steps indicated a general acceptance of livestock grazing on public land, provided that such grazing would be properly managed."

ALTERNATIVES CONSIDERED AND ANALYZED IN DETAIL

Alternative One - Rest-Rotation Grazing System

This alternative would implement a one-herd, rest-rotation grazing system with seven pastures. This is a grazing system in which one pasture would be rested from grazing for at least a full year. Livestock would be moved as one-herd through seven pastures during the grazing year. The order of pasture use would vary annually. This system would require the adjustment of stocking rates, by the amount of AUM's rested annually.

Under Alternative One, 1,250 cattle would be grazed and 6,717 BLM AUMs would be authorized. The season of use would be June 5 - December 6, for a total of 195 days of use. This represents a net reduction of 21 days from the current situation to accommodate the yearly rest of one pasture. The grazing system and the season of use period would both be evaluated at the end of year three to determine whether they are successfully meeting rangeland health objectives.

Below are two tables showing the proposed rotation schedule and pasture days for the next ten years. Both tables represent the same grazing prescription; however Table Two shows the order of pasture rotation and Table Three shows the number of days each pasture would be grazed and the approximate time of year it would be grazed.

Table 2. Modified Rest-Rotation Grazing System for Riparian/Upland Recovery

Year	Northeast Blackjack Ranch	Northwest Blackjack Ranch	South Blackjack Ranch	North Diamond Springs	South Diamond Springs	North Dobie Flat	South Dobie Flat	Shipping Pastures
2009	Rest	2nd	5th	3rd	4th	6th	8th	1st,7th
2010	Rest	3rd	2nd	4th	5th	6th	8th	1st,7th
2011	Rest	4th	5th	3rd	2nd	6th	8th	1st,7th
2012	4th	Rest	6th	5th	3rd	2nd	8th	1st, 7th
2013	5th	Rest	4th	6th	8th	3rd	2nd	1st, 7th
2014	3rd	4th	Rest	5th	2nd	6th	8th	1st, 7th
2015	3rd	4th	2nd	5th	Rest	6th	8th	1st, 7th
2016	Rest	2nd	5th	3rd	4th	6th	8th	1st, 7th
2017	4th	Rest	3rd	5th	6th	2nd	8th	1st, 7th
2018	3rd	4th	Rest	5th	2nd	6th	8th	1st, 7th

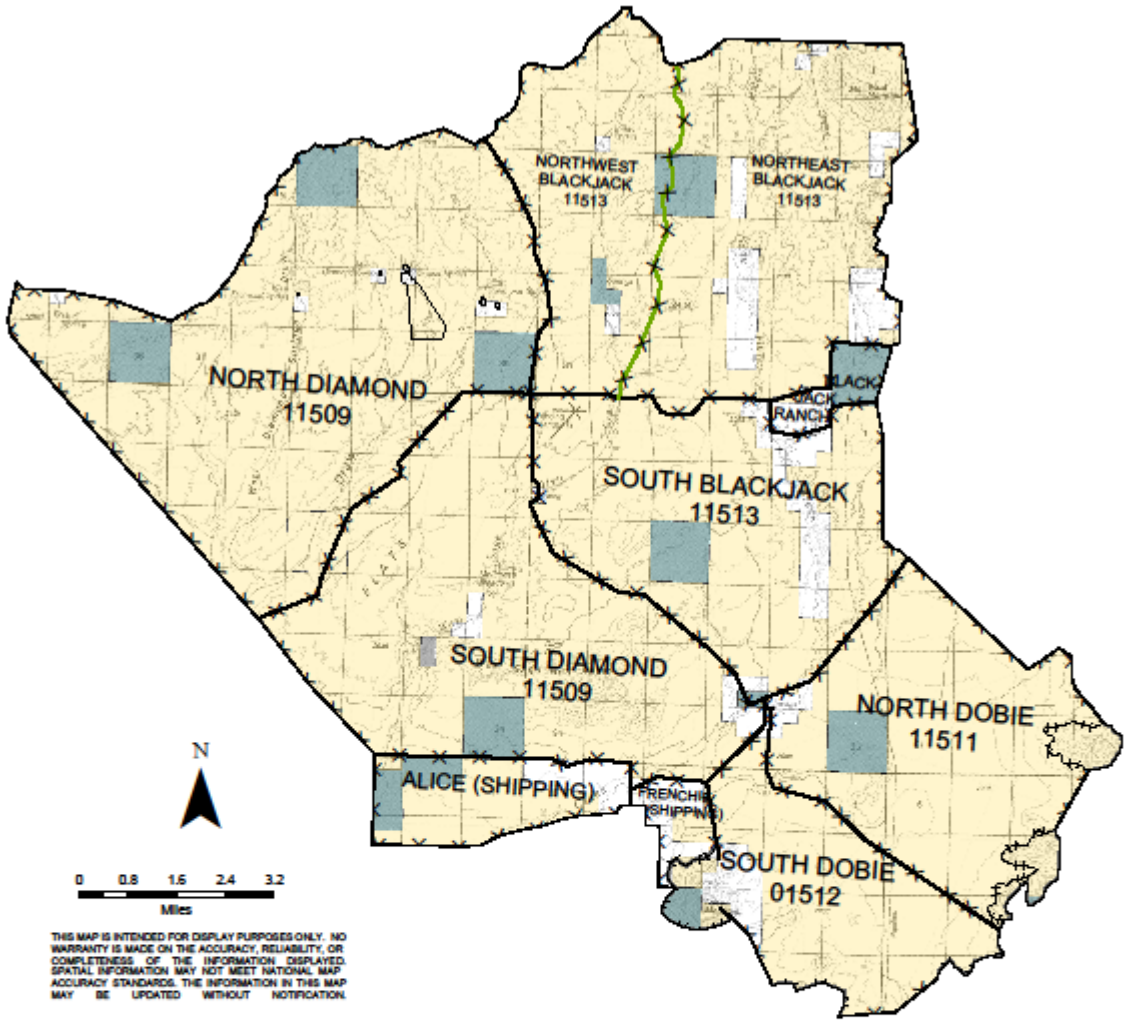
Table 3. Dates of Use and Number of Days to be Grazed per Pasture

Year	Northeast Blackjack Ranch (16 days)	Northwest Blackjack Ranch (9 days)	South Blackjack Ranch (15 days)	North Diamond Springs (50 days)	South Diamond Springs (40 days)	North Dobie Flat (30 days)	South Dobie Flat (25 days)	Shipping Pastures (10 days) 05/31-06/04
2009	REST	06/05-06/13	09/12-09/26	06/14–08/02	08/03-09/11	09/27-10/26	11/01-11/25	10/27-10/31
2010	REST	06/20-06/28	06/05-06/19	06/29–08/17	08/18-09/26	09/27-10/26	11/01-11/25	10/27-10/31
2011	REST	09/03-09/11	09/12-09/26	07/15–09/02	06/05-07/14	09/27-10/26	11/01-11/25	10/27-10/31
2012	08/14-08/29	REST	10/12-10/26	08/30-10/11	07/05-08/13	06/05-07/04	11/01-11/25	10/27-10/31
2013	08/14-08/29	REST	07/30-08/13	08/30-10/26	10/17-11/25	06/30-07/29	06/05-06/29	10/27-10/31
2014	07/15-07/30	07/31-08/08	REST	08/09-09/27	06/05-07/14	09/28-10/26	11/01-11/25	10/27-10/31
2015	07/01-07/17	07/18-07/27	06/05-06/30	07/28-09/25	REST	09/26-10/26	11/01-11/25	10/27-10/31
2016	REST	06/05-06/13	09/12-09/26	06/14–08/02	08/03-09/11	09/27-10/26	11/01-11/25	10/27-10/31
2017	07/20-08/04	REST	07/05-07/19	08/05-09/23	09/24-10/26	06/05-07/04	11/01-11/25	10/27-10/31
2018	07/15-07/30	07/31-08/08	REST	08/09-09/27	06/05-07/14	09/28-10/26	11/01-11/25	10/27-10/31

Livestock herding would be encouraged, but not mandatory under this alternative. The majority of the remaining unfenced riparian areas on BLM administered public lands in the North Diamond Springs Pasture would be fenced and excluded from grazing to facilitate appropriate grazing distribution in the uplands. This fencing would improve and protect 68 acres of riparian area identified in the RHS assessment as being degraded and not meeting the RHS.

A new fence would be constructed to divide the North Blackjack Ranch Pasture into two smaller east and west pastures (see Map 2). The eastern pasture would contain the East and Middle Forks of Sage Hen Creek and this pasture would be rested initially for three years to establish a better age class distribution of woody vegetation, improve fishery habitat, and increase the potential for beaver establishment. Coordination with the Wyoming Game and Fish Department (WYGFD) would be necessary to afford some measure of protection for the beaver from legal harvest while they are becoming established.

Map 2



Split Rock Ranch Allotments
Alternative 1 - Fences*

- Proposed North Blackjack Division Fence
- Existing Fence
- Exclosure or Corral
- Natural Boundary

*The proposed Diamond Springs Allotment riparian pasture fences are not shown on this map as they are too small to depict at this map scale.

Alternative Two – Deferred-Rotation Grazing System

Alternative Two would continue and further develop the six-pasture, deferred-rotation grazing system (see Map 3) which was implemented in 2008. Livestock grazing use would be deferred annually to a time period different than the preceding year on all pastures. Spring turn-out locations would be rotated among all of the allotments/pastures.

Under this alternative, the herd size would be reduced to 1,000 cattle and 5,358 BLM AUMs would be authorized. The grazing season would be from June 5 to December 22 for a total of 204 days. This represents a reduction of 12 days from the current season of use.

Fewer cattle along with the reduced season of use would reduce overall grazing intensity, restore vegetation health conditions identified in the RHS assessment, and provide for better soil cover to decrease the bare ground and accelerated wind erosion. Table Four shows the order of pasture rotation and Table Five describes the deferred-rotation grazing system and pasture schedule to be implemented under Alternative Two:

Table 4. Modified Deferred Rotation Grazing System
Order of Pasture Rotation

Year	North Blackjack Ranch	South Blackjack Ranch	North Diamond Springs	South Diamond Springs	North Dobie Flat	South Dobie Flat	Shipping Pastures
2009	3rd	2nd	4th	5th	7th	8th	1st, 6th
2010	2nd	5th	4th	3rd	8th	7th	1st, 6th
2011	3rd	4th	2nd	5th	7th	8th	1st, 6th
2012	3rd	5th	4th	2nd	8th	7th	1st, 6th
2013	3rd	2nd	4th	5th	7th	8th	1st, 6th
2014	2nd	5th	4th	3rd	8th	7th	1st, 6th
2015	3rd	4th	2nd	5th	7th	8th	1st, 6th
2016	3rd	5th	4th	2nd	8th	7th	1st, 6th
2017	3rd	2nd	4th	5th	7th	8th	1st, 6th
2018	2nd	5th	4th	3rd	8th	7th	1st, 6th

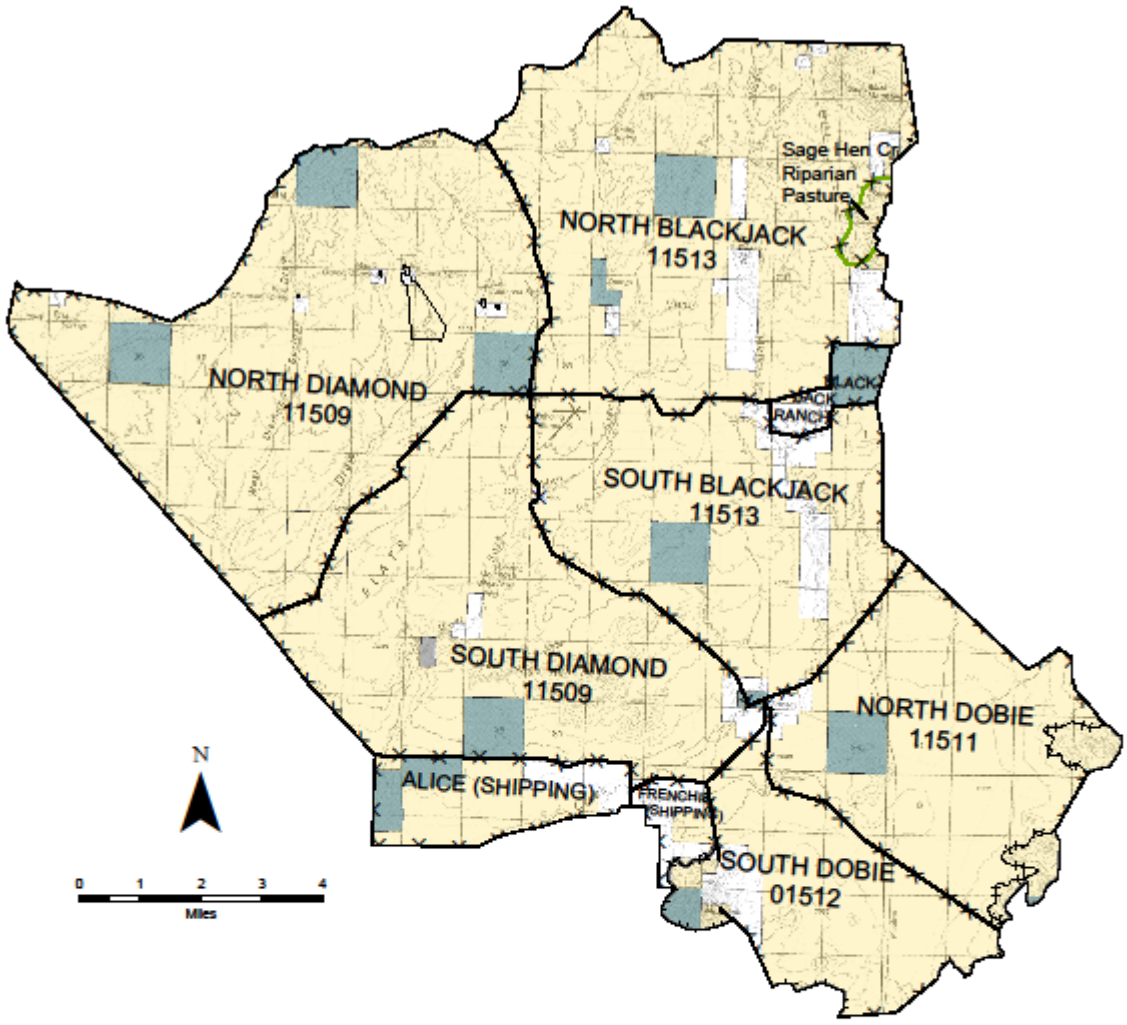
Table 5. Dates of Use and Number of Days to be Grazed per Pasture

Year		North Blackjack Ranch (42 DAYS)	South Blackjack Ranch (25 DAYS)	North Diamond Springs (44 DAYS)	South Diamond Springs (36 DAYS)	North Dobie Flat (30 DAYS)	South Dobie Flat (20 DAYS)	Shipping Pastures (7 DAYS) 06/02-06/04
2009		06/30-08/10	06/05-06/29	08/11-09/23	09/24-10/29	11/03-12/02	12/03-12/22	10/30-11/02
2010		06/05-07/16	10/05-10/29	08/22-10/04	07/17-08/21	11/23-12/22	11/03-11/22	10/30-11/02
2011		07/19-08/29	08/30-09/23	06/05-07/18	09/24-10/29	11/03-12/02	12/03-12/22	10/30-11/02
2012		07/11-08/21	10/05-10/29	08/22-10/04	06/05-07/10	11/23-12/22	11/03-11/22	10/30-11/02
2013		06/30-08/10	06/05-06/29	08/11-09/23	09/24-10/29	11/03-12/02	12/03-12/22	10/30-11/02
2014		06/05-07/16	10/05-10/29	08/22-10/04	07/17-08/21	11/23-12/22	11/03-11/22	10/30-11/02
2015		07/19-08/29	08/30-09/23	06/05-07/18	09/24-10/29	11/03-12/02	12/03-12/22	10/30-11/02
2016		07/11-08/21	10/05-10/29	08/22-10/04	06/05-07/10	11/23-12/22	11/03-11/22	10/30-11/02
2017		06/30-08/10	06/05-06/29	08/11-09/23	09/24-10/29	11/03-12/02	12/03-12/22	10/30-11/02
2018		06/05-07/16	10/05-10/29	08/22-10/04	07/17-08/21	11/23-12/22	11/03-11/22	10/30-11/02

This alternative would require a frequent herding provision to reduce/mitigate livestock impacts in riparian zones.

No additional range improvement projects for livestock grazing management would be proposed for this alternative. To restore the cold water fishery of East Sage Hen Creek, a riparian protection fence would be constructed and livestock grazing would be excluded on approximately 455 acres. The construction of this exclosure would encourage the growth of woody species, such as willows and allow for seedlings and younger plants to become established. The objective of establishing the woody species is to provide habitat for the reintroduction of beaver to this stream. These beaver would also require a period of protection by the Wyoming Game and Fish Department from legal harvest. The previous cold water fishery that existed here was dependent upon the beaver to build and maintain dams to keep water tables sufficiently high to store water and maintain the fishery. The current stream has diminished water tables, due to head cutting which occurred after the relict beaver dams washed out, and the encroachment of upland species, such as sagebrush and juniper onto the former floodplain of the creek as water tables dropped. This process may take a decade or more to accomplish (Platts, 1990).

Map 3



Split Rock Ranch Allotments
Alternative 2 - Fences

- Proposed Sage Hen Cr. Riparian Fence
- Existing Fence
- Exclosure or Corral
- Natural Boundary

Alternative Three - Deferred-Rotation Grazing System with a Longer Season of Use

Alternative Three would be similar to Alternative Two, except that there would be an increase in the number of cattle grazing the pastures and a longer season of use. This alternative consists of a continuation of the four pasture deferred-rotation grazing system among the Blackjack Ranch and the Diamond Springs Allotments (Map 4). The North and South Dobie Allotments are not proposed to be part of this deferred early season rotation system, but would receive spring and fall/winter use every year. A copy of the original SRR proposal letter is available for viewing at the BLM Lander Field Office.

Under this alternative, the herd size would be increased to1,500 head of livestock and 9,640 BLM AUMs would be authorized. The annual grazing season would start on May 10 and end January 22 for a total of 258 days. This represents an increase of 42 days from the current season of use.

Livestock herding would be employed to move cattle away from riparian areas. No new range improvement projects are proposed with this alternative.

Table Six shows the order of pasture rotation and Table Seven describes the deferred rotation grazing system and pasture schedule to be implemented under Alternative Three:

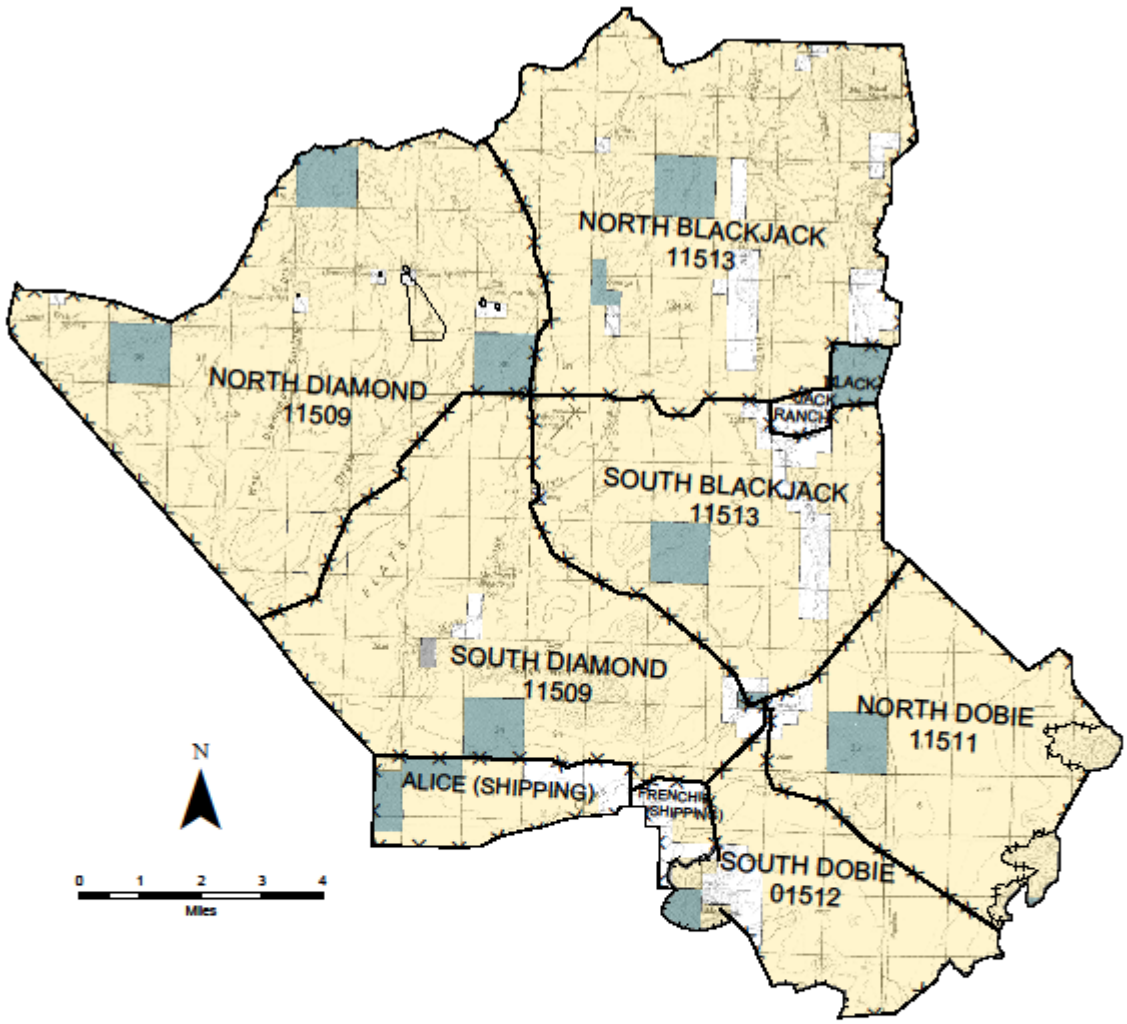
Table 6. Modified Deferred Rotation Grazing System
Order of Pasture Rotation

Year	North Blackjack Ranch	South Blackjack Ranch	North Diamond Springs	South Diamond Springs	North Dobie Flat	South Dobie Flat	Shipping Pastures
2009	4th	3rd	5th	7th	2nd, 8th	1st, 9th	6th
2010	5th	7th	4th	3rd	2nd, 8th	1st, 9th	6th
2011	3rd	7th	4th	5th	2nd, 8th	1st, 9th	6th
2012	4th	5th	3rd	7th	2nd, 8th	1st, 9th	6th
2013	4th	3rd	5th	7th	2nd, 8th	1st, 9th	6th
2014	5th	7th	4th	3rd	2nd, 8th	1st, 9th	6th
2015	3rd	7th	4th	5th	2nd, 8th	1st, 9th	6th
2016	4th	5th	3rd	7th	2nd, 8th	1st, 9th	6th
2017	4th	3rd	5th	7th	2nd, 8th	1st, 9th	6th
2018	5th	7th	4th	3rd	2nd, 8th	1st, 9th	6th

Table 7. Dates of Use and Number of Days to be Grazed per Pasture

Year		North Blackjack Ranch (46 DAYS)	South Blackjack Ranch (35 DAYS)	North Diamond Springs (54 DAYS)	South Diamond Springs (49 DAYS)	North Dobie Flat (27 DAYS) 05/20-05/29	South Dobie Flat (19 DAYS) 05/10-05/19	Shipping Pastures (28 DAYS)
2009		07/04-08/18	05/30-07/03	08/19-10/01	11/09-12/27	12/28-01/13	01/14-01/22	10/12-11/08
2010		09/10-10/25	11/23-12/27	07/08-09/09	05/30-07/07	12/28-01/13	01/14-01/22	10/26-11/22
2011		05/30-07/14	11/23-12/27	07/15-09/06	09/07-10/25	12/28-01/13	01/14-01/22	10/26-11/22
2012		07/23-09/06	09/07-10/11	05/30-07/22	11/09-12/27	12/28-01/13	01/14-01/22	10/12-11/08
2013		07/04-08/18	05/30-07/03	08/19-10/01	11/09-12/27	12/28-01/13	01/14-01/22	10/12-11/08
2014		09/10-10/25	11/23-12/27	07/08-09/09	05/30-07/07	12/28-01/13	01/14-01/22	10/26-11/22
2015		05/30-07/14	11/23-12/27	07/15-09/06	09/07-10/25	12/28-01/13	01/14-01/22	10/26-11/22
2016		07/23-09/06	09/07-10/11	05/30-07/22	11/09-12/27	12/28-01/13	01/14-01/22	10/12-11/08
2017		07/04-08/18	05/30-07/03	08/19-10/01	11/09-12/27	12/28-01/13	01/14-01/22	10/12-11/08
2018		09/10-10/25	11/23-12/27	07/08-09/09	05/30-07/07	12/28-01/13	01/14-01/22	10/26-11/22

Map 4



Split Rock Ranch Allotments
Alternative 3 - Fences

Existing Fence
Exclosure or Corral
Natural Boundary

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SECTION III – AFFECTED ENVIRONMENT

Introduction
This chapter describes the baseline conditions within the Split Rock Ranch Allotments. The baseline conditions are used as a comparison for determining the effects of the alternatives on the critical elements of the human environment, as described in the BLM's NEPA Handbook H-1790-1 (BLM 2008).

