Environment Assessment

WY-090-EA10-129

EVALUATION OF LIVESTOCK GRAZING IMPACTS:

Carter Lease Allotment

July, 2011

BLM

Kemmerer Field Office, High Desert District

The BLM's multiple-use mission is to sustain the health and productivity of the public lands for the use and enjoyment of present and future generations. The Bureau accomplishes this by managing such activities as outdoor recreation, livestock grazing, mineral development, and energy production, and by conserving natural, historical, cultural, and other resources on public lands.

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Chapter 1: Introduction

1.1 Background

The area which now comprises the Bureau of Land Management's (BLM) Kemmerer Field Office (KFO) was first settled in the 1860's. Although some farming likely occurred, pioneer settlers found the area to be more suited for the grazing of livestock than for subsistence farming based on the primitive and harsh conditions of the area. There is no documented intensive grazing management on what are now the public lands administered by the KFO and there were no established livestock numbers or seasons of use during this early settlement period.

After the enactment of the Taylor Grazing Act (TGA) in 1934, grazing allotments were created. The number and kind of livestock and the seasons of use were established for the area. In the 1960's range surveys were completed on the public lands to determine the amount of forage being produced. Following these surveys, grazing capacity for the allotments was adjudicated in consideration of critical management objectives (including, but not limited to, healthy rangelands and sustainable forage production).

The Carter Lease Allotment encompasses 257,313 acres (402 square miles) in southern Lincoln County and northern Uinta County, Wyoming. The northwest corner of the allotment is about three miles south and two miles east of the towns of Kemmerer and Diamondville, WY. The west edge of the allotment is about two to three miles east of US Highway 189. The southern and eastern borders of the allotment are defined by the southern and northern branches of the Union Pacific Railroad between Granger and Evanston and Kemmerer respectively. The northern border of the allotment is defined by a combination of the UPRR right-of way and the southern edges of the Hasset, Coyote Springs and Roberson Creek Allotments.

Uinta County adopted a Comprehensive Plan in 2002-2003 (Uinta County Planning Office 2003), which establishes guidelines for industrial, commercial, and residential developments. This plan emphasizes the value and need to conserve natural resources such as open space, wildlife, natural vegetation, soil, water and cultural resources. The plan also establishes County Policy for balancing the preservation of natural resources with developments and establishes goals for encouraging conservation of natural resources.

Lincoln County has a similar plan in place, (Lincoln County Comprehensive Plan, 2011). The latest Comprehensive Plan was adopted in 2011 and includes the following objectives and strategies:

- To support the wise use, conservation and protection of public lands and its resources including well-planned, outcome based, management prescriptions.
- To ensure management decisions are accomplished with full participation of the County and supported by tested and true scientific data
- To ensure public lands are managed for multiple use, sustained yield, and prevention of natural resource waste.
- To fully address the counties concerns and articulate them to the appropriate agencies, the County will work with other public land management agencies in a collaborative or cooperative manner.

1.2 Purpose and Need for the Proposed Action

Need: The BLM has a responsibility under the Taylor Grazing Act (TGA) of 1934 and the Federal Land Policy and Management Act (FLPMA) of 1976 to respond to applications for livestock grazing permits. In order to graze livestock on public land within the Carter Lease allotment a livestock operator must hold a valid grazing permit.

Purpose: The purpose of the action is to maintain livestock grazing opportunities for the Carter Lease allotment in a manner that will provide for multiple use and sustained yield.

Decision to be Made: The BLM will determine what (if any) changes need to be made to grazing management on the Carter Lease. These changes will be reflected on any grazing permits authorizing grazing on this allotment.

1.3 Conformance with Land Use Plan

This EA is tiered to the Resource Management Plan and Final Environmental Impact Statement (EIS) prepared during adoption of the 2010 Kemmerer Field Office (KFO) Resource Management Plan (RMP), as well as the Record of Decision and Approved Kemmerer Resource Management Plan. The proposed action would occur in an area identified as available for livestock grazing and is consistent with the land use plan decisions and resource management goals and objectives.