Location
The four SRR allotments are located north of the Sweetwater River and about 14 miles northeast of Jeffrey City. The allotments lie within the following boundaries: Townships 29 – 33 North, and Ranges 88 – 91 West.

The allotments are composed of a mixture of public, private, and state lands (lands managed by the Office of State Lands and Investments). Private and state lands are scattered throughout the allotment. The private and some state lands are generally located adjacent to water courses or springs. Table 8 shows the amount of acres by ownership, AUMs, and percent of AUMs within these four allotments:

Table 8. Total Acres and Authorized AUMs with Ownership in the SRR Allotments

Land Status	Acres	AUMs	Percent of AUMs
Public	90,113	9,400	85
State	6,107	797	7
Private	6,579	884	8
Totals:	**102,799**	**11,081**	**100**

The total numbers of acres are approximate, and are based on information generated through the BLM's Geographic Information System (GIS). The BLM does not guarantee the total acreage to be definitively accurate.

Topography and Elevation
Elevations roughly follow the annual precipitation averages with the lower elevations at approximately 6,400 feet receiving lower amount of annual precipitation. This is about 10 inches, and it occurs in the southern portions of this area nearest to the Sweetwater River. The highest elevations occur along Beaver Rim, approximately 7,400 feet, and receive the highest precipitation of about 14 inches. Black Mountain in the northeast part of Blackjack Ranch Allotment at 8,041 feet is the highest point in the SRR allotments area considered in this EA.

Climate
The climate of this area is defined as being a semiarid cold desert, continental climate. Temperatures can range from winter lows of almost -50 degrees Fahrenheit to summertime highs of in excess of 100 degrees. Annual air temperatures on the sagebrush-covered rangelands average 33 to 45 degrees Fahrenheit.

Growing seasons are generally short, but tend to be longest in the southern parts of the

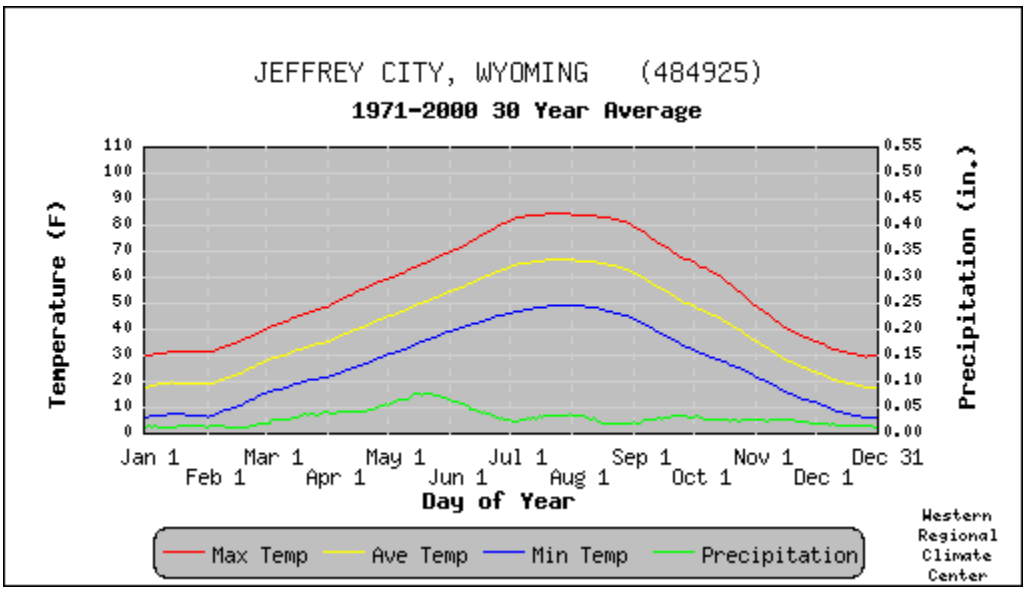
allotments and shortest in the northern portions. About 14 miles to the southeast of the SRR allotments, Muddy Gap (elevation 6,300 feet) has a five years in ten last freeze date of May 29 and a first freeze date of September 16th.

The bulk of annual precipitation occurs in the spring; typically beginning in late March, peaking in May, and declining rapidly during June. A minor, but important second peak occurs during the fall period, September through November. This fall moisture can initiate a second period of growth for cool-season grasses, but more importantly it will insure a good frost seal for the soils so that they are pre-wetted and ready to transmit spring precipitation deep into the soil profile for use by the deeper-rooted more desirable native grasses and shrubs. Storing moisture deep in the soil profile ensures it is available for later use.

Long-term average annual precipitation varies throughout the allotments. The National Weather Service has a long-term record from Jeffrey City. For the years 2000 to 2007 the long-term average precipitation at Jeffrey City was 68.5 percent of the long-term average, 10.12 inches for the period of record 1964 through 2005. The following graph illustrates the climate parameters of temperature and precipitation at Jeffrey City:

Figure 1.

JEFFREY CITY, WYOMING
1971 - 2000 Temperature and Precipitation



Data is smoothed using a 29 day running average.

- Max. Temp. is the average of all daily maximum temperatures recorded for the day of the year between the years 1971 and 2000.

- Ave. Temp. is the average of all daily average temperatures recorded for the day of the year between the years 1971 and 2000.

- Min. Temp. is the average of all daily minimum temperatures recorded for the day of the year between the years 1971 and 2000.

- Precipitation is the average of all daily total precipitation recorded for the day of the year between the years 1971 and 2000.

Portions of the allotments closest to the Sweetwater River are on the lower end of this annual precipitation range of 10 to 14 inches for the local ecological sites, and the northern reaches, along Beaver Rim are on the higher end.

Drought

Single year and multi-year droughts are not uncommon. According to the 2004 Wyoming Climate Atlas (Curtis, 2004):

> The most recent statewide drought that began in earnest in the spring of 2000 over Wyoming is considered by many to be the most severe in collective memory. However, some old timers have indicated that they remember streams drying up in the 1930's and 1950's. According to instrument records, since 1895 there have been only seven multi-year (three years or longer) statewide droughts….(page 94)
>
> This does not mean that droughts cannot occur in isolation from other river basins. In fact, Wyoming averages severe or extreme drought conditions from 10 % in the eastern plains to more than 20 % of the time over the southwest regions of the state.
>
> These percentages are nearly doubled if all drought levels are considered (mild to exceptional)…. Between 31% and 45% of the time a meteorological drought is occurring within a climate division and generally between 80% and 90% of the time these events last no longer than 6 months, although below normal precipitation has been known to last up to 16 straight months. All climate divisions having a monthly precipitation deficit at the same time occur about 17% of the time during any dry or wet season. While entire years have precipitation deficits, it is rare that every month during that year has below normal precipitation. Widespread droughts in Wyoming, as determined from stream flow records, were most notable during three periods: 1929-1942, 1948- 1962, and 1976-1982. (Wyoming Climate Atlas, 2004, page 96.)

The recent drought that the area is experiencing began in about 2000. The severity of recent dry conditions is unprecedented. Present native vegetation production has been substantially decreased in these years. This is also reflected in the voluntary and negotiated non-use, and decreased levels of use, by livestock operators, over this period.

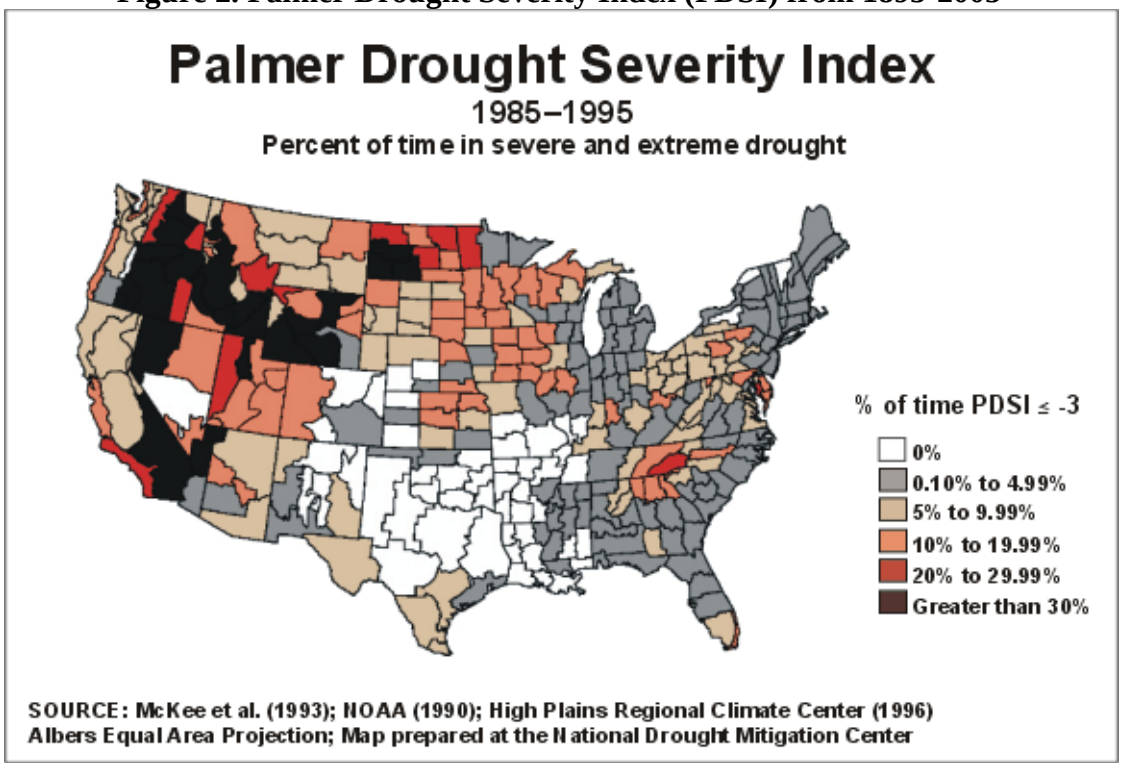
The 2008 grazing year was an exception, in that the SRR had exceptional vegetative expression due to timely and abundant late May precipitation. Nonetheless, unacceptable amounts of bare ground were still evident when the ground was viewed vertically. Less desirable grass species like Sandberg bluegrass and prairie junegrass also added greatly to the visual appearance of the ecological sites. The present monitoring record for the SRR does not contain plant production figures that approach what is expected from the ecological sites present.

The Palmer Drought Severity Index (PDSI) attempts to measure the duration and intensity of the long-term drought-inducing circulation patterns (see Figure 2). Long-term drought is cumulative, so the intensity of drought during the current month is dependent on the current weather patterns plus the cumulative patterns of previous months. Since weather patterns can change literally

overnight from a long-term drought pattern to a long-term wet pattern, the PDSI (PDI) can respond fairly rapidly.

In the PDSI map shown below, the percent of time the area encompassing the SRR has been in severe and extreme drought has risen to greater than thirty percent in recent years. Although the map only dates through 1995, the recent drought has extended through 2007 and has affected most of the area within the SRR.

Figure 2. Palmer Drought Severity Index (PDSI) from 1895-2005



Climate Change

Compounding the impacts of local drought, global mean surface temperatures have increased nearly 1.8°F from 1890 to 2006. Models indicate that average temperature changes are likely to be greater in the Northern Hemisphere. Northern latitudes (above 24° N) have exhibited temperature increases of nearly 2.1°F since 1900, with nearly a 1.8°F increase since 1970 alone. Without additional meteorological monitoring systems, it is difficult to determine the spatial and temporal variability and change of climatic conditions, but increasing concentrations of greenhouse gases (GHGs) are likely to accelerate the rate of climate change.

In 2001, the Intergovernmental Panel on Climate Change indicated that by the year 2100, global average surface temperatures would increase 2.5 to 10.4°F above 1990 levels. The National Academy of Sciences has confirmed these findings, but also has indicated there are uncertainties regarding how climate change may affect different regions. Computer model predictions indicate that increases in temperature will not be equally distributed, but are likely to be accentuated at higher latitudes. Warming during the winter months is expected to be greater than during the

summer, and increases in daily minimum temperatures is more likely than increases in daily maximum temperatures. Increases in temperatures would increase water vapor in the atmosphere, and reduce soil moisture, increasing generalized drought conditions, while at the same time enhancing heavy storm events. Although large-scale spatial shifts in precipitation distribution may occur, these changes are more uncertain and difficult to predict.

It is difficult and perhaps impossible to discern whether global climate change is already affecting resources in the allotments, particularly in light of the localized drought experienced since at least 2000. In most cases there is more information about potential or projected effects of global climate change on resources. It is important to note that projected changes are likely to occur over several decades to a century.

Soils

These four grazing allotments are located in the eastern part of central Fremont County, with some portions extending eastward into adjacent Natrona County.

There is a change in the local soils roughly between 6,900 and 7,100 feet in the Diamond Springs and the Blackjack Ranch Allotments where the lower elevation soils are quite light, or sandy, and the higher elevation soils have a heavier, or loamy, texture. The ecological sites that exist on these soils also reflect the difference with the lower elevations having predominantly Sandy and Shallow Sandy ecological sites and the higher elevation sites having Loamy and Clayey ecological sites.

The soils within these four allotments have been mapped as part of the national progressive soil survey and the soil survey reports published by the UDSA Natural Resources Conservation Service (USDA NRCS) as the Soil Survey of Natrona County Area, Wyoming, 1997, and the Soil Survey of Fremont County, East Part and the Dubois Area, Wyoming, 1993. Each of the soil series identified in these soil surveys has an ecological site correlated to it. These ecological sites are described in the USDA NRCS Technical Guides for the 10-14 Inch High Plains Southeast of Major Land Resource Area (MLRA) 34.

In addition to describing the local soils physically and chemically, the soil surveys provide engineering interpretations and ratings as to how well these soils fit certain uses; such as their suitability for road, dike, and pond construction. Erosion susceptibility is explained, as well as, runoff potential, infiltration, and available water holding capacity of the soils.

The most extensive soil map unit descriptions in the two USDA NRCS soil surveys that cover the SRR also give some general rangeland management recommendations. The example of management recommendations from the soil surveys that follows is given to illustrate the fragile nature of the local soils:

> The production of vegetation suitable for grazing is limited by low precipitation, a short growing season, and wind erosion and by doughtiness of the [sandier] soil[s]. Proper grazing use and deferred grazing are needed on rangeland that is in an undesirable condition. Additional management practices may be needed on rangeland that is in an undesirable condition. These practices include brush control, critical area planting,

fencing, water facilities, and wildlife habitat management. Areas where brush is removed should have enough ground cover remaining to prevent excessive erosion. Range seeding may be needed if the amount of desirable vegetation is not sufficient for natural seeding to occur. If the plant cover is removed during seeding, a cover crop is needed to keep windblown sand from damaging seedlings. (USDA NRCS Soil Survey of Fremont County, East Part and the Dubois Area.)

Grazing should be delayed until the soils are firm and the more desirable forage plants have achieved enough growth to withstand grazing pressure.

Presently, the sandy portions of these allotments suffer from lost fertility and lowered water holding capacities. Bare ground and sparse vegetative cover have promoted moderate amounts of wind erosion. The word moderate does not mean reasonable in this case, in that the soils so described have their entire topsoil layer absent in many places. These soils differ in management response to un-eroded soils. The uncharacteristically low production for these eroded soils reflects the fertility lost through erosion of the topsoil.

Some existing livestock grazing-related infrastructure like water sources, fence-lines and salting areas create areas of severe animal impact, known as sacrifice areas, which can typically range up to several acres in size. Sacrifice areas are typically denuded of vegetation and the soils are often compacted to varying degrees, typically decreasing as one gets further away from a livestock management project, such as a water source.

Using some standard disturbance figures that are routinely incorporated into LFO environmental analysis it is calculated that there are presently 250 acres of sacrifice areas associated with constructed livestock management projects (see Appendix 3). This figure is not all-inclusive as some private land water sources are omitted here, as are ephemeral water sources and some small springs, which too can be temporary, around the base of the Sweetwater Rocks .

Climate change predictions include increased duration and frequency of droughts and an increase in extreme precipitation events. This combination can result in an increase of surface soil erosion and gullying beyond current levels. Continental scale shifts in precipitation may lead to areas where there are increases and decreases in soil moisture. Prolonged drought would also affect soil respiration, resulting in a decreased soil carbon pool. Climate change (warmer/drier summer conditions, warmer winters) may be one of the factors in recently observed changes in increases in invasive species.

Water

The four grazing allotments are entirely contained within the watershed of the Sweetwater River. The Sweetwater River originates in the southern Wind River Mountains and flows east to join the North Platte River at Pathfinder Reservoir.

There has been no water quality monitoring of the natural waters found in these allotments by the WDEQ. There is some fisheries inventory information from 1976 located in the LFO files (6602.2 – Sage Hen Creek). The narrative from this inventory report mentions that Sage Hen Creek is unique to the area in that it drains a large watershed of roughly 86,400 acres, exclusive of the Diamond Springs drainage. Also, most of the live water sections of the stream are found

in the upper forks and middle reaches in the Blackjack Ranch Allotment. In these reaches the flows are maintained because of year-round cold spring activity. The file contains a coupl water analysis reports that give Total Dissolved Solids (TDS) figures of 278 parts per million (ppm) and 392 ppm and a total hardness ($CaCO_3$) of 168 ppm. These figures indicate that the water chemistry is good for aquatic life such as the brook trout that were planted here in the 1930's.

According to Ohio Livestock Manure Management Guide Bulletin 604-06 (Randall, 2006), pathogens in manure tend to be retained at or near the soil surface. As a result, surface runoff is the primary cause of pathogen transport. Soil may retard and filter bacteria by their absorption to organic matter; thus soil may entrap bacteria during leaching events. Higher soil organic matter would promote more entrapment, and therefore, the organic matter content of the manure applied may impact movement of the bacteria. Finer textured soils are more likely to entrap bacteria. Also, grass buffer strips are quite effective at filtering out pathogens.

The 1976 fisheries inventory report noted that for the fenced Asbell Homestead on State land, along the main Sage Hen Creek, and the small fenced area around the Blackjack Ranch, along the East Fork of Sage Hen Creek, the habitat conditions were excellent. However, the physical condition of the West, Middle, and East Forks and the main stream below the forks, are described as being in a degraded state. Poorly designed and maintained road crossings were said to be contributing sediment to the stream. For the rest of the stream, impacts observed included: unnatural channel incision, as well as hummocking of wet areas due to livestock traffic, or pugging, and physical bank destruction/alteration by livestock trampling.

Beaver ponds were noted on BLM public lands in the upper East Fork of Sage Hen Creek and on State lands on the main Sage Hen Creek on which 26 ponds were counted; they were said to be in a fairly decadent state at the time of this 1976 report.

Other surface waters can be found in the Diamond Springs Allotment: West Diamond Spring, Middle Diamond Spring, Big Diamond Spring, and the two springs called East Diamond Springs. Three of these springs originate on BLM administered public lands: West Diamond Spring, Big Diamond Spring, and the western-most of the East Diamond Springs. This allotment also contains Mud Springs in the northwest and McIntosh Meadows, most of which occurs on private land. Cold Spring originates on private land along the boundary of the Diamond Springs and Blackjack Ranch Allotments and is used to water livestock in both allotments. There are other springs that exist in these two allotments.

The North Dobie and South Dobie Allotments have only minor amounts of surface water present on BLM public lands, some of which is ephemeral.

Vegetation

Diamond Springs Allotment

Approximately forty percent of the rangeland on the Diamond Springs Allotment is classified as Sandy ecological (range) sites, approximately twelve percent is classified as Loamy ecological (range) sites, approximately seven percent is classified as Clayey ecological (range) sites, approximately twelve percent is classified as Shallow Loamy ecological (range) sites and

approximately two percent are classified as riparian sites within the 10-14" High Plains Southeast (HPSE) Major Land Resource Area (34) (MLRA).

The 1983 ecological (range) site inventory rated almost one-half (49%) of the plant communities within the allotment as fair (30-49% similarity index) condition. Forty-eight percent of the allotment was rated in good (53-75% similarity index) condition. In 2003, as part of the standards assessment, the ecological (range) conditions were re-examined. An interagency (NRCS/BLM) field determination was made that many of the sites mapped in 1983 as shallow sandy; actually have moderately deep (21-40") soils and are sandy. The existing permanent condition/trend studies and field observations show shallow rooted plant species such as threadleaf sedge, prairie junegrass, Sandberg bluegrass, blue grama and the increaser shrub, Wyoming big sagebrush, make up a large percentage of many of the plant communities found on the deeper sandy loam soils. The more palatable and productive bunchgrass species, such as Indian rice grass, are present but only in small amounts. Often the needleandthread grass and Indian rice grass plants have low vigor and in some areas found primarily in protected places, such as under Wyoming big sagebrush or amongst prickly pear cactus plants. Bottlebrush squirreltail, which according to the Sandy range site guide is supposed to make up ten percent of the plant community, is currently present in only trace amounts. This situation occurs across approximately 40 percent of the allotment on the Alcova, Bosler, Milren, and Rock River sandy loam soils.

The average annual vegetative production was estimated to be 350 pounds per acre by Rancher's Management Company (RMC) in 1998 at ten key areas (Malmberg, et al., 1998). The precipitation in 1997-98 was measured to be 127 percent of the long term average (LTA) for the area. However, this production estimate is still only 33 percent of the average potential production of 1080 pounds per acre which indicates a moderate to extreme departure from the ecological site description standards (Refer to Indicator Summary, below). Five of the ten key areas were re-sampled in 2000 by RMC and the average production was only 180 pounds per acre (Graham, et al., 2001). 2000 precipitation was measured at only 83 percent of the LTA. The area also experienced high temperatures which contributed to the unfavorable growing conditions.

Indicator Summary for Diamond Springs Allotment

The Diamond Springs Allotment has been intensively monitored since 1998 (Laycock 2003). Livestock actual use and use patterns, precipitation, vegetative cover and/or production information have been collected during this period. The following indicators of rangeland health have shown moderate to extreme departure from the potential values described in the 10-14" HPSE Sandy and Loamy ecological (range site) descriptions.

Vegetative Cover

Grass Cover ↓

Due to low vigor of desirable bunchgrasses (needleandthread, Indian rice grass, bluebunch wheatgrass)

Higher presence of shallow rooted grasses (Sandberg bluegrass, prairie junegrass, threadleaf sedge)

Shrub Cover ↑
Due to higher presence (> 50% composition) of Wyoming big sagebrush

Plant Composition and Diversity (Species, Age Class, Structure, Successional Stages, and Desired Plant Community)
Grass Composition and Diversity ↓
Desirable Bunchgrasses (needleandthread, Indian rice grass, bluebunch wheatgrass) ↓

Increaser shallow rooted grasses (Sandberg bluegrass, prairie junegrass, and threadleaf sedge) ↑

Shrub Composition and Diversity ↑
Due to higher presence (> 50% composition) of Wyoming big sagebrush

Bare Ground ↑
Moderate to extreme departure from ecological site description
Above sustainable site threshold level (> 50% of soil surface)

Litter↓
Moderate departure from ecological site description

Erosion (Rills, Gullies, Pedestals, Capping) ↑
Above sustainable site threshold level

Due to excessive bare ground, wind has caused widespread sheet erosion which has reduced organic matter and depth of A horizon

Water Infiltration Rates ↓
Due to widespread soil compaction

Blackjack Ranch Allotment

Approximately forty-three percent of the rangeland on the Blackjack Ranch Allotment is classified as Sandy ecological (range) sites, approximately twenty-six percent is classified as Loamy ecological (range) sites, approximately four percent is classified as Clayey ecological (range) sites, approximately eleven percent is classified as Shallow Loamy ecological (range) sites, approximately three percent is classified as Very Shallow ecological (range) sites and approximately two percent are classified as riparian sites within the 10-14" High Plains Southeast (HPSE) Major Land Resource Area (34) (MLRA).

The 1983 ecological (range) site inventory rated almost one-half (49%) of the plant communities within the allotment as fair (30-48% similarity index) condition. Forty-eight percent of the

allotment was rated in good (51-74% similarity index) condition. In 2003, as part of this standards assessment, the ecological (range) conditions were re-examined. An interagency (NRCS/BLM) field determination was made that many of the sites mapped in 1983 as shallow sandy; actually have moderately deep (21-40") soils and are sandy sites. The existing permanent condition/trend studies and field observations show shallow rooted plant species such as threadleaf sedge, prairie junegrass, Sandberg bluegrass, blue grama and the increaser shrub, Wyoming big sagebrush, make up a large percentage of many of the plant communities found on the deeper sandy loam soils. The more palatable and productive bunchgrass species, such as Indian rice grass, are present but only in small amounts. Often the needleandthread grass and Indian rice grass plants have low vigor and in some areas found primarily in protected places, such as under Wyoming big sagebrush or amongst prickly pear cactus plants. Bottlebrush squirreltail, which according to the Sandy range site guide is supposed to make up ten percent of the plant community, is currently present in only trace amounts. This situation occurs across approximately 43 percent of the allotment on the Alcova, Bosler, Milren, and Rock River sandy loam soils.

The average annual vegetative production was estimated to be 137 pounds per acre by Rancher's Management Company (RMC) in 1999 at eight key areas (Malmberg, et al., 1999). The precipitation in 1998-99 was measured to be 110 percent of the long term average (LTA) for the area. However, this production estimate is still only twelve percent of the average potential production of 1100 pounds per acre which indicates a moderate to extreme departure from the ecological site description standards (Refer to Indicator Summary). Eight key areas were re-sampled in 2000 by RMC and the average production was only 250 pounds per acre (Graham, et al., 2001). 2000 precipitation was measured at only 83 percent of the LTA. The area also experienced high temperatures which contributed to the unfavorable growing conditions.

Indicator Summary for the Blackjack Ranch Allotment

The Blackjack Ranch Allotment has been intensively monitored since 1999 (Laycock 2003). Livestock actual use and use patterns, precipitation, vegetative cover and/or production information have been collected during this period. The following indicators of rangeland health (Pellant, et al., 2000) have shown moderate to extreme departure from the potential values described in the 10-14" HPSE Sandy and Loamy ecological (range site) descriptions.

Vegetative Cover

Grass Cover ↓

Due to low vigor of desirable bunchgrasses (needleandthread, Indian rice grass, bluebunch wheatgrass)

Higher presence of shallow rooted grasses (Sandberg bluegrass, prairie junegrass, threadleaf sedge)

Shrub Cover ↑

Due to higher presence (> 50% composition) of Wyoming big sagebrush

Plant Composition and Diversity (Species, Age Class, Structure, Successional Stages, and Desired Plant Community)

Grass Composition and Diversity ↓

Desirable Bunchgrasses (needleandthread, Indian rice grass, bluebunch wheatgrass) ↓

Increaser shallow rooted grasses (Sandberg bluegrass, prairie junegrass, and threadleaf sedge) ↑

Shrub Composition and Diversity ↑

Due to higher presence (> 50% composition) of Wyoming big sagebrush

Bare Ground ↑

Moderate to extreme departure from ecological site description

Above sustainable site threshold level (> 50% of soil surface)

Litter ↓

Moderate departure from ecological site description

Erosion (Rills, Gullies, Pedestals, Capping) ↑

Above sustainable site threshold level

Due to excessive bare ground, wind has caused widespread sheet erosion which has reduced organic matter and depth of A horizon

Water Infiltration Rates ↓

Due to widespread soil compaction

North Dobie Flat Allotment

Approximately 80 percent of the rangeland on the North Dobie Flat Allotment is classified as Sandy ecological (range) sites within the 10-14" High Plains Southeast (HPSE) Major Land Resource Area (34) (MLRA).

The 1983 ecological (range) site inventory rated most (65%) of the plant communities within the allotment as high fair (48% similarity index) condition . Thirty-five percent of the allotment was rated in low to mid-good (54-67% similarity index) condition. In 2003, as part of this standards assessment, the ecological (range) conditions were re-examined. An interagency (NRCS/BLM) field determination was made that many of the sites mapped in 1983 as shallow sandy; actually have moderately deep (21-40") soils and are sandy sites. The existing permanent condition/trend studies and field observations show shallow rooted plant species such as threadleaf sedge, prairie junegrass, Sandberg bluegrass, blue grama and the increaser shrub, Wyoming big sagebrush, make up a large percentage of many of the plant communities found on the deeper sandy loam soils. The more palatable and productive bunchgrass species, such as Indian rice grass, are present but only in small amounts. Often the needleandthread grass and Indian rice grass plants have low vigor and in some areas found primarily in protected places, such as under Wyoming

big sagebrush or amongst prickly pear cactus plants. Bottlebrush squirreltail, which according to the Sandy range site guide is supposed to make up ten percent of the plant community, is currently present in only trace amounts. This situation occurs across approximately 60 percent of the allotment on the Rock River sandy loam soils. The average annual vegetative production was estimated to be 330 pounds per acre by Rancher's Management Company (RMC) in 2001 at the two key areas. This production estimate is only 28 percent of potential production of 1200 pounds which indicates a moderate to extreme departure from the Sandy ecological site description standard (Refer to Indicator Summary).

Indicator Summary for the North Dobie Flat Allotment

The North Dobie Flat Allotment has been intensively monitored since 2001 (Laycock 2003). Livestock actual use and use patterns, precipitation, vegetative cover and/or production information have been collected during this period. The following indicators of rangeland health have shown moderate to extreme departure from the potential values described in the 10-14" HPSE Sandy ecological (range site) description.

Vegetative Cover

Grass Cover ↓

Due to low vigor of desirable bunchgrasses (needleandthread, Indian rice grass, bluebunch wheatgrass)

Higher presence of shallow rooted grasses (Sandberg bluegrass, prairie junegrass, threadleaf sedge)

Shrub Cover ↑

Due to higher presence (> 50% composition) of Wyoming big sagebrush

Plant Composition and Diversity (Species, Age Class, Structure, Successional Stages, and Desired Plant Community)

Grass Composition and Diversity ↓

Desirable Bunchgrasses (needleandthread, Indian rice grass, bluebunch wheatgrass) ↓

Increaser shallow rooted grasses (Sandberg bluegrass, prairie junegrass, and threadleaf sedge) ↑

Shrub Composition and Diversity ↑

Due to higher presence (> 50% composition) of Wyoming big sagebrush

Bare Ground ↑

Moderate to extreme departure from ecological site description

Above sustainable site threshold level (> 50% of soil surface)

Litter ↓

Moderate departure from ecological site description

Erosion (Rills, Gullies, Pedestals, Capping) ↑
Above sustainable site threshold level

Due to excessive bare ground, wind has caused widespread sheet erosion which has reduced organic matter and depth of A horizon

Water Infiltration Rates ↓
Due to widespread soil compaction

South Dobie Flat Allotment

Approximately 70 percent of the rangeland on the South Dobie Flat Allotment is classified as Sandy ecological (range) sites within the 10-14" High Plains Southeast (HPSE) Major Land Resource Area (34) (MLRA).

The 1983 ecological (range) site inventory rated most (78%) of the plant communities within the allotment as high good (66% similarity index) to low excellent (80% similarity index) condition. Approximately 22 percent of the allotment was rated in low to mid-fair (26-48% similarity index) condition. In 2003, as part of this standards assessment, the ecological (range) conditions were re-examined. An interagency (NRCS/BLM) field determination was made that many of the sites mapped in 1983 as shallow sandy; actually have moderately deep (21-40") soils and are sandy sites. The existing permanent condition/trend studies and field observations show shallow rooted plant species such as threadleaf sedge, prairie junegrass, Sandberg bluegrass, blue grama and the increaser shrub, Wyoming big sagebrush, make up about 20 percent of the plant communities found on the deeper sandy loam soils. The more palatable and productive bunchgrass species, such as Indian rice grass, are present but in only small amounts. Often the needleandthread grass and Indian rice grass plants have low vigor and in areas are found primarily in protected places, such as under Wyoming big sagebrush or amongst prickly pear cactus plants. Bottlebrush squirreltail, which according to the Sandy range site guide is supposed to make up ten percent of the plant community, is present in only trace amounts. This situation occurs across 20 percent of the allotment on the Rock River sandy loam soils. The average annual vegetative production was estimated to be 215 pounds per acre by Rancher's Management Company (RMC) in 2001 at the two key areas. This production estimate is only 18 percent of potential production of 1200 pounds which indicates a moderate to extreme departure from the Sandy ecological site description standard (Refer to Indicator Summary).

Indicator Summary for the South Dobie Flat Allotment

The South Dobie Flat Allotment has been intensively monitored since 2001 (Laycock 2003). Livestock actual use and use patterns, precipitation, vegetative cover and/or production information have been collected during this period. The following indicators of rangeland health have shown moderate to extreme departure from the potential values described in the 10-14" HPSE Sandy ecological (range site) description.

Vegetative Cover

Grass Cover ↓

Due to low vigor of desirable bunchgrasses (needleandthread, Indian rice grass, bluebunch wheatgrass)

Higher presence of shallow rooted grasses (Sandberg bluegrass, prairie junegrass, threadleaf sedge)

Shrub Cover ↑

Due to higher presence (> 50% composition) of Wyoming big sagebrush

Plant Composition And Diversity (Species, Age Class, Structure, Successional Stages, And Desired Plant Community)

Grass Composition and Diversity ↓

Desirable Bunchgrasses (needleandthread, Indian rice grass, bluebunch wheatgrass) ↓

Increaser shallow rooted grasses (Sandberg bluegrass, prairie junegrass, and threadleaf sedge) ↑

Shrub Composition and Diversity ↑

Due to higher presence (> 50% composition) of Wyoming big sagebrush

Bare Ground ↑

Moderate to extreme departure from ecological site description

Above sustainable site threshold level (> 50% of soil surface)

Litter ↓

Moderate departure from ecological site description

Erosion (Rills, Gullies, Pedestals, Capping) ↑

Above sustainable site threshold level

Due to excessive bare ground, wind has caused widespread sheet erosion which has reduced organic matter and depth of A horizon

Water Infiltration Rates ↓

Due to widespread soil compaction

Climate Change
The consequences of weather and climate change on livestock grazing, and grassland use, can be subtle and complex. The projected changes in climate – increases in temperature, reductions in soil moisture, and more intense rainfall events – may require changes in livestock management. The availability of feed and water for livestock grazing is extremely vulnerable to drought; hence the carrying capacity of land may influence livestock management.

Due to changes in climate, grasslands and rangeland could expand into previously forested areas. Additionally, sagebrush habitats may decline sharply throughout the region and be replaced with grasslands. Increasing CO2 concentrations also lead to preferential fertilization and growth of specific plant species, such as invaders like cheat grass. Climate change may favor certain shrub species, both native and exotic. Increased CO2 in the atmosphere may favor growth of most woody plants and "cool-season" grasses at the expense of "warm season grasses." These and other differences among species could lead to changes in the composition of rangeland vegetation, but generalizations are difficult.

Riparian/Wetland Areas
A variety of riparian and wetland systems are found in the analysis area, including streams with both perennial and intermittent flow, springs with developed channels, and wet meadow complexes. Riparian areas support the greatest diversity of flora and fauna of all habitat types. Most public land riparian areas were assessed for Proper Functioning Condition (PFC) in 1997 which is the minimum standard for determining public land riparian health. The Diamond Springs Allotment has public land riparian areas primarily associated with the various Diamond Springs and West Sage Hen Creek. PFC assessments were conducted for 2.4 miles and 6.2 acres of lotic habitat located near Mud Springs and along West Sage Hen Creek and 25 acres of lentic habitat around Big, West and East Diamond Springs. From these assessments, 2.2 miles and 30.5 acres were determined to be Functional-at-Risk with a downward trend. The remaining 0.2 miles and 0.7 acres were determined to be Functional-at-Risk with a Not Apparent trend.

Areas assessed in the Blackjack Ranch Allotment include public lands on East Fork Sage Hen Creek, Middle Fork Sage Hen Creek and at Black Mountain Spring totaling 5.6 miles and 21.8 acres of riparian habitat. One acre of lentic habitat and 0.5 mile with 6.1 acres of lotic habitat was assessed as Functional-at-Risk with a Not Apparent trend. The remaining 5.1 miles and 14.7 acres of lotic habitat were assessed as Functional-at-Risk with a downward trend. East Fork of Sage Hen Creek supports a willow community on the upper end of the drainage below Black Mountain. The willow community is smaller than in recent history primarily due to a drop in the water table.

One riparian area is known to exist on public land in the North Dobie Flat Allotment. The area encompasses approximately 7 acres and constitutes the head of Frenchie Slough. This lentic meadow area was assessed for PFC in 1997 and was determined to be Functional-at-Risk with a downward trend.

There are no perennial or intermittent riparian areas on public lands within the South Dobie Flat Allotment. Frenchie Slough extends into the allotment; however it is considered ephemeral as it only flows in direct response to precipitation.

Several factors were identified during the PFC assessments for why areas were not in Proper Functioning Condition. One common factor listed was that riparian areas do not have the appropriate species composition that should be present on these sites. Plant communities tend to be dominated by species typically found on drier, upland sites and these areas lack the density, diversity and age class of wetland plants needed to stabilize the site during flow events. Upland plant species typically do not have the robust and extensive root systems necessary to hold soil in place.

The presence of upland plant species indicates a drop in water table and a subsequent loss of soil moisture. Hummocks on many of the riparian meadows such as those at Black Mountain, Barrel, and Big Diamond Springs, McIntosh Meadows and along East Fork, Middle Fork and West Fork Sage Hen Creeks have contributed to this change in the vegetative community. On top of hummocks, wetland plants have been replaced by upland species. Root shearing is evident and the interspaces between mounds have been exposed to increased erosion. Hummocks have altered some of the surface flow patterns affecting the frequency, extent and length of saturation, reducing the area's capability to capture and hold water in the soil. Reduced soil moisture has resulted in a decrease in the overall width of many riparian zones.

The head of Frenchie Slough in the North Dobie Flat Allotment is a wetland surrounded by a riparian area. The area is classified as a saline sub-irrigated ecological site, which means salt tolerant plants are present. A substantial amount of alkali deposits are evident on the soil surface indicating an upward migration of salts through the soil profile. Soil compaction has reduced water infiltration, so water is often ponded on the soil surface during high runoff periods. Standing water can decompose the organic soil layer allowing salts to migrate to the surface. Many species of wetland plants do not grow well in saline soil; therefore plant diversity is often limited. A large portion of this plant community is composed of inland salt grass which tends to increase on deteriorated sites according to the NRCS Ecological Site Guides.

Climate change contributes to changes in stream systems, such as flow, temperature, and turbidity. It is predicted that climate change will exacerbate the effects of land management activities to streams and aquatic habitats. Climate change affects the water cycle through decreased snow pack, runoff timing, and changes to total runoff volumes. Increased frequency of high intensity rainfall events related to global climate change could result in increased sedimentation or alternation of stream channels.

Wildlife and Fish

The four allotments provide both seasonal and year-long habitats for numerous wildlife species including big game, predators, small mammals, birds, amphibians, and reptiles. Many of the wildlife species found are sagebrush-obligate birds and mammals as sagebrush habitat is the dominant habitat found throughout the allotments. Wildlife diversity in upland habitats is significantly affected by the presence and condition of nearby riparian areas as many species are dependent on both upland and riparian habitats to meet their forage, birthing and cover requirements. Riparian habitats are capable of supporting the greatest variety of birds and mammals due to the presence of water and the species and structural diversity of the plant community.

Neo-tropical and other non-game birds occupy various habitats throughout the allotments. While most of these birds are not under any special management strategy, they are coming under increasing public scrutiny and concern because of their general decline throughout the west. Common bird species that use the area include horned larks, lark buntings, vesper sparrows, yellow warblers, bank swallows, western meadowlarks, black-billed magpies common nighthawks, red-tailed hawks, golden eagles, and common raven. Most of these species nest on the ground or in low-growing shrubs.

The allotments and immediate surrounding area provide suitable habitat for reptiles and amphibians. Reptiles generally prefer dense brush or rocky areas. Species found in the area include the bullsnake, intermountain wandering garter snake and eastern short-horned lizard. Amphibians require wetland sites for at least part of their life cycle. Springs, creeks, and other wetland areas located throughout the area are important for their habitat. The most common amphibian found in this area is the tiger salamander, which is typically found in the larval form known as the mud-puppy.

The four allotments provide seasonal habitat for antelope and mule deer with the higher elevation areas primarily used spring through fall and the lower elevation areas used year-long with increased use during the winter. Winter range is usually the most limited of all the seasonal habitats, therefore this area is extremely important during the winter months.

The Diamond Springs Allotment provides spring-summer-fall, winter-yearlong and crucial winter-yearlong habitat for antelope with antelope generally wintering in the south half of the allotment and summering in the north half. Mule deer typically use the northern-most part of the allotment near Beaver Rim, plus the West Sage Hen Rocks and Sage Hen Creek areas in the south, on a year-long basis. Mule deer use the area generally below Beaver Rim and above the Diamond Springs during spring, summer, and fall.

The Blackjack Ranch Allotment is spring-summer-fall habitat for antelope in the north half and winter-yearlong habitat in the south half. Mule deer spring-summer-fall range lies generally between Beaver Rim and the Blackjack Ranch Pasture and along Middle Fork Sage Hen Creek/Sage Hen Creek. Mule deer also use the northern-most part of the allotment near Beaver Rim on a year-long basis.

The North and South Dobie Flat Allotments are winter-yearlong and crucial winter-yearlong habitat for antelope. Mule deer use the rocks on the east edge of the North Dobie Flat Allotment for winter year-long and year-long habitat. Mule deer use the steeper terrain on the west and south sides of the South Dobie Flat Allotment for crucial winter year-long, winter year-long and year-long habitat.

No fisheries exist in either the North Dobie Flat or South Dobie Flat Allotments. Fisheries were known to occur historically in the Diamond Springs Allotment, but none currently exist. In 1977, the Wyoming Game and Fish Department (WGFD) developed "The Fisheries Management Plan for the Jeffrey City Area."(Viox, 1977) At that time, a section of Middle Diamond Springs Draw was documented as supporting a brook trout fishery. In the Blackjack

Ranch Allotment, information collected for the 1976 Stream Survey and the 1982 Riparian Inventory showed that the East Fork Sage Hen Creek supported a self-sustaining brook trout fishery with individual fish averaging 8 inches in length. Electro-fishing conducted by the Wyoming Game and Fish Department in 1998 found a significant reduction in the number and size of brook trout in the stream. The number of small fish had not changed significantly; however, there was a decline in the number of fish greater than 6 inches.

Special Status Species

There are no threatened, endangered, or proposed wildlife or fish species or habitat currently known to exist within the allotments; however, several BLM-Wyoming Sensitive Species are present. The northern leopard frog and the Great Basin spadefoot can be found in the area but little information is known regarding populations of these species, as specific surveys have not been conducted. Several sagebrush-obligate sensitive species are also found including logger-head shrike, Brewer's sparrow, sage thrasher, sage sparrow, and greater sage-grouse. Greater sage-grouse is the subject of much attention throughout Wyoming and the west due to population declines and habitat loss. They have been petitioned for listing under the Endangered Species Act and the U.S. Fish and Wildlife Service is currently conducting the species review. These allotments, except for the extreme north end of both the Blackjack Ranch and Diamond Springs Allotments, fall within a Core Population Area established by the Governor of Wyoming to conserve greater sage-grouse in Wyoming. The Governor issued an Executive Order stating that management should "focus on the maintenance and enhancement of those Greater Sage-Grouse habitats and populations within the Core Areas identified by the Sage-Grouse Implementation Team."

The Diamond Springs Allotment, including the Alice and Frenchie Shipping Pastures, supports breeding, nesting, and brood-rearing habitats for greater sage-grouse. Six occupied leks are known to occur within the allotment and one occupied lek is known to occur just outside the west allotment boundary. The largest documented lek in the Lander Field Office is found in the Blackjack Ranch Allotment and it supports approximately 350 males. This allotment contains breeding, nesting, and brood-rearing habitats for greater sage-grouse. The West, Middle, and East Forks of Sage Hen Creek are important areas for hens with chicks as they provide essential forbs and insects required for survival.

Greater sage-grouse utilize the North Dobie Flat Allotment for breeding and nesting. It is expected that this allotment also provides winter habitat, although these habitats have not been delineated. There is one known lek in the allotment located adjacent to the riparian area at the head of Frenchie Slough. The South Dobie Flat Allotment has one historic lek located just south of the fence dividing the North and South Dobie Flat Allotments. The lek has been inactive for a number of years and it appears the birds have joined with sage-grouse on the lek in the North Dobie Flat Allotment. This allotment also contains breeding, nesting, and winter habitats for greater sage-grouse. The lack of much natural water in both the Dobie Flat Allotments limits the use of these areas as brood-rearing habitat.

Suitable habitat exists for Ute ladies'-tresses, a listed plant species, however no plant populations have been identified in any of the grazing allotments. Ute ladies'-tresses habitat is limited to wet meadows below 7000' in elevation. Several Wyoming BLM Sensitive plant species may occur

within the area, although species-specific inventories have not been completed for the allotments. The Wyoming Natural Diversity Database model was used to determine the likelihood of sensitive plants occurring in the analysis area. There is a high potential that Beaver Rim phlox could occur on sparsely vegetated slopes on sandstone, siltstone or limestone substrates in the northeast part of the Blackjack Ranch Allotment and along Beaver Rim in the Diamond Springs Allotment. There is a medium potential for Cedar Rim thistle to occur in north Blackjack Ranch Allotment and in the North and South Dobie Flat Allotments. Cedar Rim thistle is found on gravelly slopes and fine-textured, sandy-shaley draws. There is also a medium likelihood for Rocky Mountain twinpod occurrence in the south part of the Diamond Springs Allotment and along Middle Sage Hen Creek in the Blackjack Ranch Allotment. Rocky Mountain twinpod is limited to sparsely vegetated slopes of limestone, sandstone, or clay at the 5,600 to 8,300 foot elevation.

Changes in climate can influence the timing and length of seasons, which in turn can have a direct effect on plants and animals. This includes changes in ranges, abundances, phenology (timing of an event such as breeding), morphology and physiology, and community composition, biotic interactions and behavior. Changes are being seen in all different types of taxa, from insects to mammals, in North America as well as on many other continents.

Cultural Resources

Range permit renewals are undertakings under Section 106 of the National Historic Preservation Act. Range improvements and other projects associated with the allotment (e.g., fences, spring developments, and road realignments) are subject to compliance requirements under Section 106 and will undergo standard cultural resources inventory and evaluation procedures, and Native American consultation if appropriate. During Section 106 review, a cultural resource assessment was completed in February of 2009 following the procedures and guidelines outlined in the 1980 National Programmatic Agreement Regarding the Livestock Grazing and Range Improvement Program, IM-WO-99-039, IM-WY-99-17, and the State Protocol between the Wyoming BLM and Wyoming SHPO.

A file search was conducted of SHPO and Lander Field Office records for previously recorded projects and sites within the Split Rock Ranch Allotments. The file search revealed 38 previous Class III cultural resource inventories, the majority of which are small block or linear inventories. The file search also revealed 47 previously recorded sites and 4 reported site locations within the allotments. Of these, 46 sites are prehistoric in age, 2 are historic, and 3 contain both prehistoric and historic components. The historic Waltman to Sweetwater Freight Road passes through the allotments, but this regional trail has been determined not eligible for the National Register of Historic Places (NRHP). In total, 10 sites are considered eligible for the NRHP, 21 are considered not eligible, and 20 have not yet been evaluated. Although 15 sites have features known to be of interest to Native American tribes, there are no specifically known sites or areas of Native American religious or cultural concern.