1.4 Relationship to Statutes, Regulations, and Associated Land Use Plans

All alternatives analyzed for this action conform to the 2010 KFO Resource Management Plan (RMP) and Record of Decision (ROD) (USDI, BLM, 2010b) and, by extension, all of the statutes and regulations that guided the decisions made while writing that document. The following list includes the laws that were of particular relevance in creating this document:

- Taylor Grazing Act of 1934 (TGA)
- Federal Land Policy and Management Act of 1976 (43 U.S.C. 1701) (FLPMA)
- Public Rangelands Improvement Act of 1978 (PRIA)
- Endangered Species Act of 1973 as amended (ESA)
- Section 106 of the National Historic Preservation Act of 1966 as amended (NHPA)
- National Environmental Policy Act of 1969 (NEPA)

43 CFR § 4100 Grazing Administration-Exclusive of Alaska authorizes BLM to issue grazing permits on identified allotments for periods of up to 10 years under the guideline that; "The authorized officer shall manage livestock grazing on public lands under the principle of multiple use and sustained yield." The following portions of 43 CFR § 4100 deal specifically with issuing permits and monitoring rangeland health:

- 43 CFR § 4130.2(a) which states, in part, "Grazing permits or leases shall be issued to qualified applicants to authorize use on public lands and other lands under the administration of the BLM that are designated as available for livestock grazing though land use plans."

- The Fundamentals of Rangeland Health (43 CFR § 4180) and Wyoming's Standards and Guidelines for Rangeland Health, address watersheds, ecological condition, water quality and habitat for special status species.
- BLM National Riparian Management Policy which states, in part, that riparian areas will be maintained in, or improved to, "Proper Functioning Condition".

1.5 Scoping

BLM sent an initial written scoping notice to permittees and affected Interested Publics on April 28, 2009. The scoping notice advised those on the mailing list of BLM's intent to conduct an analysis in preparation for renewing the grazing permits on the Carter Lease allotment. The responses from that letter were:

1. Larson Livestock, Inc. requested that the BLM convert permit #4900132 from summer cattle to summer sheep use at the 8:1 ratio used in 1971. He also requested that the grazing season be shifted forward 15 days to prevent a break in the allowed grazing season between April 30 and May 16.
   - This is addressed in Alternative 1.
2. DJR Land and Livestock (DRJ L&L) requested that the BLM convert their forage allocation [based on 4 shares of Western Wyoming Range, Limited Partnership (WWR, LP)] from only winter sheep use to allow either summer cattle or winter sheep use in any given year.
   - Full implementation of this request is addressed in Alternative 2 and partial implementation is addressed in Alternative 3.
3. Wyoming Department of Agriculture sent a letter reminding the Kemmerer Field Office of the BLM's multiple use mission and that the 'No Grazing Alternative' had been considered and eliminated under the recent RMP analysis and decision.
   - The No Grazing Alternative (4) is addressed in this document as evidence that the full range of alternatives were considered, as well as the impacts those alternatives would have on the natural and human environments.
4. Wyoming Game and Fish Department (WGFD) reminded the BLM that the Carter Lease permit contains important habitat for the Carter Lease Pronghorn Antelope herd, contains portions of the core habitat for Greater Sage-grouse, as well as some valuable habitat for the Uinta and Wyoming Range Mule Deer herds.
   - The wildlife populations present in the Carter Lease are listed in Chapter 3. The impacts to those populations that would likely result from implementing each alternative considered in this EA are addressed in Chapter 4.

   The agency expressed great concern over deteriorations in vegetation classes and conditions in the Carter Cedars area to the point that the area is no longer used by Mule Deer. WGFD provided BLM with photographs documenting stripped bark on juniper trees and severe use of the vegetative and woody understory species on private, and some public, land bordering Highway 412. They asked that the sheep camps be "constructed" outside the Carter Cedars area and the herds kept away until the understory vegetation had recovered.
   - The BLM has no authority to regulate use levels on private land. However, provisions addressing this area of concern on federal land are proposed in Alternative 3 (Proposed Action).

Game and Fish also expressed concern over the constriction of pronghorn movement caused by fencing and asked that pronghorn migration be considered in all future fence construction and/or maintenance. They suggested BLM 3-wire fences and offered to assist the KFO in identifying fences of concern.

- The Carter Lease has no internal fences except for those constructed by WYDOT inside the Highway 412 right-of-way. There are no fence construction or modification projects under consideration as part of this action.

The letter concluded by identifying the importance of riparian areas to both terrestrial and aquatic wildlife and how livestock management, both in and outside of riparian areas, can affect riparian area health.

- The current riparian conditions, and likely impacts to those riparian areas from each alternative considered in detail are discussed in Chapters 3 and 4 respectively.