Socioeconomics

Economic conditions relate to the analyses of production, distribution, and consumption of goods and services. Economic conditions describe how individuals and communities participate in the exchange of goods and services by earning a living and consuming products and services they need and want. The BLM has the capacity, through its decision making responsibilities, to

manage resource development within the Lander Field Office planning area and thereby influence the economy of the wider region. Approximately 58 percent of land in Fremont County is administered by State and Federal agencies, including BLM's Lander Field Office.

The Lander Field Office manages lands for livestock grazing in five counties. There are 300 grazing allotments covering approximately 2.7 million surface acres of public land in the planning area. As of 2008, the Lander Field Office administered 60 grazing leases and 144 permits, consisting of approximately 280,372 animal unit months (AUMs). While the majority of AUMs are used by cattle, sheep and horses also are grazed on BLM lands.

BLM-administered grazing allotments are leased at lower fees on average than state or private lands: federal grazing fees in Wyoming were $1.56 per AUM in 2006 and $1.35 per AUM in 2007. For comparison, grazing fees on state land were $4.78 per AUM in 2006, $5.17 per AUM in 2007, are currently $5.21 (Pannell 2008), and expected to be $5.13 in 2009 (Pannell 2008). The average grazing rate on privately owned non-irrigated land in Wyoming was $15.10 per AUM in 2006 and $16.10 per AUM in 2007 (Shepler 2008).

The annual long-term average (1993-2008) grazing use for the Diamond Springs, North Dobie Flat, South Dobie Flat, and Blackjack Ranch Allotment is 8,054 AUMs. At today's federal grazing fee of $1.35/AUM, this equates to a long-term annual average of $10,873 of grazing receipts. Of the $10, 873, fifty percent, or $5,436 is returned to the State of Wyoming and the grazing district from where they were generated (Fremont County) for range improvement projects.

SECTION IV – ENVIRONMENTAL CONSEQUENCES

This section describes environmental consequences that may result from implementing each of the three alternatives described in Section Two. The purpose of this section is to analyze and disclose potential impacts of the various alternatives. The proposed action for this Environmental Assessment (EA) is the Bureau of Land Management's (BLM's) selection of an alternative on which future livestock grazing management actions would be based.

The potential consequences of each alternative are described in this section as impacts using the same order of eight resource topics (e.g. soil and water resources, vegetation, riparian/wetland areas, wildlife/fisheries, cultural and socioeconomics) presented in Section Three. Identical organization for Sections Three and Four allows the reader to compare existing resource conditions to potential impacts for the same resources.

INTRODUCTION

The human environment is interpreted comprehensively to include the natural and physical environment and the relationship of people with that environment. Environmental consequences are usually described as being direct or indirect. Direct effects are caused by the action and occur at the same time and place. Indirect effects are caused by the action, and are later in time or farther removed in distance, but are still reasonably foreseeable. Indirect effects may be induced

changes. Effects include ecological, aesthetic, historic, cultural, economic, social, or health. Effects include both beneficial and negative effects.

ASSUMPTIONS

The assumptions listed below, and for each resource in the following section, are disclosed to provide a basis for the conclusions reached in this section. Assumptions common to all alternatives and all resources are listed below, whereas assumptions unique to specific resources are listed immediately following the impact analysis for that resource:

1. Soil and water quality are closely tied to the adequacy of vegetative cover and type. Commonly used erosion and sediment yield equations all depend upon accurate assessments of soil cover for making good estimates. Vegetative cover is the one factor that a land manager can control most directly. Slopes, climates, soil physical features, and soil textures are little affected by management changes.

2. Sporadic grazing use on uplands is generally not considered as having an impact on most cultural resources, therefore it has not been considered in the cultural resources sections of the environmental consequences. Factors which cause intensified grazing use on uplands are addressed through standard cultural resource protection measures listed in Section 2.

3. Another assumption for this EA is taken from a recent study of rest and deferred-rotation grazing systems in the Western U.S. Briske et al. (2008), have found that:

> "Rest and deferment during periods of minimal plant growth; associated with low soil water availability or temperature extremes, limit the potential for positive vegetation responses. Rest periods that coincide with limited plant growth convey minimal benefit to plants so that the impacts of increased grazing pressure during short grazing periods may not be offset during subsequent rest periods.
>
> Conditions of limited and erratic precipitation are the rule, rather than the exception, on most rangelands throughout the West."

4. This EA does not address site specific climate change analyses which are comprised of several factors, including greenhouse gases (GHGs), land use management practices, the albedo effect, etc. The tools necessary to quantify climatic impacts are presently unavailable. As a consequence, impact assessment of specific effects of human caused activities cannot be determined. Additionally, specific levels of significance have not yet been established. Therefore, climate change analysis for the purpose of this document is limited to accounting and disclosing of factors that contribute to climate change. Qualitative analysis of potentially contributing factors are discussed where data is available.

EFFECTS COMMON TO ALL ALTERNATIVES

For the lowlands, riparian/wetland areas, the most effective strategy for restoring their ecological health is rest from grazing; unmanaged grazing leads to over-use and degradation (Fitch and Adams, 1998).

Rotationally grazed riparian areas may protect water quality as well as, if not better than, some woody buffers. Short-duration, rotational grazing of stream banks has only limited and short-term impacts on water quality (Sovell et al., 2000). Correll (1996) concluded that rotational grazing reduces impacts, he also concluded that winter grazing increases impacts. Where heavy late fall rain can occur livestock should be moved out of riparian areas. Timing of riparian grazing is important for preventing erosion and the degradation of soil and water quality (Bellows, 2003).

Complete rest from grazing has been shown to improve channel and water width: depth ratios, channel entrenchment, bank angle, bank undercut, and bank depth. Deferred rotation grazing, with light stocking and short duration has been shown to yield improvement on some streams, but complete rest has been shown to allow for the most improvement from degraded conditions (Meyers and Swanson, 1991). It is most important that grazed riparian areas be given enough time to rest and regrow; when degraded, they first need to recover vigor and appropriate species before grazing should occur.
Also, it has been shown that buffer strip width and vegetation biomass density are the two important factors in controlling erosion and sediment delivery to streams. Narrow widths, steep slopes and sparse vegetation increase risk of sediment delivery to streams. Vegetation characteristics such as biomass, cover, or density are more appropriate than stubble height for judging capacity to remove sediment from overland runoff, though stubble height may indirectly indicate impacts that can affect erosion and the buffer-strip's performance (Hook, 2002).

EFFECTS ON SOIL AND WATER RESOURCES

Alternative One

Alternative One proposes a one-herd, rest-rotation grazing system with a reduced season of use (195 days) and reduced livestock numbers (1,250 head of cows) to move cattle through seven pastures. At least one of these pastures would be rested from grazing for at least a full year. Rest would eventually be employed in each of the pastures over the long-term.

The effects to soil resources from implementing this alternative would involve increases in vegetative cover and resultant plant litter, and the alleviation of soil compaction conditions in the North and South Dobie Allotments which currently hinders water infiltration. The sandy portions of the Diamond Springs and Blackjack Ranch Allotments also have bare ground in excess of expected conditions for these ecological sites. A corresponding decrease in the amount of bare ground would be realized as vegetation is allowed to move into the currently bare areas that now exist between sagebrush plants. This increase in vegetation would serve to decrease the accelerated erosion in all of the allotments.

With the three consecutive years of rest on the East and Middle Forks of Sage Hen Creek to aid in the establishment of willows, and short periods of grazing in the years proposed for grazing, improvement from its presently degraded state should occur. Later in the proposed grazing schedule, the West Fork of Sage Hen Creek would receive two consecutive years of rest and a grazing period of not more than 20 days. These streams should respond favorably to this management.

This alternative should move these allotments toward meeting the required RHSs in an acceptable time. Of course, in drought years it may not be possible to attain the desired degree of improvement in the uplands. Drought periods do allow stream channels to better vegetate their lower bank areas, so they can be useful for improving stream channel functionality.

Deferring use in the two Dobie Flat Allotments would also allow for increased plant vigor. Native grass seedlings would survive their early, vulnerable growth stages better and occupy the large bare ground patches that exist between sage brush plants. The new plants and healthier root systems would also aid in restoring more water infiltration into these soils. This would also be true of the large sandy portions of the Diamond Springs and the Blackjack Ranch Allotments where the issue is not soil compaction, but the large bare ground areas and low natural fertility in these soils that show moderate wind erosion of their topsoil layers.

Enhancing plant vigor would lead to more robust root systems, which would, in turn, supply more litter both above and below ground as leaves and roots are shed and replaced by new ones. The organic matter content of these soils would be enhanced. Increasing organic matter in these soils would do several things: 1) aid in increasing fertility through providing exchange sites for plants growth nutrients to adhere to; 2) aid in returning water infiltration to a expected situation for these ecological sites; 3) soil aggregate stability would also be enhanced, increasing the soil's resistance to erosive forces.

The planned livestock grazing deferment in the North and South Dobie Allotments would serve to relieve the soil compaction. By not grazing the soils of these two allotments every year in the spring, when they are most vulnerable for compaction, annual freezing and thawing should suffice to alleviate the compaction and restore more water infiltration by precipitation.

Under this alternative, the permittee in cooperation with the BLM, would construct exclosure fences on the riparian areas below the several Diamond Springs on BLM administered public lands. This would exclude 68 acres from grazing by livestock and require 7 miles of exclosure fence to be built. Trailing along the new fences would create 3.5 acres of permanent sacrifice area along the outer perimeter.

The key strategy employed under this alternative to protect riparian areas is that of total exclusion for some riparian areas and periodic rest, or deferral, for pastures from livestock grazing for at least a full year in a complete grazing cycle.

Stream banks are expected to suffer less mechanical damage from livestock trampling and riparian vegetation is expected to become more vigorous over time, compared to the current

situation. Improved plant vigor will lead to healthier and more extensive root systems better able to withstand spring melt and storm flow events.

Sacrifice areas within the allotments currently total about 188 acres. If the outside perimeter of the boundary fences is considered, then these sacrifice areas expand to 250 acres. Under this alternative the sacrifice areas figure would increase by 12.5 acres.

Rest-rotation grazing strategies are said to be one of the best strategies for managing droughts, especially short-term ones. This is due to the production of more vigorous forage species better suited to surviving droughts and because a rested, or reserve, pasture would be available for use in an emergency drought situation.

Alternative Two

Alternative Two would implement a one-herd, modified-deferred rotation strategy for livestock grazing in the SRR allotments. This alternative would reduce the current season of use by twelve days, down to 204 days, and the numbers of cattle grazed down to 1,000 head. Herding, by several riders, would be used to keep livestock trampling impacts to stream channel banks, and vegetation use, at acceptable levels in riparian areas. The most frequent herding would be necessary during the hot-season grazing period, which occurs generally from mid-June through mid-September.

A protective fishery exclosure fence of 2.7 miles would be constructed under this alternative on the BLM-administered public land parcel on the northern reach of the East Sage Hen Creek. About 455 acres of BLM administered public lands would be excluded from use by livestock. This new fence would add about 2 acres of sacrifice area above the current management amount for a total of 252 acres.

The planned livestock grazing deferment in the North and South Dobie Allotments would serve to relieve their soil compaction. By not grazing the soils of these two allotments every year in the spring, when they are most vulnerable for compaction, natural annual freezing and thawing should suffice to alleviate the compaction and restore more water infiltration by precipitation.

Deferring use in the two Dobie Flat Allotments would also allow for increased plant vigor and native cool season bunch grasses establishing to occupy the large bare ground patches that exist between sage brush plants. The new plants and healthier root systems would also aid in restoring more water infiltration into these soils. This would also be true of the large sandy portions of the Diamond Springs and the Blackjack Ranch allotments where the issue is not soil compaction, but the large bare ground areas and low fertility in these soils that have moderate wind erosion of their topsoil layers.

For all the pastures, stream banks are expected to suffer less trampling damage from cattle and riparian vegetation is expected to become more vigorous over time, compared to the current situation. Improved plant vigor will lead to healthier and more extensive root systems better able to withstand spring melt, storm flow events, and short-term droughts.

Enhancing plant vigor would lead to more robust root systems, which would in turn produce more litter both above and below ground as leaves and roots are shed and replaced by new ones. The organic matter content of these soils would be enhanced. Increasing organic matter in these soils would do several things: 1) aid in increasing fertility through providing exchange sites for plants growth nutrients to adhere to; 2) aid in returning water infiltration to a expected situation for these ecological sites; 3) soil aggregate stability would also be enhanced, increasing the soil's resistance to erosive forces.

This alternative should move these allotments toward meeting the required RHS in an acceptable timeframe, but not as fast as Alternative One. Of course, in drought years it may not be possible to attain the desired degree of improvement in the uplands. Drought periods do allow stream channels to better vegetate their lower bank areas, so they can be useful for improving stream channel functionality.

Alternative Three

Alternative Three proposes a four-pasture deferred- rotation system with the largest proposed number of cattle (1,500) and the longest grazing season (258 days). The grazing season would be extended into the winter period, ending on January 22nd. The proposed cattle numbers are higher than currently authorized on the permit. Fifteen hundred cattle are above the long-term (1993-2008) actual use of 1,366 head.

No additional fences, water developments, or other livestock management projects are planned under this alternative. Approximately188 acres of trailing and bare ground inside the allotments, plus another 62 acres along the outside of the boundary fences, would continue to occur under this alternative.

This alternative recognizes, with the existing infrastructure of the ranch and the geographical location of the pastures in relation to the cattle's winter range along the Sweetwater River, would need to be flexible and require annual adjustment.

The deferred-rotation system proposed by this alternative would rotate grazing use annually among the four pastures of the Diamond Springs and the Blackjack Ranch Allotments; primarily during a portion of the hot-season. Herding or riding would be used to move cattle away from riparian areas to keep impacts from the large herd from occurring to riparian zones. To be effective this would require several riders, one or two more than under Alternative Two, riding frequently, if not daily.

The North and South Dobie Flat Allotments would be grazed in the early spring and the late fall/winter periods. Continuing the practice of grazing, during the early spring period and then again in the late fall/winter periods would not only perpetuate the present degraded soil and vegetation conditions, but lead to further degradation of these resources. Unacceptable amounts of bare ground, soil compaction on the uplands, loss of fertility, decreased water infiltration, and loss of topsoil have caused the North and South Dobie Flat Allotments to fail the soil and vegetation upland Rangeland Health Standards. Wet, spring period grazing on these soils allows for soil compaction to occur. If cattle grazing were to be deferred to other pastures during this season of typically higher precipitation and moist soils; the soil compaction would be

ameliorated through annual freeze-thaw cycles. However, under this alternative, deferment for these allotments is not planned.

Of all of the pastures in the proposed rotation, the North and South Dobie Flat Allotments would be the best suited for hot-season grazing as the riparian acreage in them is minimal. This alternative does not propose to graze these allotments for hot-season grazing, however.

The present unhealthy state of the riparian areas in the other two allotments, Diamond Springs and Blackjack Ranch, are not expected to improve with high numbers of cattle and long periods of grazing use, mostly in the hot-season of the year. The large numbers of cattle would also be expected to cause severe stream bank trampling damage.

The present amounts of bare ground and erosion by wind and water on the uplands are expected to increase under this alternative; as deferred-rotation grazing systems were developed to shift use into the lightly grazed uplands. During normal production years, pasture rotations would be expected to occur more frequently than are called for in this alternative, as much of the rangeland is not very productive. Improvement of upland vegetation conditions is expected to occur at the slowest pace under this alternative.

Cumulative Impacts

In addition to the uranium mining activity discussed above, there are other soil disturbing activities that impact soil and water in the analysis area (as opposed to the project area). These include other livestock grazing authorizations (the Green Mountain Common Allotment lies immediately to the south and livestock grazing there is currently being evaluated under an environmental assessment), other types of mining activity, and oil and gas development. These developments all increase the amount of soil that is disturbed, thus increasing the potential for erosion and reducing the vegetation that is available for wildlife and livestock grazing.

Although there is a variance in the impacts to soil and water among the alternatives, those variances are not of the type that is influenced by cumulative impacts from outside of the project area. For example, nearby projects causing soil disturbance do not lead to erosional deposition of silt into riparian-wetlands in the project area nor do they increase or magnify the impacts to soil and water of any of the alternatives. Therefore, a more detailed analysis of the cumulative effect of past, present, and anticipated future activities on the soil and water resources by alternative is not needed.

Earlier permitted activities have resulted in cumulative impacts to the project area, including the location of roads in riparian areas and diversion of spring water to a livestock water project. The impacts of these earlier activities do not need to be analyzed however, as their impacts do not vary among the alternatives.

The proposed PRI uranium in situ facility will be the subject of future environmental impact assessment and its impact on the surrounding areas including the project area will be assessed in a separate document.

Alternative One would add 9 miles of pasture fence and 13 acres of associated sacrifice area to

the present total of 102 miles of fence and 153 sacrifice acres, both inside and outside the allotments; an increase over present amounts of fencing by 9 percent and sacrifice areas by 13 percent. The proposed riparian fences would add an additional 7 miles and 3.5 acres of sacrifice area under this alternative.

Presently, there are 242 BLM administered public land and 24 private land acres contained within riparian exclosures. Alternative One would add 68 acres to this existing total. Alternative Two, with the construction of the East Sage Hen Creek fisheries exclosure, 2.7 miles of permanent fence would be constructed that would enclose about 455 acres of BLM administered public lands. These 455 acres would no longer be available for livestock grazing.

Under Alternative Three no additional fences, water sources, or other livestock management projects are planned at this time.

Residual Impacts

Under Alternative One vegetation, both on the uplands and the lowlands, is expected to increase in amounts and vigor over time through effective implementation of the rest rotation grazing strategy. The more preferred cool season bunch grasses are expected to establish on the patches of bare ground between the sage brush plants. Plant vigor too is expected to improve; with this would lead to better root growth which would aid in improving water infiltration rates for the soil profile.

The fence-related sacrifice area totals given above under the Cumulative Impacts of Alternative One would also be remaining, or residual, impacts.

For Alternative Two, vegetation both on the uplands and the lowlands is expected to increase in amounts and vigor over time through effective employment of this deferred-rotation grazing strategy. The more preferred native grazing species are expected to move out from under the sage brush and into the patches of bare ground. Plant vigor is expected to improve and would lead to better root growth which would aid in improving water infiltration rates for the soil profile.

The fence-related sacrifice areas totals discussed above under the Cumulative Impacts for Alternative Two would also remain as residual impacts.

The lowland vegetation is not expected to improve under Alternative Three and resource degradation there is expected to increase. The upland vegetation would benefit from a deferred-rotation grazing strategy in the Diamond Springs and Blackjack Ranch Allotments. In the two Dobie Flat Allotments, the already elevated levels of bare ground are expected to increase and plant vigor, in general, is expected to decrease. These impacts can be expected to lead to increases in wind erosion in these two allotments. The high numbers of cattle would have stream bank and riparian area-upland transition zone livestock trampling impacts. Several results of this will be: 1) an increase in sediment contributed to ephemeral and perennial stream channels; 2) continued entrenchment of natural stream channels and the lowering of local water tables; 3) a more accelerated loss of soil fertility in lowland areas as topsoil is lost through erosion; and 4) decreased fertility of the soils would be reflected in a lowered potential of the ecological plant

communities to produce expected kinds and amounts of vegetation. The production of desirable forage plant species is expected to decrease and the lowlands and transition zones to the uplands would be more vulnerable to invasion by weed species; which are typically not preferred for grazing and would keep the rangeland in a degraded state.

Continuing the spring and late fall-winter grazing of the North and South Dobie Flat Allotments would continue the compaction of these the soils and would serve to exacerbate the present levels of bare ground. The increased bare ground would lead to higher levels of accelerated erosion presently occurring here.

EFFECTS ON VEGETATION RESOURCES

Vegetation – General

This section discusses generalized principles of plant growth in relation to the impacts of the various grazing treatments, followed by summaries of short and long-term impacts for these alternatives. The vegetation section concludes with a discussion of range improvements' impacts on vegetation.

Estimates of vegetation impacts as a result of implementation of the alternatives are based upon vegetation studies and professional judgment. Although the vegetation studies were not performed within the allotment, they are believed to be applicable to the four Split Rock Ranch Allotments (SRRA). It should be noted, however, that the predicted impacts are the best estimates of what would happen and are not to be interpreted as certainties. The monitoring studies described in Section Two are designed to detect the actual vegetative impacts of the selected alternative. If the desired results are not being achieved, then the grazing plan would be revised as necessary.

Defoliation of a plant by grazing reduces the photosynthetic capability of the plant. The leaves are the food factory. Rate of plant regrowth following grazing is dependent on the amount of leaf area remaining for photosynthesis and the availability of active axillary buds to initiate new tillers. Roots anchor the plants to the soil, take up water and nutrients, and if healthy, enable the plant to survive stress from drought, cold, heat, and grazing. Root growth is dependent upon the energy provided from photosynthesis. Healthy plant roots are essential for soil stability and erosion control, especially in riparian areas (USDA-NRCS, 1997).

Impacts to vegetation caused by grazing vary according to the vegetative stage of growth or dormancy. Defoliation of plants during susceptible periods can reduce the ability of plants to maintain growth and vigor (Buwai and Trlica, 1977). The time of defoliation is very important in determining the ability of the plant to recover. The most detrimental time of defoliation occurs during active growth when carbohydrate reserves are being used to produce herbage. McCarty and Price (1942-from Stoddart, Smith, and Box 1975) identified two critical periods in the growth of forage grasses: (1) the period of active reproduction, from flower-stalk formation to and including seed ripening; and (2) the initiation of the normal carbohydrate-storage period. Garrison (1972) stated that fall and winter seasons are the least detrimental periods for utilization of shrubs. Late spring and the middle of the growing season, when the carbohydrate reserves are the lowest, are the most damaging periods of use. Trlica and Cook (1971) found that most shrub

species defoliated by clipping about May 10 or July 1 had significantly smaller food reserves by the fall season than did unclipped plants. Defoliation during the first part of April had less impact on food reserves than May or July defoliation.

Alternative One

Upland Vegetation – Short Term

Under Alternative One, each pasture in the SRRA would receive a rest period or deferment from livestock grazing during portions of the growing season. Deferring grazing use during the growing season is very important to the plant in terms of carbohydrate reserve levels. The carbohydrate reserves are used during periods of rapid herbage growth, such as initial growth, subsequent regrowth, and for respiration and slight growth during the winter (Cook 1976; Priestly 1962-from Coyne and Cook, 1970). Allowing growth without grazing pressure during portions of the growing season would allow the plant to have available ample carbohydrate reserves for normal growth and development. Not grazing during portions of the growing season would allow an increase in vigor, production, seed production, root growth/replacement and litter accumulation.

Cattle grazing would occur in all upland pastures, except the Northeast Blackjack (NEBJ) Pasture, the North Dobie Flat (NDF) and South Dobie Flat (SDF) Allotments during the summer growing period during the first three years (short term). Grazing during the growing season is considered detrimental to the vegetation by removal of portions of the plant necessary in the synthesis of carbohydrates and by forcing the plant to deplete its carbohydrate reserves by regrowth. However, the 40 percent lower stocking level (grazing intensity) from the current permit and proposed rest-rotation system would limit cattle grazing the same pasture during the same time each year. Under this grazing prescription the upland vegetation would be allowed to recover vigor, improve seed production, and increase root growth/replacement.

The seasonal grazing in the Alice and Frenchie (Shipping) Pastures would occur from May 31 through June 4 for branding and then again October 27 through October 31 for shipping each year. This spring grazing during branding has historically taken place on both these pastures of approximately 4,270 acres. The historical fall use for shipping would continue with the implementation of this alternative. Concentration of fall cattle use in these pastures near the six existing water sources and working corrals would result in the decline of the vegetative vigor, production, and litter accumulation in these same areas (approximately 30 acres) with the spring use. The remaining portions of these pastures (approximately 4,240 acres) would be expected to improve in production, litter accumulation, vigor, and seed production (see Table 9).

Table 9. Predicted Short-term Impacts on Upland Vegetation

Pasture/Allotment Name	Grazing Prescription/Treatment	Short-term Impacts of Grazing Treatment
Northwest Blackjack Ranch (8,760 acres)	Treatment: Graze from June 5 or 20 until June 13 or 28 Treatment: Rest until after seed ripe of key species (July 20), then graze to trample seed into soil from September 3 to 11.	Graze: Vigor, seed production, litter accumulation reduced Rest: Vigor, seed production increased. Litter accumulation increased. Seedling establishment increased Graze: Vigor, litter accumulation reduced. Trampling of seeds increased.
South Blackjack Ranch (12,885 acres)	Treatment: Graze from June 5 until June 19 Treatment: Rest until after seed ripe of key species (July 20), then graze to trample seed into soil from September 12 to 26.	Graze: Vigor, seed production, litter accumulation reduced Rest: Vigor, seed production increased. Litter accumulation increased. Seedling establishment increased Graze: Vigor, litter accumulation reduced. Trampling of seeds increased.
North Diamond Springs (23,725 acres)	Treatment: Graze season-long through the summer (as early as June 14 to as late as September 2)	Vigor and litter accumulation, seed production reduced.
South Diamond Springs (17,865 acres)	Treatment: Rest until after seed ripe of key species (July 20), then graze to trample seed into soil from August 3 or 18 until September 11 or 26. Treatment: Graze from turnout through mid-summer (June 5 to July 14).	Rest: Vigor, seed production increased. Litter accumulation increased. Seedling establishment increased. Graze: Vigor, litter accumulation reduced. Trampling of seeds increased. Vigor, litter accumulation and seed production reduced.
North Dobie Flat (12,375 acres)	Treatment: Rest until seed ripe of key species (July 20), then graze to trample seed into soil from September 27 until October 26.	Rest: Vigor, seed production, litter accumulation, and seedling establishment increased. Graze: Vigor, litter accumulation reduced. Trampling of seeds increased.
South Dobie Flat (7,835 acres)	Treatment: Rest until after seed ripe of key species (July 20). Treatment: Graze during the fall from November 1 to 25.	Rest: Vigor, seed production, litter accumulation, and seedling establishment increased. Vigor and litter accumulation reduced.
Northeast Blackjack Ranch (13,460 acres)	Treatment: Rest year long.	Rest: Vigor, litter accumulation, seedling establishment, and seed production increased.
Shipping (Alice and Frenchie) Pastures (4,270 acres)	Treatment: Rest summer long. Graze spring (May 31-June 4) and fall (October 27-October 31)	Rest: Vigor, litter accumulation, seedling establishment, and seed production increased. Graze: Vigor and litter accumulation reduced.

Late spring and summer grazing by cattle would occur in the Northwest Blackjack Ranch (NWBJ), South Blackjack Ranch (SBJ), North Diamond Springs (NDS) and South Diamond Springs (SDS) Pastures. The turnout dates would range from June 5 to as late as August 18 depending on the pasture rotation schedule for these pastures. This would allow time for normal plant growth to occur during the growing season before livestock grazing begins. From April 15 to June 4, these pastures would receive deferment from livestock grazing. Deferment during this period of time is critical to the vegetation in order to begin growth (refer to Table 10, Phenology of Key Forage Species).

Coincident with the beginning of growth at the end of the dormant season is a decline in stored carbohydrates. The length of time during which stored foods are being depleted with the onset of growth may be as little as a few days in grasses (White 1973 from Stoddart, Smith, and Box 1975) or as much as months in some desert shrubs (Coyne and Cook 1970). The period ends when food manufactured by the newly-formed leaves exceeds the needs for metabolism and growth (Stoddart, Smith, and Box 1975). If grazing takes place during this time, the growth of the new leaves would be disrupted and would cause a delay in the replenishment of the food reserves.

Table 10. Phenology Of Key Forage Species

Species	Common Names	Start Growth Date	Flowering Date	Seed Ripe Date	Average Range Readiness Date
Agropyron dasystachyum	Thickspike wheatgrass	04-25	07-05	07-20	06-07
Artemisia tridentate	Big sagebrush	04-15	09-15	10-15	
Oryzopsis hymenoides	Indian ricegrass	04-25	06-25	07-10	
Stipa comate	Needle-and-thread grass	04-20	06-20	07-10	
Agropyron spicatum	Bluebunch wheatgrass	04-20	07-01	07-15	

Despite some short-term negative effects due to periodic grazing during the growing season for the SRRA, the overall beneficial effects of the proposed rest-rotation grazing system on upland vegetation would more than offset these short-term impacts because: (1) grazing use would be rested or deferred during the initial vegetation growing season, (2) the level of grazing use would be dispersed to areas which are presently receiving only light use, and (3) grazing would be kept at a level well below average annual growth during the short term and implementation period.

Upland Vegetation – Long Term

The long-term impacts in the upland range of the rest-rotation grazing system would be increased vegetation production due to the increased seedling establishment, improved vigor, improved root growth and replacement, increased litter accumulation, and increased percentage composition of grass and forb key species. A study by Gibbens and Fisser (1975) in the Red Desert region (near where SRRA are located) on a two-pasture deferred-rotation grazing system

found that plant composition, calculated as a percentage by species of the total vegetation cover, would result in a relative increase in the grasses and forbs. In this same study, a two pasture deferred-grazing system showed an increase in grass cover of 31 percent outside of the control area, while the grass cover increase from 1967 to 1971 inside the control area was 25 percent. Therefore, the net increase of grass cover from 1967 to 1971 of 6 percent was a result of the two-pasture deferred grazing system. Shrub cover change from 1967 to 1971 outside the exclosure showed a decrease of 11percent, while inside the exclosure was an increase of 34 percent. These results indicate that a two-pasture deferred grazing system should cause a reduction of shrub cover when compared to the absence of grazing. It is estimated that the proposed rest-rotation grazing system in the SRRA would decrease shrub cover 10 percent.

Reduction of growing season grazing intensity would improve vigor of vegetation species and increase production in the long-term (Blaisdell, et al. 1982, Blaisdell and Holmgren 1984, Masters, et al. 1996a, Holechek, et al. 1998).

The West, Middle, and East Forks of Sage Hen Creek would be expected to improve in condition and production over the long-term as a result of the riparian management applied to the Northeast Blackjack, Northwest Blackjack and South Blackjack Ranch Pastures under the rest-rotation grazing system (Blaisdell, et al. 1982, Blaisdell and Holmgren 1984, Masters, et al. 1996a, Holechek, et al. 1998).

The fall and winter seasons are considered to be the least detrimental to the vegetation in terms of grazing. Fall-winter is considered to be the least detrimental period of utilization for shrubs (Garrison 1972, Blaisdell and Holmgren 1984). The lack of grazing pressure during the growing season in the North and South Dobie Flat Allotments (in 7 or 9 years out of the first 10-year cycle) would allow the vegetation to improve in terms of vigor, root growth and replacement, seed production, seedling establishment, and litter accumulation.

Periodic rest or deferment of grazing during the spring and summer months would allow the upland vegetation to recuperate from the depletion of carbohydrate reserve levels from grazing during the growing season. A slight increase in forage production over the entire SRRA would be expected from implementation of this alternative in the long-term.

Sacrifice areas which are adjacent to water sources would be expected to continue to receive excessive grazing pressure. These areas would have the vegetation completely removed or damaged so severely that restoration would be extremely limited. An area of approximately one to three acres per water source would be expected to be impacted. The rest-rotation grazing system and reduced cattle grazing levels should keep these areas from enlarging.

Range Improvements

Under this alternative, the permittee in cooperation with the BLM, would construct exclosure fences on the riparian areas below the several Diamond Springs on BLM administered public lands. This would exclude 68 acres from grazing by livestock and require seven miles of exclosure fence to be built. The new fence would create 3.5 acres of sacrifice area along its outer perimeter (see Appendix 3).

In addition, the proposed pasture division fence to divide the North Blackjack Ranch Pasture into two smaller east and west pastures would require six miles of permanent fence to be built. This proposed fence would create nine acres of sacrifice area from construction, maintenance activities and cattle trailing along both sides. The vegetation along the fence would be removed by cattle through consumption and trampling. This concentrated grazing would result in the decline of the preferred species and an increase in the less-preferred forage species. The overall production, seed production, vigor, condition, and trend of the vegetation would decline in the areas of trailing.

Construction of the proposed fences would remove approximately 13 acres from production. Appendix 3 lists the total acres disturbed by each type of range improvement.

The overall impact to the vegetation within the SRRA as a result of the proposed fence construction would be minor. Even though fences are beneficial in the management of livestock, they do cause trailing impacts along the fences. This would result in the deterioration of the vigor of the plants due to overgrazing and trampling. Use of motorized vehicles for maintenance would also lead to a reduction in vigor of vegetation. Another impact of the trailing of livestock and wildlife along fence lines, would be the removal of vegetation through trampling and compaction of the soil. This would cause adverse growing conditions. A change in composition of the vegetative species could occur in the immediate vicinity of the fence and in areas away from the fence, impacts would be less noticeable.

Summary
Short-term impacts under summer grazing would be reductions in plant vigor, litter accumulation, and seed production. Short-term impacts from fall and winter grazing would be reductions in plant vigor and litter accumulation.

The summer-long deferment and year-long rest treatments would increase vigor, litter accumulation, seedling establishment, and seed production for the rotating rest pasture in SRRA. Rest periods would enhance the vegetation by increasing vigor, root growth and replacement, seed production, and litter accumulation of the vegetation.

The proposed long term use level of 6,717 BLM AUMs for cattle is 71 percent of the current permitted use of 9,400 BLM AUMs and is 83 percent of the long-term (1993-2008) actual use of 8,054 BLM AUMs. Blaisdell and Holmgren recommended the basic stocking level on Intermountain salt-desert rangelands at 75 percent of the long-term average forage production because of the normal inability to adjust animal numbers to the wide variations in forage yield. This recommendation is based on long term forage (1935-1974) production on moderately-grazed (11 acres per AUM) salt desert rangeland. This recommendation provided adequate forage except in years when production was extremely low.

The proposed long term use level 6,717 BLM AUMs for cattle would be an average stocking rate of 13.4 acres per AUM on the public land within the SRRA. This proposed use level is at the mid-range for recommended stocking rates on the predominate ecological sites occurring on SRRA. The mid-range stocking rate of 13.3 acres per AUM would be for shallow sandy and

shallow loamy sites in mid-seral status (fair condition) within the 8-12 inch precipitation zones on SRRA.

Blaisdell, Murray and McArthur summarized the importance of stocking rate (grazing intensity) in improving or maintaining range condition on sagebrush-grass ranges in the Intermountain West (*Managing Intermountain Rangelands-Sagebrush Grass Ranges*, 1982). Several studies from Wyoming were reviewed in this summary (Gibbens and Fisser, (1975), Smith et al. (1967), and Cooper, (1953) as well as, several by Laycock and others from Idaho and Utah. While the specific study results varied depending on the location and grazing system implemented, two conclusions were evident; that the existing range condition and then the grazing intensity (stocking rate) applied were the overriding factors on whether grazing systems improved, maintained or degraded these sagebrush-grass rangelands. Further, they stated that "Rate of stocking-balancing numbers of grazing animals with forage resources-is the most important part of good grazing management (Pechanec, 1956)."

The last nine years (1999-2007) of below average precipitation have required lower livestock use levels to manage for rangeland health standards and provide for drought recovery. In the long term, the upland areas located away from present livestock water sources would receive a 17 percent decrease in grazing use over the 1993-2008 actual use levels.

This decreased livestock grazing intensity, combined with the rest-rotation grazing system, would result in the vegetation of the upland areas maintaining or improving in vigor, root growth and replacement, production, seed production, and litter accumulation (Blaisdell, et al. 1982, Blaisdell and Holmgren 1984, Holechek et al. 1998).

The upland and lowland areas within the SRRA would improve in vigor, production, seedling establishment, seed production, and litter accumulation due to the lack of grazing during the summer growing season and year-long rest period. Implementation of this alternative would result in a slight increase in production (USDI-BLM 1979, Blaisdell and Holmgren 1984). Also, by 2019, it is expected that there would be an improving trend in upland range condition, a static to improving trend in those riparian areas outside riparian exclosures within the SRRA. Platts and Nelson (1989) rated rest-rotation grazing systems as fair for improving stream and riparian habitats (see Appendix 4). However, the proposed rest-rotation grazing system, which limits the summer grazing period to 16 days or less for the three Blackjack Ranch Pastures, would allow for long-term improvement compared to the existing situation (Myers 1989, Masters et al. 1996b, Mosley, et al. 1997, Clary and Webster 1989, Clary and Webster 1990, USDI-BLM 1998).

Construction of the proposed fences would cause the loss of approximately 13 acres from production. Major impacts to the vegetation would be the removal of vegetation along the proposed fence lines and the decrease in vigor of the vegetation through trampling and concentrated grazing by the cattle along the fences.

Overall, the impacts upon vegetation by implementation of this alternative are: (1) a static to slight increase in the percent composition of those vegetation species that are more desirable forage for livestock and wildlife (i.e., grasses and forbs would increase relative to big sagebrush); (2) a slight increase in production; (3) a static to upward trend in the condition class on the upland areas adjacent to water sources; (4) a stabilization of declining trend (in the short term) and then an improving trend towards PFC of the public land riparian areas in the SRRA (in the long term); and (5) a stable to increasing trend in live vegetation cover (USDI-BLM-1979) (Holechek et al. 1998).

Alternative Two

Upland Vegetation – Short Term

Under Alternative Two, each pasture in the SRRA would receive deferment from livestock grazing during portions of the growing season. Deferring grazing use during the growing season is very important to the plant in terms of carbohydrate reserve levels. The carbohydrate reserves are used during periods of rapid herbage growth, such as initial growth, subsequent regrowth, and for respiration and slight growth during the winter (Cook 1976; Priestly 1962-from Coyne and Cook, 1970). Allowing growth without grazing pressure during portions of the growing season would allow the plant to have available ample carbohydrate reserves for normal growth and development. Not grazing during portions of the growing season would allow an increase in vigor, production, seed production, root growth/replacement and litter accumulation.

Cattle grazing would occur in all upland pastures, except the North Dobie Flat (NDF) and South Dobie Flat (SDF) Allotments during the summer growing period during the first four years (short term). Grazing during the growing season is considered detrimental to the vegetation by removal of portions of the plant necessary in the synthesis of carbohydrates and by forcing the plant to deplete its carbohydrate reserves by regrowth. However, the considerably lower stocking level (grazing intensity) and proposed deferred-rotation system would limit cattle grazing the same pasture during the same time each year. Under this grazing prescription the upland vegetation would be allowed to recover vigor, improve seed production, and increase root growth/replacement.

The seasonal grazing in the Alice and Frenchie (Shipping) Pastures would occur from June 2 through June 4 for branding and then again October 30 through November 2 for shipping each year. This spring grazing during branding has historically taken place on both these pastures of approximately 4,270 acres. The historical fall use for shipping would continue with the implementation of this alternative. Concentration of fall cattle use in these pastures near the six existing water sources and working corrals would result in the decline of the vegetative vigor, production, and litter accumulation in these same areas (approximately 30 acres) with the spring use. The remaining portions of these pastures (approximately 4,240 acres) would be expected to improve in production, litter accumulation, vigor, and seed production (see Table 11).

Table 11. Predicted Short-term Impacts on Upland Vegetation

Pasture/Allotment Name	Grazing Prescription/Treatment	Short-term Impacts of Grazing Treatment
North Blackjack Ranch (13,460 acres)	Treatment: Graze from June 5 or 30 until July 16 or August 10 Treatment: Defer until after seed ripe of key species (July 20), then graze to trample seed into soil until August 29.	Graze: Vigor, seed production, litter accumulation reduced Rest: Vigor, seed production increased. Litter accumulation increased. Seedling establishment increased Graze: Vigor, litter accumulation reduced. Trampling of seeds increased.
South Blackjack Ranch (12,885 acres)	Treatment: Graze from June 5 until June 29 Treatment: Defer until after seed ripe of key species (July 20), then graze to trample seed into soil from August 30 to September 23 or October 5 to 29.	Graze: Vigor, seed production, litter accumulation reduced Rest: Vigor, seed production increased. Litter accumulation increased. Seedling establishment increased Graze: Vigor, litter accumulation reduced. Trampling of seeds increased.
North Diamond Springs (23,725 acres)	Treatment: Graze season-long through the summer (as early as June 5 to as late as October 4)	Vigor and litter accumulation, seed production reduced.
South Diamond Springs (17,865 acres)	Treatment: Defer until after seed ripe of key species (July 20), then graze to trample seed into soil from September 24 or until October 29. Treatment: Graze from turnout through mid-summer (June 5 to July 10 or July 17 until August 21).	Rest: Vigor, seed production increased. Litter accumulation increased. Seedling establishment increased. Graze: Vigor, litter accumulation reduced. Trampling of seeds increased. Vigor, litter accumulation and seed production reduced.
North Dobie Flat (12,375 acres)	Treatment: Defer until seed ripe of key species (July 20), then graze to trample seed into soil from November 3 or 23 until December 2 or 22.	Rest: Vigor, seed production, litter accumulation, and seedling establishment increased. Graze: Vigor, litter accumulation reduced. Trampling of seeds increased.
South Dobie Flat (7,835 acres)	Treatment: Defer until after seed ripe of key species (July 20). Treatment: Graze during the fall from November 3 to 22 or December 3 to 22.	Rest: Vigor, seed production, litter accumulation, and seedling establishment increased. Vigor and litter accumulation reduced.
East Sage Hen Exclosure (455 acres)	Treatment: Rest year long.	Rest: Vigor, litter accumulation, seedling establishment, and seed production increased.
Shipping (Alice and Frenchie) Pastures (4,270 acres)	Treatment: Defer summer long. Graze spring (June 2 to June 4) and fall (October 30 to November 2).	Rest: Vigor, litter accumulation, seedling establishment, and seed production increased. Graze: Vigor and litter accumulation reduced.

Late spring and summer grazing by cattle would occur in the North Blackjack Ranch (NBJ), South Blackjack Ranch (SBJ), North Diamond Springs (NDS) and South Diamond Springs (SDS) Pastures. The turnout dates would range from June 5 to as late as August 30 depending on the pasture rotation schedule for these pastures. This would allow time for normal plant growth to occur during the growing season before livestock grazing begins. From April 15 to June 4, these pastures would receive deferment from livestock grazing. Deferment during this period of time is critical to the vegetation in order to begin growth (refer to Table 10, Phenology of Key Forage Species).

Coincident with the beginning of growth at the end of the dormant season is a decline in stored carbohydrates. The length of time during which stored foods are being depleted with the onset of growth may be as little as a few days in grasses (White 1973 from Stoddart, Smith, and Box 1975) or as much as months in some desert shrubs (Coyne and Cook 1970). The period ends when food manufactured by the newly-formed leaves exceeds the needs for metabolism and growth (Stoddart, Smith and Box 1975). If grazing takes place during this time, the growth of the new leaves would be disrupted and would cause a delay in the replenishment of the food reserves.

Despite some short-term negative effects due to periodic grazing during the growing season for the SRRA, the overall beneficial effects of the proposed deferred-rotation grazing system on upland vegetation would more than offset these short-term impacts because: (1) grazing use would be deferred during the initial vegetation growing season, (2) the level of grazing use would be dispersed to areas which are presently receiving only light use, and (3) grazing would be kept at a level substantially below average annual growth during the short term and implementation period.

Upland Vegetation – Long Term

The long-term impacts in the upland range of the deferred-rotation grazing system would be increased vegetation production due to the increased seedling establishment, improved vigor, improved root growth and replacement, increased litter accumulation, and increased percentage composition of grass and forb key species. A study by Gibbens and Fisser (1975) in the Red Desert region (near where SRRA are located) on a two-pasture deferred-rotation grazing system found that plant composition, calculated as a percentage by species of the total vegetation cover, would result in a relative increase in the grasses and forbs. In this same study, a two pasture deferred-grazing system showed an increase in grass cover of 31 percent outside of the control area, while the grass cover increase from 1967 to 1971 inside the control area was 25 percent. Therefore, the net increase of grass cover from 1967 to 1971 of 6 percent was a result of the two-pasture deferred grazing system. Shrub cover change from 1967 to 1971 outside the exclosure showed a decrease of 11percent, while inside the exclosure was an increase of 34 percent. These results indicate that a two-pasture deferred grazing system should cause a reduction of shrub cover when compared to the absence of grazing. It is estimated that the proposed deferred-rotation grazing system in the SRRA would decrease shrub cover 10 percent.

The substantial reduction of growing season grazing intensity would improve vigor of vegetation species and increase production in the long-term (Blaisdell, et al. 1982, Blaisdell and Holmgren 1984, Masters, et al. 1996a, Holechek, et al. 1998).

The West, Middle, and East Forks of Sage Hen Creek would be expected to improve in condition and production over a longer term (than Alternative One) as a result of the riparian management applied to the North Blackjack and South Blackjack Ranch Pastures under the deferred-rotation grazing system (Blaisdell, et al. 1982, Blaisdell and Holmgren 1984, Masters, et al. 1996a, Holechek, et al. 1998).

The fall and winter seasons are considered to be the least detrimental to the vegetation in terms of grazing. Fall-winter is considered to be the least detrimental period of utilization for shrubs (Garrison 1972, Blaisdell and Holmgren 1984). The lack of grazing (every year) during the growing season in the North and South Dobie Flat Allotments would allow the vegetation to improve in terms of vigor, root growth and replacement, seed production, seedling establishment, and litter accumulation.

Periodic deferment of grazing during the spring and summer months would allow the upland vegetation to recuperate from the depletion of carbohydrate reserve levels from grazing during the growing season. A slight increase in forage production over the entire SRRA would be expected from implementation of this alternative in the long term.

Sacrifice areas which are adjacent to water sources would be expected to continue to receive excessive grazing pressure. These areas would have the vegetation completely removed or damaged so severely that restoration would be extremely limited. An area of approximately one to three acres per water source would be expected to be impacted. The deferred-rotation grazing system and substantially reduced cattle grazing levels should keep these areas from enlarging.

Range Improvements

A protective fishery exclosure fence of 2.7 miles would be constructed under this alternative on the BLM-administered public land on the northern reach of the East Sage Hen Creek. About 455 acres of BLM administered public lands would be excluded from use by cattle. This new fence would create two acres of sacrifice area along its outer perimeter. The vegetation along the fence would be removed by cattle through consumption and trampling. This concentrated grazing would result in the decline of the preferred species and an increase in the less-preferred forage species. The overall production, seed production, vigor, condition, and trend of the vegetation would decline in the areas of trailing.

Construction of this proposed fence would remove approximately two acres from production compared to 13 acres for proposed fences in Alternative One. Appendix 3 lists the total acres disturbed by each type of range improvement. The overall impact to the vegetation within the SRRA as a result of the proposed riparian protection fence construction would be minor.

Summary

Short-term impacts under summer grazing would be reductions in plant vigor, litter accumulation, and seed production. Short-term impacts from fall and winter grazing would be reductions in plant vigor and litter accumulation.

The spring and summer-long deferment treatments would increase vigor, litter accumulation, seedling establishment, and seed production for the fall use pastures in SRRA. Growing season deferment would enhance the vegetation by increasing vigor, root growth and replacement, seed production, and litter accumulation of the vegetation.

The proposed long term use level of 5,358 BLM AUMs for cattle is 57 percent of the current permitted use of 9,400 BLM AUMs and is 67 percent of the long-term (1993-2008) actual use of 8,054 BLM AUMs. Blaisdell and Holmgren recommended the basic stocking level on Intermountain salt-desert rangelands at 75 percent of the long-term average forage production because of the normal inability to adjust animal numbers to the wide variations in forage yield. This recommendation is based on long term forage (1935-1974) production on moderately-grazed (11 acres per AUM) salt desert rangeland. This recommendation provided adequate forage except in years when production was extremely low.

The proposed long term use level 5,358 BLM AUMs for cattle would be an average stocking rate of 16.8 acres per AUM on the public land within the SRRA. This proposed use level is well within (below) the mid-range for recommended stocking rates on the predominate ecological sites occurring on SRRA. The mid-range stocking rate of 13.3 acres per AUM would be for shallow sandy and shallow loamy sites in mid-seral status (fair condition) within the 8-12 inch precipitation zones on SRRA.