5. The Secretary of WWR, LP contacted this office to point out that Permit 4900235 is based on two shares of WWR, LP which provide a total of 1152 active animal unit months (AUMs), not the 1212 listed in Table 2. A copy of the original 1971 adjudication for the Carter Lease was provided as evidence.
   - This issue will be handled separately from the re-authorization action and is not analyzed in this document

As a result of the requests by Larson Livestock, Inc. and DJR Land and Livestock, a second scoping letter was sent out on September 28, 2009 that included the conversions of livestock type. This letter received the following responses:

1. A phone call from DJR Land and Livestock pointed out that KFO had erred in the scoping letter. The scoping letter had identified the requested conversion as sheep-to-cattle only.
   - This EA will fully consider the dual (sheep or cattle) permit application.
2. A letter from WGFD reminded KFO of their May letter and added statements about their concerns over the sheep-cattle conversion leading to increased impact by summer cattle use on the vegetation, especially in the limited riparian areas. They asked that Proper Functioning Condition (PFC) be considered before any conversions are allowed in the Carter Lease. They also mentioned concerns over a straight conversion of 1 sheep AUM to 1 cow AUM.
   - The KFO RMP (USDI, BLM, 2010) requires all persons applying for a conversion in livestock kind have a management plan and range improvements in place to protect any riparian areas prior to application. DJR Land and Livestock (DJR L&L) did submit the documentation necessary to satisfy BLM that the plan and improvements are in place. Chapter 2, Alternative 2 details the process of how BLM determined the appropriate stocking rate. The discussions of Alternatives 2 and 3 throughout chapter 4 analyze the likely effects of converting four WWR, LP shares and one share, respectively.
3. Multiple emails were received from Western Watersheds Project (WWP). WWP advised KFO of literature sources related to domestic livestock grazing on public lands. They also asked BLM to carefully review regional sage-grouse populations and trend, as well as to be mindful of BLM and Wyoming Sage-grouse policy. WWP further requested the BLM-KFO to comply with the RMP and asked that BLM use only actual use reports for

the past 15-30 years to determine grazing impacts. They further expressed concern over a 1:1 conversion of sheep AUMs to cattle AUMs.

- This document does consider the effects of domestic livestock grazing on sage-grouse populations.
- This document is in conformance with the current RMP.
- As the Carter Lease is an M-Category allotment, actual use reports have not been required since the 1986 RMP, nor are they required at this time. In the absence of Actual Use Reports, the Billed AUM Records from the 1988 – 2010 grazing years were consulted.

Internally Identified Issues

4. Anticipated impacts of livestock grazing under current or identified alternative management systems on:
   - The functionality of the resources systems (Soils, Upland and Riparian Vegetation, Water Quality, Air) identified in the Standards of Rangeland Health.
   - Wildlife – big game, non-game and sensitive species that inhabit the Carter Lease during any part of their life cycle.
   - Cultural Resources
   - Livestock management programs of the Carter Lease permittees.
   - Social and economic impacts to the local communities.

Chapter 2: Proposed Action and Alternatives

This chapter describes the alternative development process and the alternatives carried forward and fully analyzed. The alternatives that will be fully analyzed are:

- Alternative 1- Continuation of Current Practices: (Analyze likely results of continuation or conversion of current leases to preserve current actual management).
- Alternative 2 - Increase Summer Cattle Use: (Analyze likely results of retaining all current cattle permits and fully authorize all pending sheep-to-cattle conversion).
- Alternative 3 – Proposed Action: (Authorize current cattle-to-sheep conversion request, partially authorize current sheep-to-dual use conversion).
- Alternative 4 – No Grazing Alternative: (Analyze likely results of canceling all current grazing permits).

The 2010 Kemmerer RMP ROD addressed conversion in livestock kind. The relevant portion, Decision 6017, states that livestock type conversions will be allowed in allotments that have riparian issues (which the Carter Lease does) only when a plan is approved to address riparian issues. Management actions and range improvements would have to be in place before such a conversion could be authorized and that the conversion may be authorized if it is determined that riparian habitats will be maintained or improved by the conversion.

This Environmental Assessment analyzes the likely effects of requested livestock type conversions.

- Alternative 1 addresses the likely results of maximizing likely sheep use, based on current existing and requested sheep use.
- Alternative 2 addresses the likely results of maximum foreseeable cattle use, based on existing and requested cattle use.

- Alternative 3 (Proposed Action) address the likely results of granting some, but not all of the requested livestock kind conversions with the addition of new use criteria to the terms and conditions to the permits authorizing grazing use on the Carter Lease Allotment.
- Alternative 4 (No Grazing) addresses the anticipated results of banning domestic livestock from the public lands within the Carter Lease

Alternative 1 – Continuation of Current "On-The-Ground" Management

This alternative would re-authorize or convert the existing grazing permits (see Table 2) for the Carter Lease Allotment with the appropriate Terms and Conditions to authorize the continuation of current actual management practices. Temporary, Non-Renewable (TNR) permits converting the summer cattle use authorized by permit #4900132 to spring and summer sheep use at a rate of 8 sheep per 1 cow (1.6 sheep AUM per 1 cow AUM) have been granted annually since 2004. These TNR permits have also shifted the beginning of the grazing season from May 16 to May 1 while similarly shifting the end of the season from Oct 15 to Sept 30. However, the permittee rarely makes use of the permit between June 15 and September 1. Therefore, the impacts observed on the ground reflect spring and summer sheep use rather than summer cattle use. This alternative would make the conversion permanent. Maintaining current management practices would also carry forward the Terms and Conditions attached to the current permits (listed below) without modification.