Blaisdell, Murray and McArthur summarized the importance of stocking rate (grazing intensity) in improving or maintaining range condition on sagebrush-grass ranges in the Intermountain West (*Managing Intermountain Rangelands-Sagebrush Grass Ranges*, 1982). Several studies from Wyoming were reviewed in this summary (Gibbens and Fisser, (1975), Smith et al. (1967), and Cooper, (1953) as well as, several by Laycock and others from Idaho and Utah. While the specific study results varied depending on the location and grazing system implemented, two conclusions were evident; that the existing range condition and then the grazing intensity (stocking rate) applied were the overriding factors on whether grazing systems improved, maintained or degraded these sagebrush-grass rangelands. Further, they stated that "Rate of stocking-balancing numbers of grazing animals with forage resources-is the most important part of good grazing management (Pechanec1956)."

The last nine years (1999-2007) of below average precipitation have required lower livestock use levels to manage for rangeland health standards and provide for drought recovery. In the long term, the upland areas located away from present livestock water sources would receive a 33 percent decrease in grazing use over the 1993-2008 actual use levels.

This substantial decrease in livestock grazing intensity, combined with the deferred-rotation grazing system, would result in the vegetation of the upland areas maintaining or improving in vigor, root growth and replacement, production, seed production, and litter accumulation (Blaisdell, et al. 1982, Blaisdell and Holmgren 1984, Holechek et al. 1998).

The upland and lowland areas within the SRRA would improve vigor, production, seedling establishment, seed production, and litter accumulation due to the reduced level of grazing intensity during the summer growing season and proposed deferment periods. Implementation of this alternative would result in a slight increase in production (USDI-BLM 1979, Blaisdell and Holmgren 1984). Also, by 2019, it is expected that there would be an improving trend in upland range condition, a static to improving trend in those riparian areas outside riparian exclosures within the SRRA. Platts and Nelson (1989) rated deferred-rotation grazing systems only fair (slower than rest-rotation systems) for improving stream and riparian habitats (see Appendix 4). However, the proposed deferred-rotation grazing system would allow for long-term improvement compared to the existing situation (Myers 1989, Masters et al. 1996b, Mosley, et al. 1997, Clary and Webster 1989, Clary and Webster 1990, USDI-BLM 1998). Because of the proposed length of the summer grazing periods (25-42 days) in the North and South Blackjack Ranch Pastures, improvement would be slower than under Alternative One.

Construction of the proposed East Sage Hen riparian protection fence would cause the loss of approximately two acres from production. Major impacts to the vegetation would be the removal of vegetation along the proposed fence lines and the decrease in vigor of the vegetation through trampling and concentrated grazing by the cattle along the fences.

Overall, the impacts upon vegetation by implementation of this alternative are: (1) a static to slight increase in the percent composition of those vegetation species that are more desirable forage for livestock and wildlife (i.e., grasses and forbs would increase relative to big sagebrush); (2) a slight increase in production; (3) a static to upward trend in the condition class on the upland areas adjacent to water sources; (4) a stabilization of declining trend (in the short term) and then an improving trend towards PFC of the public land riparian areas in the SRRA (in the longer term than Alternative One); and (5) a stable to increasing trend in live vegetation cover (USDI-BLM-1979) (Holechek et al. 1998).

Alternative Three

Upland Vegetation – Short Term

Under Alternative Three, each pasture in the SRRA would receive deferment from livestock grazing during portions of the growing season. Deferring grazing use during the growing season is very important to the plant in terms of carbohydrate reserve levels. The carbohydrate reserves are used during periods of rapid herbage growth, such as initial growth, subsequent regrowth, and for respiration and slight growth during the winter (Cook 1976; Priestly 1962-from Coyne and Cook, 1970). Allowing growth without grazing pressure during portions of the growing season would allow the plant to have available ample carbohydrate reserves for normal growth and development. Not grazing during portions of the growing season would allow an increase in vigor, production, seed production, root growth/replacement and litter accumulation.

Cattle grazing would occur in all upland pastures, except the Shipping Pastures during the summer growing period during the first four years (short term). Grazing during the growing season is considered detrimental to the vegetation by removal of portions of the plant necessary

in the synthesis of carbohydrates and by forcing the plant to deplete its carbohydrate reserves by regrowth. However, the higher stocking level (grazing intensity) and proposed deferred-rotation system would only partially limit the effects of cattle grazing the same pasture during the same time each year. Under this grazing prescription, the upland vegetation would be limited in its recovery of vigor, improvement of seed production, and increase in root growth/replacement.

The fall grazing in the Alice and Frenchie (Shipping) Pastures would occur from October 12 or 26 through November 8 or 22 for shipping each year. Historical fall use for shipping has taken place on both these pastures of approximately 4,270 acres and would continue with the implementation of this alternative. However, this alternative proposes to graze these pastures for 28 days which would substantially increase the grazing intensity from 9.6 acres per AUM to 3.1 acres per AUM, an increase of over 300 percent. Concentration of fall cattle use in these pastures near the six existing water sources and working corrals at this increased stocking rate would result in a substantial decline of the vegetative vigor, production, and litter accumulation, as well as, an expansion of these same areas (currently estimated at 30 acres). The remaining portions of these pastures (approximately 4,240 acres) would be expected to decline in production, litter accumulation, vigor, and seed production (see Table 12).

Table 12. Predicted Short-term Impacts on Upland Vegetation

Pasture/Allotment Name	Grazing Prescription/Treatment	Short-term Impacts of Grazing Treatment
North Blackjack Ranch (13,460 acres)	Treatment: Graze from May 30 or July 4 to July 14 or as late as September 6 Treatment: Defer until after seed ripe of key species (July 20), then graze to trample seed into soil from September 10 until October 25.	Graze: Vigor, seed production, litter accumulation reduced Rest: Vigor, seed production increased. Litter accumulation increased. Seedling establishment increased Graze: Vigor, litter accumulation reduced. Trampling of seeds increased.
South Blackjack Ranch (12,885 acres)	Treatment: Graze from May 30 until July 3. Treatment: Defer until after seed ripe of key species (July 20), then graze to trample seed into soil from September 7 or November 23 to October 11 or December 27.	Graze: Vigor, seed production, litter accumulation reduced Rest: Vigor, seed production increased. Litter accumulation increased. Seedling establishment increased Graze: Vigor, litter accumulation reduced. Trampling of seeds increased.
North Diamond Springs (23,725 acres)	Treatment: Graze season-long through the summer (as early as May 30 to as late as October 1).	Vigor and litter accumulation, seed production reduced.
South Diamond Springs (17,865 acres)	Treatment: Defer until after seed ripe of key species (July 20), then graze to trample seed into soil from September 7 or November 9 until October 25 or December 27. Treatment: Graze from late May through mid-summer (May 30 to July 7).	Rest: Vigor, seed production increased. Litter accumulation increased. Seedling establishment increased. Graze: Vigor, litter accumulation reduced. Trampling of seeds increased. Vigor, litter accumulation and seed production reduced.
North Dobie Flat (12,375 acres)	Treatment: Graze in late May (May 20 to May 29). Treatment: Defer until seed ripe of key species (July 20), then graze to trample seed into soil from December 28 to January 13.	Vigor, litter accumulation and seed production reduced. Rest: Vigor, seed production, litter accumulation, and seedling establishment increased. Graze: Vigor, litter accumulation reduced. Trampling of seeds increased.
South Dobie Flat (7,835 acres)	Treatment: Graze in mid-May (May 10 to May 19). Treatment: Defer until after seed ripe of key species (July 20) then graze during the winter from January 14 to January 22.	Vigor, litter accumulation and seed production reduced. Rest: Vigor, seed production, litter accumulation, and seedling establishment increased. Graze: Vigor, litter accumulation reduced. Trampling of seeds increased.
Shipping (Alice and Frenchie) Pastures (4,270 acres)	Treatment: Defer until after seed ripe of key species (July 20) then graze during the fall from October 12 or 26 to November 8 or 22.	Rest: Vigor, seed production, litter accumulation, and seedling establishment increased. Graze: Vigor, litter accumulation reduced. Trampling of seeds increased.

Late spring and summer grazing by cattle would occur in the North Blackjack Ranch (NBJ), South Blackjack Ranch (SBJ), North Diamond Springs (NDS) and South Diamond Springs (SDS) Pastures. The turnout dates would range from May 30 to as late as July 23 depending on the pasture rotation schedule for these pastures. This would allow time for normal plant growth to occur during the growing season before livestock grazing begins. From April 15 to June 1, these pastures would receive deferment from livestock grazing. Deferment during this period of time is critical to the vegetation in order to begin growth (refer to Table 10, Phenology of Key Forage Species).

Coincident with the beginning of growth at the end of the dormant season is a decline in stored carbohydrates. The length of time during which stored foods are being depleted with the onset of growth may be as little as a few days in grasses (White 1973 from Stoddart, Smith, and Box 1975) or as much as months in some desert shrubs (Coyne and Cook 1970). The period ends when food manufactured by the newly-formed leaves exceeds the needs for metabolism and growth (Stoddart, Smith, and Box 1975). If grazing takes place during this time, the growth of the new leaves would be disrupted and would cause a delay in the replenishment of the food reserves.

The short-term negative effects due to periodic grazing during the growing season for the SRRA, would not be offset by the overall beneficial effects of the proposed deferred-rotation grazing system on upland vegetation which are: (1) grazing use would be deferred during the initial vegetation growing season and (2) the level of grazing use would be dispersed to areas which are presently receiving only light use; because grazing intensity would be kept at a level above average annual growth during the short term and implementation period.

Upland Vegetation – Long Term

The long-term impacts in the upland range of a deferred-rotation grazing system would be increased vegetation production due to the increased seedling establishment, improved vigor, improved root growth and replacement, increased litter accumulation, and increased percentage composition of grass and forb key species. A study by Gibbens and Fisser (1975) in the Red Desert region (near where SRRA are located) on a two-pasture deferred-rotation grazing system found that plant composition, calculated as a percentage by species of the total vegetation cover, would result in a relative increase in the grasses and forbs. In this same study, a two pasture deferred-grazing system showed an increase in grass cover of 31 percent outside of the control area, while the grass cover increase from 1967 to 1971 inside the control area was 25 percent. Therefore, the net increase of grass cover from 1967 to 1971 of 6 percent was a result of the two-pasture deferred grazing system. Shrub cover change from 1967 to 1971 outside the exclosure showed a decrease of 11percent, while inside the exclosure was an increase of 34 percent. These results indicate that a two-pasture deferred grazing system should cause a reduction of shrub cover when compared to the absence of grazing. It is estimated that the proposed deferred-rotation grazing system in the SRRA would decrease shrub cover 5 percent.

The 20 percent increase (from long term actual use) of growing season grazing intensity would reduce vigor of vegetation species and decrease production in the long-term (Blaisdell, et al. 1982, Blaisdell and Holmgren 1984, Masters, et al. 1996a, Holechek, et al. 1998).

The West, Middle, and East Forks of Sage Hen Creek would be expected to decline in condition and production over the long term as a result of the increased grazing intensity applied to the North Blackjack and South Blackjack Ranch Pastures riparian areas under the proposed deferred-rotation grazing system for this alternative (Blaisdell, et al. 1982, Blaisdell and Holmgren 1984, Masters, et al. 1996a, Holechek, et al. 1998). The proposed herding would be very difficult to implement effectively with the increased grazing pressure and extended grazing periods (35-46 days) on these riparian areas.

The fall and winter seasons are considered to be the least detrimental to the vegetation in terms of grazing. Fall-winter is considered to be the least detrimental period of utilization for shrubs (Garrison 1972, Blaisdell and Holmgren 1984). The ten days of grazing during the growing season in the North and South Dobie Flat Allotments would still allow the vegetation to improve in terms of vigor, root growth and replacement, seed production, seedling establishment, and litter accumulation.

Periodic deferment of grazing during the spring and summer months would ordinarily allow the upland vegetation to recuperate from the depletion of carbohydrate reserve levels from grazing during the growing season. However, the proposed 20 percent increase (from long term actual use) of growing season grazing intensity would be expected to decrease the forage production over the entire SRRA in the long-term.

Sacrifice areas which are adjacent to water sources would be expected to continue to receive excessive grazing pressure. These areas would have the vegetation completely removed or damaged so severely that restoration would be extremely limited. An area of approximately one to three acres per water source would be expected to be impacted. Even with the deferred-rotation grazing system, the increased cattle grazing levels would cause these areas to enlarge.

Range Improvements
No new range improvement projects are proposed under this alternative.

Summary
Short-term impacts under summer grazing would be reductions in plant vigor, litter accumulation, and seed production. Short-term impacts from fall and winter grazing would be reductions in plant vigor and litter accumulation.

The spring and summer-long deferment treatments would increase vigor, litter accumulation, seedling establishment, and seed production for the fall use pastures in SRRA. Growing season deferment would enhance the vegetation by increasing vigor, root growth and replacement, seed production, and litter accumulation of the vegetation.

The proposed long term use level of 9,640 BLM AUMs for cattle is a three percent increase over the current permitted use of 9,400 BLM AUMs and is a 20 percent increase over the long-term (1993-2008) actual use of 8,054 BLM AUMs. Blaisdell and Holmgren recommended the basic stocking level on Intermountain salt-desert rangelands at 75 percent of the long-term average forage production because of the normal inability to adjust animal numbers to the wide variations

in forage yield. This recommendation is based on long term forage (1935-1974) production on moderately-grazed (11 acres per AUM) salt desert rangeland. This recommendation provided adequate forage except in years when production was extremely low.

The proposed long term use level 8,054 BLM AUMs for cattle would be an average stocking rate of 9.3 acres per AUM on the public land within the SRRA. This proposed use level is outside (above) the mid-range for recommended stocking rates on the predominate ecological sites occurring on SRRA. The mid-range stocking rate of 13.3 acres per AUM would be for shallow sandy and shallow loamy sites in mid-seral status (fair condition) within the 8-12 inch precipitation zones on SRRA.

Blaisdell, Murray and McArthur summarized the importance of stocking rate (grazing intensity) in improving or maintaining range condition on sagebrush-grass ranges in the Intermountain West (*Managing Intermountain Rangelands-Sagebrush Grass Ranges*, 1982). Several studies from Wyoming were reviewed in this summary (Gibbens and Fisser, (1975), Smith et al. (1967), and Cooper, (1953) as well as, several by Laycock and others from Idaho and Utah. While the specific study results varied depending on the location and grazing system implemented, two conclusions were evident; that the existing range condition and then the grazing intensity (stocking rate) applied were the overriding factors on whether grazing systems improved, maintained or degraded these sagebrush-grass rangelands. Further, they stated that "Rate of stocking-balancing numbers of grazing animals with forage resources-is the most important part of good grazing management (Pechanec1956)."

The last nine years (1999-2007) of below average precipitation have required lower livestock use levels to manage for rangeland health standards and provide for drought recovery. In the long term, the upland areas located away from present livestock water sources would receive a 20 percent increase in grazing use over the 1993-2008 actual use levels.

This moderate increase in livestock grazing intensity would counteract the deferred-rotation grazing system and would result in the vegetation of the upland areas declining in vigor, root growth and replacement, production, seed production, and litter accumulation in the long term (Blaisdell, et al. 1982, Blaisdell and Holmgren 1984, Holechek et al. 1998).

The upland and lowland areas within the SRRA would decline in vigor, production, seedling establishment, seed production, and litter accumulation due to the increased level of grazing intensity during the summer growing season and longer "hot season" grazing periods. Implementation of this alternative would result in a slight decrease in production (USDI-BLM 1979, Blaisdell and Holmgren 1984). Also, by 2019, it is expected that there would be a static to declining trend in upland range condition and a static to declining trend in those riparian areas outside riparian exclosures within the SRRA. Platts and Nelson (1989) rated deferred-rotation grazing systems only fair (slower than rest-rotation systems) for improving stream and riparian habitats (see Appendix 4). However, this proposed deferred-rotation grazing system with an increased stocking rate would cause long-term deterioration compared to the existing situation (Myers 1989, Masters et al. 1996b, Mosley, et al. 1997, Clary and Webster 1989, Clary and Webster 1990, USDI-BLM 1998). Because of the proposed length of the summer grazing periods (35-46 days) in the North and South Blackjack Ranch Pastures and the increased grazing

intensity during the "hot season", the current deterioration of the unfenced riparian areas would continue.

Overall, the impacts upon vegetation by implementation of this alternative are: (1) a decrease in the percent composition of those vegetation species that are more desirable forage for livestock and wildlife (i.e., grasses and forbs would decrease relative to big sagebrush); (2) a slight decrease in production (due to the loss of grasses and forbs); (3) a downward trend in the range condition class on the upland areas adjacent to water sources; (4) a continuation of declining trend (in the short term) and then an acceleration of the trend away from PFC on the public land riparian areas in the SRRA (in the long term); and (5) a static trend (in the short term) and then a declining trend in live vegetation cover (due to the loss of grasses and forbs) (USDI-BLM-1979) (Holechek et al. 1998).

Cumulative Impacts

Potential cumulative impacts to vegetation communities would result from surface disturbing actions outside of the area of analysis that contribute to either short or long-term loss of vegetation, including other actions that contribute to altering vegetation attributes through foraging, trampling, vehicle routes, dust and application of vegetation treatments. In situ uranium mining, for example, results in the long term loss of vegetation from the area being mined which reduces vegetation and forage for wildlife. Varying acreage of disturbance would occur, depending on the level of development anticipated per alternative.

The primary difference among the alternatives with regard to impact on vegetation resources is the time that would be required under each alternative to achieve meaningful improvement in rangeland health. Thus, the cumulative impacts of loss of vegetation from activities outside of the project area would have the least consequence under Alternative One and the most under Alternative Three. However, the remoteness of other disturbances and the small amount of disturbance in the context of the size of the allotment and the planning area, do not rise to the level of significance under any alternative.

The expansion of weeds within and adjacent to the area of analysis would have a negative impact to livestock, and to lesser degree, on wildlife through reduced forage and increased death loss from poisonous plants.

The expansion of invasive plants is an issue of concern across the field office and not limited to the planning area or the project area. The amount of bare ground that would continue to exist under Alternative Three is greater than under either of the other two alternatives. But even under Alternative Three, the cumulative impact from activities outside of the project area are not close enough in proximity to meaningfully contribute to the spread of invasive species. There is little or no overlap of the developments with the allotments such as would contribute to the spread of invasive weeds. No portion of the SRRA has been identified as heavily weed infested. No reasonably foreseeable activities are likely to increase the potential for weed infestation.

While the future uranium development in the Gas Hills Mining District may have cumulative impacts, assessment of that proposed development is in its beginning phase and will, itself,

consider impacts to all resources by both that proposed action and the livestock grazing being considered under this environmental assessment.

Residual Impacts
Under Alternative One vegetative cover, production and plant vigor, both on the uplands and the lowlands, would be expected to increase over the long term through effective implementation of the rest-rotation grazing system. The more preferred cool season bunch grasses would be expected to establish on the patches of bare ground between the sagebrush plants. Plant vigor would be expected to improve leading to better root growth and increased litter accumulation on the soil surface.

The fence-related sacrifice areas discussed above under Alternative One would remain as residual impacts.

For Alternative Two, vegetative cover, production and plant vigor, both on the uplands and the lowlands, would be expected to increase over the long term through effective implementation of the deferred-rotation grazing system. The more preferred cool season bunch grasses would be expected to occupy the patches of bare ground between the sagebrush plants. Plant vigor would be expected to improve leading to better root growth and litter accumulation. This increase in litter accumulation would improve water infiltration rates and soil fertility.

The fence-related sacrifice areas discussed above for Alternative Two would remain as residual impacts.

The lowland vegetation is not expected to improve under Alternative Three and riparian degradation is expected to increase over the long term. The upland vegetation would decline due to the increased livestock grazing intensity even with the deferred-rotation grazing system in the Diamond Springs and Blackjack Ranch Allotments. In the North and South Dobie Flat Allotments, the existing elevated levels of bare ground are expected to increase and plant vigor is expected to decrease. The increased grazing pressure would intensify stream bank and riparian area-upland transition zone cattle trampling impacts. Several results of this would be: 1) decreased fertility of the soils would be reflected in a lowered potential of the plant communities to produce desired kinds and amounts of vegetation; 2) production of desirable forage plant species would be expected to decrease; 3) the lowlands and transition zones to the uplands would be more vulnerable to invasion by weed species; and 4) these invasive plants would not be preferred by grazing animals and would keep the rangeland in a degraded state.

EFFECTS ON RIPARIAN/WETLAND AREAS

The condition of riparian/wetland areas in the Diamond Springs, Blackjack Ranch, and North Dobie Flat Allotments is one reason why these allotments are not meeting the Rangeland Health Standards. The North Blackjack Ranch pasture has been identified as a priority for riparian/wetland improvement. There are impacts that would be common under the three different alternatives. Grazing during the hot season could result in the high utilization levels of riparian/wetland plants under all alternatives. Successful grazing systems have, on an average, approximately 12 days of hot season grazing (Myers, 1989). One pasture under Alternative One

would have 12 days or less of hot season grazing, but all other pastures would exceed 12 days. Myers (1989) also found that timing of grazing, duration of use, and frequency of fall grazing were important factors in successful riparian management. Any grazing system must provide for regrowth of riparian plants after use, or should leave sufficient vegetation at the time of grazing for maintenance of plant vigor and stream bank protection (Clary, 1989). Riparian/wetland plant regrowth after grazing is essential to slow down spring runoff, capture sediment, and prevent soil erosion and bank degradation.

The average date of the first frost in this area is September 10 and grazing after the first week of August would typically not allow enough time for plant regrowth except on those plants at the water's edge. This issue would be common to all alternatives. The use of a rotation system would allow most pastures to see some plant regrowth before the end of the growing season. According the Myers (1989), successful grazing systems receive an average 35 days of post-grazing regrowth. To reach the recommended number of days of post-grazing regrowth, cattle would have to be removed from the Blackjack Ranch, Diamond Springs and North Dobie Flat Allotments by early August. All of the alternatives would have pastures that would not receive adequate time for riparian/wetland plant regrowth prior to the end of the growing season.

Limiting hot season grazing on riparian/wetland areas to 21 days or less is successful in improving riparian/wetland areas, whereas limiting grazing to 30 days or less is successful in maintaining riparian/wetland areas (Myers, 1991). The level of impacts and the speed to which riparian/wetland areas improve under each alternative would be directly related to the duration of grazing, forage utilization levels, and the effectiveness of cattle management.

Alternative One

With-in pasture herding would not be required under Alternative One, therefore cattle would likely concentrate on riparian/wetland areas while in the pasture, particularly during the hot period between mid-June to mid- September. Cattle spending a lot of time in one area could lead to trampling and heavy utilization of riparian plants. This issue would be of most concern in the Blackjack Ranch Allotment, the south pasture of the Diamond Springs Allotment, and the North Dobie Flat Allotment. The majority of the riparian areas in the North Diamond Springs pasture would be fenced off under this alternative.

There would be less days of grazing authorized under Alternative One. Reducing the days cattle are in a pasture should reduce the level of plant utilization in each pasture, resulting in greater stubble heights being left going into the dormant season. Utilization levels would be dependent on the time of year the pasture is grazed and how long cattle linger on the riparian areas. Myers (1989) found that the duration of grazing is a key factor in determining the severity of impacts such as utilization levels and mechanical damage from trampling and hoof action. This alternative would authorize 250 less cattle than under the current permit which would reduce the amount of trampling and hoof action on riparian/wetland areas.

The Blackjack Ranch Allotment has some of the highest priority riparian/wetland areas in the 4 allotments due to the variety in types of areas and their size. Under this alternative, the north pasture would be divided by a north-south fence. The Northeast Blackjack Ranch pasture would

be rested for 3 consecutive years during which time the Northwest Blackjack Ranch pasture would receive 9 days of grazing. After 3 years, the Northwest Blackjack Ranch pasture would then be rested for 2 years and the Northeast pasture would be grazed for 16 days. The South Blackjack Ranch pasture would receive 15 days of use each year and the South Diamond Springs pasture would receive 40 days, except for those years the pastures would be rested. If utilization triggers indicate that the pasture rotation needs to be accelerated, then the number of days may be less. Based on the recommendation that 21 days or less of grazing should be planned to improve riparian/wetland areas (Myers 1991), this alternative should promote rehabilitation in the Northeast, Northwest, and South Blackjack Ranch pastures. The number of grazing days in the South Diamond Springs pasture would exceed the number of days recommended for riparian/wetland area improvement. This pasture should improve under this alternative, but improvement will take longer to achieve than in the Northeast, Northwest, and South Blackjack Ranch pastures.

The riparian area in the North Dobie Flat Allotment would receive 40 days of grazing use, but should also see improvement. For the first four years of the grazing cycle, there would be no spring grazing authorized which should allow riparian vegetation to produce seedlings and establish root systems. Fall grazing would be less harmful on these plants as cooler air temperatures should be conducive to reducing cattle congregation on the riparian area and facilitate animal distribution throughout the allotment. It is expected that after 4 years of grazing rest during the spring, the riparian area would have a more vigorous plant community and root system that should withstand overland flow and mild flood events. This alternative would have dormant season grazing approximately 7 out of 10 years on the allotment which would benefit the riparian/wetland area.

Under the proposed schedule for this alternative, one of the 3 pastures in the Blackjack Ranch Allotment or the south pasture of the Diamond Springs Allotment would be rested each year. Rest-rotation favors herbaceous bank-forming vegetation (Leonard, 1997) and allows plants and stream banks time to recoup from past damage. The consecutive years of rest implemented in the Northeast and Northwest Blackjack Ranch pastures should provide a “jump start” to the healing needed to move the East, Middle and West Forks of Sage Hen Creek towards Proper Functioning Condition. The year of no grazing would give seedlings a chance to become established and older plants another season to gain vigor and produce seed.

Plants in the rested pasture would have a full year’s growth going into the dormant season, which would provide vegetative cover to protect meadows and stream banks during runoff the following spring. Riparian plants in rested and fall grazed pastures would have time to develop seed heads and build carbohydrate reserves, resulting in more robust plants with vigorous root systems.

The six pastures that would not be rested on a given year would be grazed using a deferred rotation system. Rotating the order of pasture usage would eliminate the impacts of grazing a pasture the same time each year, which is usually detrimental to optimal plant growth and reproduction. Pastures having the largest amount of riparian/wetland acreage would not have hot season grazing each year, which should benefit the plant community.

Not grazing during the late period of the growing season allows for plant regrowth, enhanced food storage in the roots of perennial grasses, and fosters better growth the following year (Platts, 1990). Allowing plants to set seed would promote the colonization of desirable riparian species, reducing the amount of upland species present. Grazing pastures early in the season would likely not allow plants to develop seed, but plants should have time to regrow on meadow riparian areas and those areas adjacent to water. It is important to provide for residual vegetative cover through rest or regrowth during at least 75% of the years or annually if possible (Myers 1989). Based on the proposed 10 year schedule and using September 10 as the average date when regrowth potential ceases, the possibility of plant regrowth following pasture grazing would be: 10 years in Northeast Blackjack Ranch, 10 years in Northwest Blackjack Ranch, 6 years in South Blackjack Ranch, 7 years in South Diamond Springs, and 3 years in North Dobie Flat. The North Diamond Springs pasture would have the majority of the riparian/wetland areas fenced so regrowth would not be an issue. The rotation would be planned to prevent consecutive years where no regrowth would occur.

Grazing after mid-August in the Northeast Blackjack Ranch pasture could impact the willow community as cattle tend to graze on willows during the fall. Heavy utilization could cause damage or kill mature willows, prevent new willows from establishing, and reduce the overall size of the willow community. Resting the Northeast Blackjack Ranch pasture for three consecutive years would promote new willow establishment and allow willows to grow and become more robust before exposing them to potential grazing by livestock. Periodic rest in subsequent years would help to continue this trend. The proposed grazing schedule would limit fall use in this pasture to approximately 2 weeks in 2 of 10 years.

Under this alternative, an additional 68 riparian/wetland acres would be fenced and excluded from livestock grazing in the North Diamond Springs pasture. Potential for improvement would be excellent on these areas and improvement could occur quickly.

Improvement of riparian/wetland areas would be achieved under Alternative One due to the periodic rest of pastures having the greatest amount of public land riparian habitat, the deferred rotation of the remaining pastures, the number of years timing of grazing in pastures would facilitate regrowth, and the shorter grazing season. Riparian/wetland area improvement is necessary to move these allotments towards meeting the rangeland Health Standards. Platts and Nelson (1989) rated various grazing strategies for their ability to improve stream riparian habitats. Rest rotation, particularly double rest rotation, was rated as one of the most effective methods.

Alternative One should be successful at making progress towards meeting Rangeland Health Standard #2.

Alternative Two

This alternative would maintain the current number of pastures therefore the number of grazing days per pasture would be higher than under Alternative One. The deferred rotation system would ensure that each pasture would receive early season grazing 1 out of 4 years and that hot season grazing would be rotated among the pastures. Rotating this use should allow

riparian/wetland areas to improve. The North Dobie Flat Allotment would not be part of this rotation and it would be grazed during the fall and winter season. Fall grazing would be less harmful on plants as cooler air temperatures would be conducive to reducing cattle congregation on the riparian area and facilitate animal distribution throughout the allotment. This alternative would have dormant season grazing on the allotment which would benefit riparian/wetland plants.

There would be less grazing days permitted under Alternative Two than under the current situation, but more days than under Alternative One. Increasing the number of grazing days would likely lead to increased forage utilization levels than under Alternative One, resulting in less vegetation available to slow the next years runoff. This alternative would have the same turnout date as Alternative One, but would authorize grazing later into December. The additional 19 grazing days would occur during the dormant season, thus impacts to riparian plant health from grazing during this period would be minimal.

Under Alternative Two, the North Blackjack Ranch pasture would receive 42 days of grazing, South Blackjack Ranch pasture would receive 25 days, North Diamond Springs pasture would receive 44 days, and South Diamond Springs pasture would receive 36 days. The current unfenced riparian/wetland area in North Diamond Springs would be grazed and managed as the rest of the pasture. None of the pastures would receive the 21 days or less of grazing recommended for riparian/wetland improvement, however the South Blackjack Ranch pasture would receive the 25 days which is recommended to maintain the condition of riparian/wetland areas.

Under a 10 year rotation that focuses on improvement in the North Blackjack Ranch pasture, plant regrowth after grazing would be possible all 10 years on North Blackjack Ranch, 3 years on South Blackjack Ranch, 2 years on North Diamond Springs, and 5 years on South Diamond Springs. Regrowth in North Dobie Flat would not be possible as this pasture would be grazed during fall/winter. This alternative would not allow for as much regrowth opportunity and would not have residual cover on most pastures during 75% of the years.

Herding would be conducted under Alternative Two so it is expected that impacts on riparian/wetland areas from grazing would be controlled. Improvement would be achieved using diligent herding to ensure cattle do not over-utilize these areas. Herding would be important throughout the grazing period but would be critical during the hot season. Daily herding may be necessary and riding not conducted in a timely manner would allow cattle to linger in riparian/wetland areas, resulting in higher than desired plant utilization and trampling. Ineffective herding could result in riparian/wetland areas not improving and remaining static in their condition.

This alternative would reduce the number of cattle to 1,000 which would be the fewest number of animals of all the alternatives. A lower number of cattle would make herding easier and reduce the effects of stream bank and riparian area trampling.

Exclosure fencing on East Fork Sage Hen Creek would result in rapid improvement of the riparian/wetland areas associated with the fenced part of the creek. Excluding livestock grazing

would allow this area to move towards Proper Functioning Condition by promoting riparian/wetland vegetation and plant root systems, ensuring ground cover, eliminating bank trampling, and facilitating water storage. Plants on this undisturbed area would slow the runoff of water and promote its infiltration into the soil, allowing the water table to rise. A higher water table would eventually crowd out upland grasses and shrubs and allow for desirable riparian/wetland species to spread. There would be no impacts to willows from fall grazing as the willow community would be fenced inside the exclosure. This alternative would promote willow establishment and growth. Fencing was rated by Platts and Nelson (1989) as an excellent strategy to improve stream habitats.

Riparian/wetland improvement towards meeting Rangeland Health Standard #2 would occur under this alternative but would be slower than under Alternative One and would be dependent on effective livestock herding.

Alternative Three

Alternative Three would have the longest grazing season and authorize the largest number of cattle. The May 5th turnout date could be too early in some years to achieve plant growth past the point where grazing would not be detrimental to the plant. The riparian area in the North Dobie Flat Allotment would continue to receive some early spring grazing each year that could limit the amount of seedlings produced each year, which may not promote riparian area improvement. As described under Alternative Two, grazing later into the winter would not impact plant health, but would increase plant utilization and leave less material to slow water runoff.

Herding cattle away from riparian/wetland areas would be conducted under Alternative Three and impacts would be similar to those described under Alternative Two. The larger number of cattle would increase the need for timely livestock moves to minimize the potential for heavy grazing use to occur on these areas. A larger number of livestock may increase herding difficulty and increase the potential for failure.

Hot season grazing would occur more frequently in the North Blackjack Ranch pasture than under the other alternatives. Due to the large amount of riparian/wetland acreage and the terrain in this pasture, it would be one of the most difficult pastures to conduct effective herding. The potential for higher than intended grazing use increases in this pasture and could make riparian/wetland improvement slow.

Under Alternative Three, the North Blackjack Ranch pasture would receive 46 days of grazing, South Blackjack Ranch pasture would receive 35 days, North Diamond Springs pasture would receive 54 days, and South Diamond Springs pasture would receive 49 days. Unfenced riparian areas in the North Diamond Springs pasture would be managed like areas in the other pastures. No pastures would receive the 21 days or less of grazing recommended for riparian/wetland improvement. The number of grazing days in pastures containing the majority of the riparian/wetland acres would far exceed the recommended days to see improvement or maintenance.

The opportunity for plant regrowth following grazing is much more limited under this alternative due to the increased number of grazing days per pasture. Using a traditional rotation pastern, plant regrowth would occur on the pastures in the Blackjack Ranch and Diamond Springs Allotments approximately 2 or 3 years out of 10. The lack of regrowth during most years would greatly increase the risk of riparian/wetland impacts from spring runoff and reduce the amount of water infiltration into the system. This alternative would not provide residual cover during 75% of the years on any of the pastures.

As described under Alternative One, on years that fall grazing would be scheduled in the North Blackjack Ranch pasture, utilization of willows could result in damage to the plants or the loss of that year's seedlings. Based on the proposed schedule, fall grazing would occur in this pasture approximately 5 out of 10 years. The larger number of cattle would increase the risk of stream bank and riparian area trampling, resulting in slower improvement.

Riparian/wetland improvement would occur very slowly, if at all, under this alternative and would be highly dependent on effective livestock herding. The potential for areas not improving and not making progress towards meeting the Rangeland Health Standard #2 is greatest under this alternative.

Cumulative Impacts
No cumulative impacts to riparian-wetlands have been identified that would have effects that would vary among the alternatives.

Residual Impacts
No residual impacts to riparian-wetlands have been identified that would have effects that would vary among the alternatives.

EFFECTS ON WILDLIFE AND FISH

There are several impacts to wildlife and fish that could occur under all the alternatives. Forage competition between grazing animals could occur during winter or on years where vegetation production is low. Snow deep enough to make herbaceous vegetation unavailable could cause cattle to graze on sagebrush, affecting the quality and quantity of forage and cover needed by sagebrush-obligate wildlife. Livestock grazing on big game winter habitats could result in less forage being available for wildlife during the critical winter months. Wildlife trying to avoid livestock and human presence during the winter could expend critical energy reserves or start utilizing less suitable habitat.

Many species of wildlife depend on forbs to meet seasonal diet demands, particularly during the spring breeding/birthing period. Grazing during spring and early summer could affect the quantity and diversity of available forbs as cattle often select these plants when they are actively growing. Forbs consumed by cattle would be unavailable to wildlife during the critical May and June breeding/birthing period.

Grazing during the spring and early summer months could result in the trampling of nests of ground-nesting or low shrub-nesting birds, primarily during herding or moving of groups of cattle. It is expected that this would occur infrequently.

Alternative One

The installation of 5.9 miles of pasture division fence in the North Blackjack Ranch pasture and 7 miles of new exclosure fence in the North Diamond Springs pasture could affect big game movement in these areas. Antelope and mule deer migrate north and south in this area to reach seasonal habitats and the orientation of this fence would complement their migration movement. Movement caused by human, vehicle, and predator disturbance or fear are not necessarily north-south in nature, therefore the fence could limit or altar big game avoidance or escape patterns. Deep snow can prevent antelope from getting under the bottom wire, restricting their ability to reach winter habitat. Fence construction that does not allow for wildlife passage could prevent big game animals from transitioning between seasonal habitats resulting in additional habitat fragmentation within herd boundaries. Animals crossing the fence could get entangled in the wires resulting in injury or mortality.

Implementing a rest rotation grazing system would provide a pasture where forage and cover would be readily available for wildlife each year. Standing ungrazed grass plants would offer desirable nesting cover for birds. Pasture rest and early season deferment would encourage seedling establishment and increase hiding cover and forage in riparian and upland habitats for bird, small mammal, reptile, and big game species. Plant diversity would also improve as plants preferred by cattle would be allowed to reproduce in greater numbers. Increased plant diversity in both riparian and upland habitats would facilitate increased biodiversity of these areas.

Rested pastures would have increased herbaceous ground cover that would help to slow water runoff and increase water infiltration into the soil. Capturing additional rain and snow would help provide deeper moisture to sagebrush plants, resulting in improved vigor and annual growth. All sagebrush-obligate wildlife species would benefit from healthier sagebrush communities.

The willow community on East Fork Sage Hen Creek would improve under this alternative as it would receive 3 years of consecutive rest. Increasing the density and heights of willows would provide habitat for a variety of neotropical birds and other wildlife species. Taller and denser willow communities would increase shading of the stream and slow evaporative water loss, benefiting fish habitat. Increasing willows would increase the availability of suitable food for beavers and it is expected that they would eventually return to the system. The presence of beaver would enhance the fishery in this drainage. After the initial 3 years of rest, the proposed pasture rotation would have 2 years where grazing would be scheduled for 2 weeks after mid-August which is generally the time when willow grazing by cattle becomes a concern. Minimizing fall grazing would allow the pasture to continue to improve and reduce the risk of impacts from no herding.

Alternative One would have cattle grazing ending on December 6, which is the earliest end-of-season date of all the alternatives. This alternative would have the lowest risk for creating

conflicts with wintering wildlife. The June 5 turnout date would allow the majority of the pastures to achieve maximum forb growth before being grazed, promoting new plant recruitment and ensuring plants would be available for wildlife. Forbs are a very important component of the diet of antelope.

Alternative One should be successful at making progress towards meeting Rangeland Health Standard #4.

Alternative Two

There would likely be impacts to big game movement from the installation of an additional 2.6 miles of exclosure fence proposed under Alternative Two. Impacts to movement would be similar as described under Alternative One. East Fork Sage Hen Creek provides water, forage, and cover for many species of wildlife and fencing that would prevent animals from accessing this area may have adverse impacts to the overall health and recruitment of individuals and populations.

Early season pasture deferment would encourage seedling establishment and plant diversity in riparian and upland habitats on the four pastures that would be included in the rotation. Plant diversity would remain static or see a slight improvement in the North and South Dobie Flat Allotments. Biodiversity should increase on riparian and upland habitats experiencing improvement in plant community health and diversity.

Implementing a deferred rotation would increase herbaceous ground cover although it would be slower than under Alternative One. Increased ground cover would help to slow water runoff and increase water infiltration. Deeper moisture would benefit the growth and recruitment of sagebrush plants, ultimately benefitting sagebrush-obligate wildlife species.

The fishery and willow community on East Fork Sage Hen Creek would see the quickest improvement under this alternative. Excluding livestock grazing would allow plants to maximize growth and seed production each year. The benefits of improving the willow community and creek would be the same as described under Alternative One. The availability of a steadily improving and robust willow community should encourage beavers to return to the system within a few years. The potential for improving and maintaining a viable fishery in this section of creek would be greatest under this alternative.

Alternative Two has a greater risk of creating forage availability and/or competition problems with wintering wildlife than Alternative One, as it would permit grazing 16 days later into the season on antelope and mule deer winter range. Snowfall that makes herbaceous forage unavailable could cause livestock to graze sagebrush, resulting in potential forage competition with wildlife.

Alternative Two should be successful at making progress towards meeting Rangeland Health Standard #4 although progress will be slower than under Alternative One.

Alternative Three

No new fencing is proposed under Alternative Three therefore potential impacts to wildlife movement from additional fencing would not occur. This alternative would authorize grazing a month earlier in the year than the other alternatives so impacts from cattle selecting for forb species would be a concern.

Early season pasture deferment would occur on each of the Blackjack Ranch and Diamond Springs pastures 1 year out of 4. This deferment would allow plants to set seed in deferred pastures most years before being grazed. The longer grazing season would increase the number of years these pastures would not have adequate time for plant regrowth. This situation would increase the need for timely and effective herding as repeated hot season grazing could adversely impact riparian and upland plants, resulting in less habitat quality for wildlife and fish species.

The deferred rotation under Alternative Three would increase herbaceous ground cover slower than under Alternative One or Two due to the longer grazing period and larger herd size. It would take longer to increase ground cover that is needed to slow water runoff and increase soil infiltration.

Alternative Three would likely result in the slowest improvement in the willow community and fishery due to the length of time cattle would be in the North Blackjack Ranch pasture. This alternative proposes 54 days of grazing compared to the roughly 25 days under Alternative One and 44 days under Alternative Two. It is expected that the utilization move triggers would be implemented more frequently under Alternative Three than under Alternative Two.

The longer winter grazing season would increase the risk of creating forage availability and/or competition problems with wintering wildlife. Cattle would be in the North and South Dobie Flat Allotments until January 22 each year. These allotments provide winter and yearlong habitat for antelope and mule deer.

Alternative Three should make progress towards meeting Rangeland Health Standard #4 but progress would be slower than under Alternative Two and much slower than under Alternative One.

Cumulative Impacts

The placement of additional fencing within the Split Rock grazing allotments, in combination with fencing proposals in other parts of the Lander and Rawlins Field Offices to improve livestock management, could negatively impact antelope and mule deer movements, as they move to crucial winter habitats near Jeffery City and along State Highway 789. Antelope and mule deer would continue to be able to migrate to these crucial winter habitats, but new fencing could slow migration or change migration patterns.

Lander Field Office analysis determined that vegetation removal, trampling, and soil compaction near proposed fencing developments, combined with natural gas developments and large pipeline projects in the vicinity of Jeffery City would remove forage and habitat for wildlife species. At the present time, there are two existing uranium mining districts and four additional areas of

uranium exploration in the adjacent Green Mountain Common Allotment. No plans of development have been proposed for these resources so acres of habitat loss from mining activities are, as yet, undetermined. The likely impacts from these identified future developments will be analyzed in the NEPA documents associated with the projects.

Residual Impacts
Proposed fences would add to the number of fence wildlife must navigate to transition to their seasonal ranges and would result in additional incremental habitat fragmentation. Crossing or flying over fences adds a level of risk to animal movements. Striking or getting caught in the wires could lead to an increase in the number of wildlife injuries or deaths.

EFFECTS ON SPECIAL STATUS SPECIES

Alternative One

Impacts to riparian and upland habitats for Special Status Species would be the same as those described under Alternative One for Wildlife and Fish. Fencing additional riparian areas would improve riparian and aquatic habitats capable of supporting leopard frogs, which could result in larger populations. Improving and/or increasing habitats for sensitive plant and animal species would benefit overall population numbers. Healthy populations would help to keep these species from becoming listed as threatened or endangered.

Additional fencing could create a hazard to greater sage-grouse using the area. The Blackjack lek is located approximately 0.6 miles east of the proposed pasture division fence and sage-grouse flying to and from this breeding ground could strike the fence causing serious injury or mortality. The loss of birds could result in a decline in the overall number of birds in this population or cause the birds to vacate the lek. Reducing the number of grazing days would improve the associated nesting habitat around this lek. The rested pasture would offer excellent nesting and brood-rearing habitat as plant growth would be maximized and threats of nest trampling would be eliminated. Pasture rest and early season deferment would encourage seedling establishment and increase hiding cover and forage in both riparian and upland habitats used for nesting and brood-rearing. The grazing system would promote forb production and growth which are important for greater sage-grouse chick survival. The additional riparian exclosures in the North Diamond Springs pasture would increase the amount of wet meadow brood-rearing habitat in the allotment. This alternative would improve important habitat within Wyoming's Core Population Area for greater sage-grouse.

As described under Alternative One for Wildlife and Fish, sagebrush plants would benefit from additional moisture provided by increased water infiltration. Sagebrush is critical for greater sage-grouse forage and nesting and other sensitive sagebrush obligate species such as Brewer's sparrow, sage thrasher and dwarf shrew.

This alternative could benefit sensitive plant species, particularly Rocky Mountain twinpod populations. Periodic pasture rest and early season deferment would allow this plant to produce seed, resulting in the potential to increase the number of individual plants and the size of communities. Beaver Rim phlox and Cedar Rim thistle are typically not grazed by livestock,

therefore it is expected that these plant communities would remain static or see minimal population expansion.

Alternative One should be successful at making progress towards meeting Rangeland Health Standard Four.

Alternative Two

Impacts to riparian and upland habitats for Special Status Species would be the same as those described under Alternative Two for Wildlife and Fish. Excluding grazing along a portion of East Fork of Sage Hen Creek would increase the amount of available high-quality leopard frog and greater sage-grouse brood-rearing habitat.

Implementing a pasture deferred rotation would improve habitats for sensitive plant and animal species. As described under Alternative One, implementing a deferred pasture rotation would likely benefit Rocky Mountain twinpod populations. Providing periodic early season deferment would allow plants on those pastures to produce seed which should allow for reproduction opportunities.

Alternative Two should be successful at making progress towards meeting Rangeland Health Standard #4 but progress would be slower than under Alternative One.

Alternative Three

Impacts to riparian and upland habitats would be the same as those described under Alternative Two for Wildlife and Fish. No new fencing would occur under Alternative Three therefore no potential impacts to greater sage-grouse from additional fencing would occur under this alternative.

As described under Alternative One for Wildlife and Fish, the potential for sagebrush utilization by cattle increases under this alternative due to the longer winter grazing period. Cattle use of sagebrush is often harmful as they typically bite into the older parts of the plants, resulting in that part or all of the plant dying. These sagebrush plants would then be unavailable for greater sage-grouse forage or nesting.

Higher grazing utilization levels due to larger livestock numbers and a longer season of use would reduce the amount of acres having adequate residual cover suitable for nesting greater sage-grouse. The 28 days of fall grazing that would occur in the shipping pastures would likely cause this pasture to not meet the required residual grass height for nesting sage-grouse the following nesting season.

The deferred pasture rotation would likely benefit Rocky Mountain twinpod populations over time in the Blackjack Ranch and Diamond Springs pastures. The Dobie Flat pastures but would likely not see increases in the plant occurrence as they would continue to have spring grazing each year. Impacts to this species would be dependent on the turnout date in each pasture and the phenology of the plant on that year.

Alternative Three should make progress towards meeting Rangeland Health Standard #4 but progress would be slower than under Alternative Two and much slower than under Alternative One.

Cumulative Impacts
Cumulative impacts would be similar to those described under the Wildlife and Fish section. Management actions that delay or do not result in improvement of greater sage-grouse habitats could contribute to the need to list the species as threatened or endangered. Additional fencing projects constructed under Alternative One and Two combined with habitat loss and modifications from proposed (and potential) energy developments and utility corridors will increase the cumulative impacts to sage-grouse habitat within the Core Population Area.

Residual Impacts
Impacts would be the same as the residual impacts described for Wildlife and Fish.

EFFECTS ON CULTURAL RESOURCES

Alternative One

For all alternatives, the direct impacts that occur where livestock concentrate (e.g., at water sources) include trampling, chiseling, and churning of site soils, cultural features, and cultural artifacts, artifact breakage, and impacts from standing, leaning, and rubbing against historic structures, above-ground cultural features, and rock art. Indirect impacts include soil erosion, gullying, and increased potential for unlawful collection and vandalism.

Impacts from Alternative One to cultural properties within the Split Rock Ranch Allotments are predicted to be minimal. The proposed rest-rotation grazing system will reduce impacts from the continuation of existing management, and no known sites are considered threatened by continued livestock grazing. Overall, there would be a reduction in AUMs and season of use, which directly correlates to a reduction of impacts to sites near springs or creeks as the rate of trampling and soil churning from livestock use would be less. Pastures that are rested would have no impacts from livestock grazing during the rested years. Also, the rotation of use for each pasture will serve to reduce impacts to sites near springs and creeks since each pasture will only be grazed during the hot season part of the time. For example, the North Diamond Springs pasture will not be rested, but some years it will be grazed during the summer when livestock grazing most impacts the areas of high site potential near springs and creeks. Other years the North Diamond Springs pasture will be grazed late in the season when fewer impacts to cultural resources would occur.

The north-south fence bisecting the North Blackjack Ranch Pasture would also reduce impacts to cultural resources. The eastern pasture, containing Sage Hen Creek and the East Fork of Sage Hen Creek, has more known sites than the rest of the Split Rock Ranch Allotments that are near springs or creeks that could be impacted by livestock use. This pasture would be rested for 3 years initially, and periodically rested thereafter. With this rest, there will be less overall livestock use along the creeks of this pasture, resulting in reduced impacts to all sites along these

creeks. Construction of the north-south fence in the North Blackjack Ranch Pasture is expected to have minimal impacts to cultural resources. A Class III cultural resource inventory will be completed before fence construction begins, and all located sites will either be avoided or mitigated.

Fencing all riparian areas in the North Diamond Springs Pasture would also reduce impacts to cultural resources. Some springs in this pasture are already fenced off from livestock use. When sites were discovered around these springs, the fences were designed to completely or partially encompass these sites. As such, they are no longer impacted by livestock grazing in any way. This same strategy will be used when designing new fences around springs, resulting in additional sites being protected from any livestock grazing impacts.

Alternative Two

It is expected that impacts of Alternative Two to cultural resources would be similar to those identified for Alternative One and be less than the continuation of existing management. Reduced AUMs and season of use, the deferred-ration grazing system, and daily herding would lessen impacts to sites near springs and creeks. Sites along Sage Hen Creek and the East Fork of Sage Hen Creek would not see the physical protection provided for in Alternative One, but daily herding would work to reduce impacts to those sites. Additionally, an exclosure fence is proposed for a segment of the East Fork of Sage Hen Creek. Several known sites along that creek would be fenced off from livestock use altogether and would see no further impacts from grazing. Impacts from fence construction are expected to be minimal. A Class III cultural resource inventory will be completed before construction of the exclosure fence. If previously undocumented sites are found, the fence route will be altered to include all or part of the sites within the fence, protecting them from any further grazing impacts. Any sites that cannot be avoided by the fence route will be mitigated.

Alternative Three

It is expected that impacts from Alternative Three will be higher than the other two alternatives, though still not substantial. An extended season of use and higher AUMs will increase overall livestock use near springs and creeks where there is the highest site potential and occurrence of known sites. Only those sites currently fenced off from livestock use will see no impacts from increased grazing. Impacts to cultural resources from this increased livestock grazing are expected to be minimal to small. Upland sites are expected to see minimal impacts, while impacts to sites near springs and creeks will be somewhat greater. While impacts to those sites will still be gradual, the rate of impacts will be higher than in the other two alternatives. Over a period of decades, heavy grazing could damage many sites near water sources, such as destroying buried hearths along cutbanks. Such impacts would result in the loss of scientific data, but are unlikely to alter any sites so severely that they no longer are eligible for the NRHP. No range improvement projects are proposed under this alternative, so there will be no impacts to cultural resources from fence construction, spring development, or water trough placement.

Cumulative Impacts
In general, management actions associated with livestock grazing activities under all of the action alternatives within and outside the planning area are expected to affect relatively small localized areas and would not have measureable effects on cultural resources. Cultural sites that are fenced would exclude grazing, causing a small loss of available forage; however, this would occur on few sites. Restriction on surface disturbing activities near cultural sites could potentially result in modifications or relocation of range improvements. Through the implementation of utilization monitoring and active herding, long-term reductions in trampling and congregation near natural water sources and riparian areas would decrease impacts to cultural resources, causing a positive trend in their long-term preservation.

Residual Impacts
Residual impacts from grazing include gradual, minimal impacts to sites near creeks and springs. In general, these impacts are expected to be small, and are not expected to alter any aspects of integrity that make a site eligible for the NRHP. Upland sites are not expected to have any impacts from grazing. No residual impacts are expected from fence construction as sites will be avoided through project redesign whenever possible.

EFFECTS ON SOCIOECONOMICS

Alternative One

Adjustments in grazing operation to comply with the Wyoming Standards for Healthy Rangelands (USDI, BLM 1997) under Alternative One would likely cause a financial impact to the livestock operator. These adjustments would include changes in season or duration of use, the development of a new riparian pasture and several smaller riparian exclosures.

The reduction in AUMs under Alternative One would likely cause the operator to re-evaluate his operational strategy. The grazing program on federal lands within the four Split Rock Ranch allotments make up an insignificant portion of the overall economic makeup within Fremont County, therefore no significant local or regional socioeconomic impacts are predicted as a result of implementing this alternative.

Alternative Two

Socioeconomic impacts under Alternative Two are similar to Alternative One; however the overall reduction in AUMs is slightly more (34% versus 31%). As with Alternative One, local communities would continue to benefit from multiple-use management of public lands, including the grazing operation owned and operated by the Split Rock Holdings, LLC. Overall, the management activities proposed under Alternative Two would decrease forage extraction but would continue to provide the operator with flexibility and a stable ranching operation.

Alternative Three

Socioeconomic impacts under Alternative Three are not expected to result in any adverse impacts on the grazing operator. Local communities would continue to benefit from multiple-use management of public lands, including the grazing operation owned and operated by the

Split Rock Holdings, LLC. Overall, the management activities proposed under Alternative Three would increase forage extraction and other resource uses and would result in a more flexible and stable ranching operation than under Alternatives One and Two.

Cumulative Impacts
Economic conditions relate to the analyses of production, distribution, and consumption of goods and services. Economic conditions describe how individuals and communities participate in the exchange of goods and services by earning a living and consuming products and services they need and want. The BLM has the capacity, through its decision making responsibilities, to manage resource development within the Lander Field Office planning area and thereby influence the economy of the wider region. Approximately 58 percent of land in Fremont County is administered by State and Federal agencies, including BLM's Lander Field Office.

The Lander Field Office manages lands for livestock grazing in all five counties in the study area. There are 300 grazing allotment covering approximately 2.7 million surface acres of public land in the planning area. As of 2008, the Lander Field Office administered 60 grazing leases and 144 permits, consisting of approximately 280,372 animal unit months (AUMs). While the majority of AUMs are used by cattle, sheep and horses also are grazed on BLM lands.
With respect to social conditions related to ranching, where surface ownership is the primary consideration, management decisions of the Lander Field Office have more potential to impact conditions in Fremont County than Carbon, Hot Springs, Natrona, and Sweetwater Counties.

Socioeconomic impacts under all management alternatives are not expected to result in any adverse cumulative impacts on local or regional social conditions. Federally and State-managed lands make up approximately 87% of the land area within the four Split Rock Allotments. Local communities rely on public lands within Fremont County to maintain their economic livelihood and sense of place.

Residual Impacts
No residual impacts to socioeconomics have been identified that would have effects that would vary among the alternatives.

SECTION V - CONSULTATION AND COORDINATION

This analysis has been developed following consultation and coordination with the grazing permittee, state and local agency personnel, other affected parties, and interested members of the public. The following is a list of individuals and agencies that have been consulted as part of this planning effort:

Dallas Horton, Split Rock Holdings, LLC
US Fish and Wildlife Service
Wyoming Department of Agriculture
Wyoming Game and Fish Department
WDEQ - Water Quality Division
Western Watersheds Project
USDA Natural Resource Conservation Service
Popo Agie Conservation District

A more detailed list of Interested Publics for the Split Rock Ranch allotments is on file at the Lander Field Office, in Lander, Wyoming.

Interdisciplinary Team:
John Likins, Range Management Specialist
Sue Oberlie, Wildlife Biologist
Greg Bautz, Soil Scientist
Karina Bryan, Archeologist
Kristin Yannone, Planner
Connie Breckenridge, GIS Specialist
Rubel Vigil, Jr., Assistant Field Manager

GLOSSARY

Most of the following definitions are taken from *A Glossary of Terms Used in Range Management* published by the Society for Range Management. Also, USDA – NRCS *Rangeland Soil Quality Information Sheet* definitions were used. Other definitions are taken from the Grazing Administration Code of Federal Regulations, Chapter 43, Section 4100.0-5 or Bureau of Land Management manuals and technical references.

Basal cover (area): The cross sectional area of the stem, or stems, of a plant, or all plants, in a stand. Herbaceous plants are measured at, or near, the ground level; larger woody plants are measured at breast, or another designated, height.

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

Hydrologic cover: The sum of organic litter (dead plant parts, feces, etc.) and live vegetation basal area. Rock and bare mineral soil are not included.

Density of herbage (vegetative) cover: Consists of general estimates of overhead (vertical) ground cover for the current year's growth of all usable vegetation on a given range type. Density is recorded as the decimal proportion of the ground that is covered as viewed from directly above. Values for each species are obtained through composition estimates of the percentage of total density attributable to each. These two estimates are made concurrently as the examiner traverses the type.

Litter (organic): The fallen leaves, stems, bark, flowers, and seeds of trees, shrubs, forbs, and grasses; detached lichen; animal feces and dead insects and other animals; and unidentifiable amorphous woody organic matter (humic litter) lying on the mineral soil surface.

Noxious weed: A weed arbitrarily defined by law as being especially undesirable, troublesome, and difficult to control. In Wyoming the following plants are defined as *Noxious Weeds* according to the Wyoming Weed and Pest Control Act of 1973 [§§§§ 35-7-372]: *Field bindweed, Canada thistle, Leafy spurge, Perennial sow thistle, Quack grass, Hoary cress, Perennial pepperweed, Ox-eye daisy, Skeletonleaf bursage, Russian knapweed, Yellow toadflax, Dalmatian toadflax, Scotch thistle, Musk thistle, Common burdock, Plumeless thistle, Dyers woad, Houndstongue, Spotted knapweed, Diffuse knapweed, Purple loosestrife, Tamarisk (salt cedar), Common St. Johnswort, and Common tansy.*

Proper Functioning Condition (PFC): This refers both to a ***method*** for assessing riparian zones / wetlands and ***functionality rating***.

In performing the PFC ***method*** of assessment each riparian zone / wetland is judged against its *capability* and *potential* as characterized by three components: hydrology, vegetation, and

erosion/deposition (soils). Here the term *potential* refers to: *The highest ecological status a riparian –wetland area can attain…. Also, referred to as the" potential natural community".* The term *capability* refers to: *The highest ecological status an area can attain given political, social, or economic constraints which are often referred to as limiting factors.*

As a ***functionality rating*** riparian-wetland areas are functioning properly when adequate vegetation, landform, or large woody debris is present to dissipate stream energy associated with high water flows, thereby reducing erosion and improving water quality; filter sediment, capture bed load, and aid floodplain development; improve flood-water retention and ground-water recharge; develop diverse ponding and channel characteristics to provide the habitat and the water depth, duration, and temperature necessary for fish production, waterfowl breeding, and other uses; and support biodiversity.

Rangeland health: Rangeland health is the degree to which the integrity of the soil, the vegetation, the water, and the air as well as the ecological processes of the rangeland ecosystem are balanced and sustained.

Vegetative cover: The percent ground cover provided by all live vegetation (basal cover of grasses plus foliar cover of forbs and shrubs).

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APPENDIX # 1

SPLIT ROCK HOLDINGS, LLC
APPROPRIATE ACTIONS
GRAZING PERMIT TERMS & CONDITIONS
Page 1 of 2

1. Implement rest-rotation grazing system with seven pastures

-Establish new Agate Flats Allotment by combining Diamond Springs, Blackjack Ranch, North Dobie Flat and South Dobie Flat Allotments
-Three pastures in Blackjack Ranch Allotment - Northwest, Northeast, and South
    -Existing Ranch Pasture (private and state land) would continue to be used for branding, breeding, or shipping purposes
-Two pastures in Diamond Springs Allotment – North and South
-North Dobie Flat (Allotment)
-South Dobie Flat (Allotment)
-Continue to Use Alice and Frenchie Pastures for shipping and branding
-All pastures would be permanently fenced in accordance with BLM fence standards compatible for antelope, mule deer and elk ranges

2. Implement "recovery" grazing prescription within framework of AMP and grazing system

-Riparian Prescription – See Appropriate Actions for Recovery Prescription for Riparian Areas

-Upland Prescription – See Appropriate Actions for Recovery Prescription for Uplands

3. Implement "low stress livestock handling" intra-pasture herding

-Encourage ranch employees to attend a low stress livestock handling training session sponsored by a local conservation district

-Frequent herding (5 days per week)

4. Place mineral and salt only at designated locations

-Sites will be jointly determined on the ground with BLM and Split Rock Ranch

-Sites will be at least 0.5 mile from existing water sources

5. Properly operate and maintain all range improvements

-In accordance with cooperative agreements and range improvement permits to support grazing system

6. Modify existing grazing permit terms and conditions

-Change seasons of use for Diamond Springs, North Dobie Flat, South Dobie Flat and Blackjack Ranch Allotments to conform with attached rest -rotation grazing schedule

-Decrease permitted use in Diamond Springs Allotment according to results of suitability analysis

-Increase permitted use in Blackjack Ranch Allotment according to results of suitability analysis

RECOVERY PRESCRIPTION FOR RIPARIAN AREAS

1. Carefully control time and timing of grazing
2. Increase rest and recovery times
3. Reduce trampling on stream banks
    Mechanical/shearing/compaction impacts
4. Reduce intensity of herbivory
    Class of cattle (pairs vs. AU forage requirement)
5. Increase water storage in stream banks and sub-irrigated meadows
6. Develop higher water table and increase water storage by improving riparian and wetland soil health
7. Stop channel incision
8. Start aggrading incised channels
9. Remove and/or decrease dry land plants (juniper, sagebrush, greasewood, thistles) from riparian zone
10. Increase wetland/riparian plants (sedges, rushes, tufted hair grass, willows)
11. Widen floodplains

APPROPRIATE ACTIONS
RECOVERY PRESCRIPTION FOR RIPARIAN AREAS

1. Designate salt/mineral locations
    GPS locations (permanently mark with steel posts or containers)
2. Frequent herding (5 days per week) within pastures that have riparian areas
    Low stress livestock handling with horses
    No ATV's off road or trail for herding
3. Three day pasture rotation limits
4. Twenty day hot season (Hot season June 15 - September 15) grazing for Northeast and Northwest Blackjack Pastures
5. Thirty percent utilization limit on current annual growth for willow species
6. Six-inch minimum stubble height (green line or first terrace) after July 15th
7. Four-inch minimum stubble height (green line or first terrace) before July 15th
8. Maintain all spring protection fences during entire grazing season
9. Deferred-rotation grazing on all six pastures in year one
10. Rest rotation grazing on six pastures and rest one pasture in year two
11. Realignment/reconstruction of BLM Beaver Rim Road No. 2401 across West, Middle, Big and East Diamond Springs drainages

RECOVERY PRESCRIPTION FOR UPLANDS

1. Implement proper grazing intensity
    30-40% utilization on individual plants
2. Implement proper grazing frequency
    Proper time and timing of grazing
3. Implement proper grazing distribution at pasture level
    Herding, mineral placement, maintaining operational water sources
4. Reduce bare ground
5. Increase residual herbaceous cover for sage grouse habitat and for litter incorporation into soil surface
6. Increase ground cover
    -Increase basal cover of perennial cool season grasses and forbs (needleandthread grass, Indian rice grass, bluebunch wheatgrass, globemallow, vetches)
    -Decrease basal cover of Sandberg bluegrass, prairie junegrass, and threadleaf sedge
7. Increase plant vigor (size of perennial cool season grasses)
8. Reduce wind erosion
9. Reduce water erosion (overland flow, rills, gullies)
10. Increase water infiltration
11. Increase cool season bunch grass and forb density
12. Increase litter cover
13. Improve sagebrush age class distribution
    Increase younger plants
14. Build/aggrade top soil
    -Increase organic matter in A horizon
    -Increase thickness of A horizon

APPROPRIATE ACTIONS
RECOVERY PRESCRIPTION FOR UPLANDS

1. Apply suitability standards for upland range
    Distance from water, steep slopes
2. Determine suitable forage base
    Diamond Springs Allotment
        -Too far from water - West side, North along Beaver Rim,
    Blackjack Ranch Allotment
        -Steep and rocky slopes - Black Mountain, West Sagehen Rocks
3. Adjust stocking levels within pastures and allotments
4. Develop grazing rotation, plan and schedule for 2007-2013
5. Interim (2006-2013) plan
        -East/West Blackjack Division Fence
        -North/South Sagehen Division Fence

6. Long term (2014-2020) plan
    Range Improvements
        -Sagebrush treatment, juniper control
        -North Dobie Flat and South Dobie Flat pipeline extensions to accommodate hot season grazing
7. Maintain all existing fences, pipelines, wells and bird drinkers according to cooperative agreements and range improvement permits
8. Measure residual cover at key areas
9. Measure utilization levels at key areas
10. Measure vegetative production at five year intervals

MONITORING ACTIONS

1. North Dobie Flat Allotment
    Construct two upland study exclosures (300' x 300')
        Northeast site near boundary fence with Circle Bar Allotment
        Central site near C/T study
    Conduct long term vegetative production and cover measurements
    Correlate measurements for revising ecological site descriptions
        Sandy Ecological site
    Conduct infiltration and bulk density measurements inside and outside exclosure
    Complete Soil description/characterization – (Sample pH, EC, texture)
    Consult and coordinate with NRCS field personnel regarding ecological site and soil descriptions
2. Blackjack Ranch Allotment
    Establish additional rain gage(s) at bird drinker north of tank no. 7
    Establish additional riparian/aquatic studies with Wyoming Game & Fish Dept.
        Cross Sections – USDA Tech Reference GTR No. 47

WY050–EA09-035
TERMS AND CONDITIONS
Common Terms and Conditions

A) Grazing use will not be authorized in excess of the amount of specified grazing use (AUM number) for each allotment. Numbers of livestock annually authorized in the allotment(s) may be more or less than the number listed on the permit/lease within the grazing use periods as long as the amount of specified grazing use is not exceeded.

B) Unless there is a specific term and condition addressing utilization, the intensity of grazing use will insure that no more than 40% of the key grass species and 25% of the key browse species current year's growth, by weight, is utilized at the end of the grazing season for winter allotments and the end of the growing season for allotments used during the growing season. Application of this term needs to recognize recurring livestock management that includes opportunity for re-growth, opportunity for spring growth prior to grazing, or growing season deferment.

C) Failure to maintain range improvements to BLM standards in accordance with signed cooperative agreements and/or range improvement permits may result in the suspension of the annual grazing authorization, cancellation of the cooperative agreement or range improvement permit, and/or the eventual cancellation of this permit.

D) Storing or feeding supplemental forage on public lands other than salt or minerals must have prior approval. Forage to be fed or stored on public lands must be certified noxious weed-free. Salt and/or other mineral supplements shall be placed at least one-half mile from water sources or in such a manner as to promote even livestock distribution in the allotment or pasture.

E) Hazardous Materials: No hazardous materials/hazardous or solid waste/trash shall be disposed of on public lands. If a release does occur, it shall immediately be reported to this office at (307)332-8400.

F) Administrative Access: The permittee/lessee shall provide reasonable administrative access across private and leased lands to the BLM and its agents for the orderly management and protection of public lands.

G) Application of a chemical or release of pathogens or insects on public lands must be approved by the authorized officer.

APPENDIX 2
WYOMING DEPARTMENT OF ENVIRONMENTAL QUALITY
REFERRENCED LETTER CONCERNING AIR QUALITY

The State of Wyoming

Department of Environmental Quality

Jim Geringer, Governor

Herschler Building. 122 West 25th Street. Cheyenne, Wyoming 82002

ADMIN/OUTREACH (307) 777-7758 FAX 777-3610

ABANDONED MINES (307) 777-6145 FAX 777-6462

AIR QUALITY (307) 777-7391 FAX 777-5616

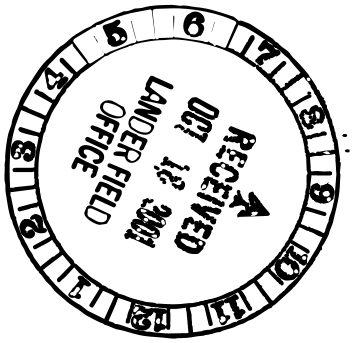
INDUSTRIAL SITING (307) 777-7368 FAX 777-6937

LAND QUALITY (307) 777-7756 FAX 777-5861

SOLID & HAZ. WASTE (307) 777-7752 FAX 777-5973

WATER QUALITY (307) 777-7781 FAX 777-5973

October 15, 2001



Mr. Greg Bautz
U.S. Department of the Interior Bureau
of Land Management Lander Field
Office
P.O. Box 589
Lander, Wyoming 82520-0589

Dear Mr. Bautz:

This letter is in reply to your letter dated September 5, 2001 requesting information on the ambient air quality levels for the Lander Field Office Area. In response to this inquiry, enclosed please find a copy of the latest annual account of Wyoming's Air Quality -Ambient Air Monitoring Data for 2000. This booklet provides a listing of all ambient air monitoring data gathered by stations in the Air Quality Division's statewide monitoring network. At the present time, Wyoming has one non-attainment area (City of Sheridan for PM10) for which a National Ambient Air Quality Standard (NMQS) has been established. Currently, all other areas in Wyoming where Division monitoring stations have been established are reporting levels below the applicable NAAQS.

Should you have any questions, contact me at (307) 777-3772.

~nl .& ~~ Sincerely,

Mon[illegible] m Manager

enclosure

APPENDIX 3

Rationale for computing Surface Acres Disturbed

TYPE IMPROVEMENT	ACRES DISTURBED PER UNIT
Spring development	2.6
Three-Wire fence (Use Area/Pasture boundary)	1.5/miles
Water well development & Troughs	1.8
Reservoir reconstruction	4.0
Exclosure (Artesian wells/wetland fenced)	0.75/miles

Appendix 4
Evaluation and Rating of Grazing Strategies for Stream Riparian Habitats
(Platts and Nelson 1989)

Strategy	Level to which riparian vegetation is commonly used	Control of animal distribution (allotment)	Stream bank stability condition	Brushy species regrowth potential	Seasonal plant rehabilitative	Stream-riparian	Rating
Continuous season-long (cattle)	heavy	poor	poor	poor	poor	poor	l_a
Holding (sheep or cattle)	heavy	excellent	poor	poor	fair	poor	1
Short duration-high intensity (cattle)	heavy	excellent	poor	poor	poor	poor	1
Three herd-four pasture (cattle)	heavy to moderate	good	poor	poor	poor	poor	2
Holistic (cattle or sheep)	heavy to light	good	poor to good	poor	good	poor to excellent	2-9
Deferred (cattle)	moderate to heavy	fair	poor	poor	fair	fair	3
Seasonal suitability (cattle)	heavy	good	poor	poor	fair	fair	3
Deferred-rotation (cattle)	heavy to moderate	good	fair	fair	fair	fair	4
Stuttered deferred-rotation (cattle)	heavy to moderate	good	fair	fair	fair	fair	4
Winter (sheep or cattle)	moderate to heavy	fair	good	fair	fair to good	good	5
Rest-rotation (cattle)	heavy to moderate	good	fair to good	fair	fair to good	fair	5
Double rest-rotation (cattle)	moderate	good	good	fair	good	good	6
Seasonal riparian preference (cattle or	moderate to light	good	good	good	fair	fair	6

sheep)							
Riparian pasture (cattle or sheep)	as prescribed	good	good	good	good	good	8
Corridor fencing (cattle or sheep)	none	excellent	good to excellent	excellent	good to excellent	excellent	9
Rest rotation with seasonal preference (sheep)	light	good	good to excellent	good to excellent	good	excellent	9
Rest or closure (cattle or sheep)	none	excellent	excellent	excellent	excellent	excellent	10
[a] Rating scale based on 1 (poorly compatible) to 10 (highly compatible with fishery needs							