A. Carter Lease-Specific Terms and Conditions

1. Cattle use would be coordinated on an annual basis to provide the users with alternatives for watering sources that would provide adequate water sites away from the Little Muddy and Muddy Creeks.

2. All salt blocks must be located at least ¼ mile from any water source (USDI, BLM 2010).

3. No supplemental feeding or roughage would be allowed on public lands except where emergency conditions exist; then only by written permission from the Authorized Officer.

4. Wyoming State Law requires trichomoniasis testing for bulls in common use allotments. Documentation of trichomoniasis tests must be filed with the BLM at least 20 days prior to turn-out or bulls will not be authorized in accordance with 43 CFR 4130.7(B).

B. Other Terms and Conditions

1. BLM offers this grazing permit under 43 CFR § 4100 based on the permittees's recognized qualifications. The permittee is authorized to make grazing use of lands in this allotment, under the jurisdiction of the BLM and covered by this lease, upon acceptance of the terms and conditions of this grazing lease and payment of grazing fees when due.

2. The authorized officer for the BLM will specify the kind and number of livestock, the period(s) of use for the designated allotment (Table 2). The authorized livestock grazing use shall not exceed the livestock carrying capacity of the allotment.

3. Terms and Conditions of this grazing permit or lease may be modified if additional information indicates that revision is necessary to conform with 43 CFR § 4180

4. Permittee must maintain all assigned range improvements in good working order and in an aesthetic state. BLM encourages the permittee to participate in rangeland monitoring activities.

5. Permittee is required to obtain a trailing permit prior to trailing sheep across allotments other than those he is licensed on.

C. Monitoring
The BLM and the Permittees will participate in rangeland monitoring according to guidelines in the Wyoming Rangeland Monitoring Guide: A Cooperative and Voluntary Approach to Monitoring Rangelands (USDI 2001).

Alternative 2 – Increase Summer Cattle Use

This alternative would maximize summer cattle use by (Part 1) denying the requested cattle-to-sheep conversion of permit no. 4900132 (49 cattle; 441 AUMs at 100%PL) and (Part 2) authorizing the current DJR L&L-requested conversion to convert 4 WWR, LP shares' worth of winter sheep use (5360 sheep, 2288 public AUMs at 43% PL) to dual use (either sheep or cattle). If the applicant were to use the entire conversion for cattle, it would authorize a maximum of 532 cattle (1271 public AUMs at 43% PL). The livestock kind conversion would be in compliance with the RMP ROD because the existing, operator-committed method of utilizing portable steel tanks (see section 3.7a) filled by a water truck..

The cattle AUMs for the dual-use conversion were arrived at by the following process: The original adjudication books recorded only sheep AUMs on the federal land. However, both cattle and sheep carrying capacity numbers were recorded for the state and private acres owned by WWR, LP. It was assumed that the state and private sections were, on the average, equivalent to the federal sections. The total private land cattle AUMs and sheep AUMs within the boundary of the proposed use area were compared and a ratio of 1.8 sheep AUMs to 1 cow AUM was arrived at. The sheep AUM total (2288 AUMs) from 4 shares of WWR, LP was divided by 1.8, arriving at 1271 public AUMs, which was allocated over the proposed grazing season (5/16-10/31) at 43% PL. With the following exceptions, all other permit Terms and Conditions would remain the same as Alternative 1.

1. The permittee and the KFO would establish exclusion cages at reasonable sites throughout the proposed DJR L&L use area to monitor utilization levels of the upland vegetation. The cage locations would be moved within the broader sites each year to avoid creating artificial microsites with plant and soil conditions that no longer represent the conditions outside the cages. The applicant should monitor the utilization levels when he trucks water to the tanks. The cattle will be moved when the calendar move date arrives or the average plant height outside of the cages reaches 50–60% of the ungrazed vegetation inside the exclusion cages (whichever comes first). When the season end date arrives, or use in the final pasture of that years' rotation reaches the move criteria, the cattle should leave the allotment.

2. Established WWR, LP monitoring transects in the proposed use area would be read every four to five years to monitor long-term trend. If it is determined that additional transects

may be necessary, the permittee, any consultant they may hire, and BLM would cooperate in the site selection.

3. If apparent signs of resource damage or decline are observed, the BLM would suspend further use of this cattle permit and cause the cattle to be removed immediately. At the discretion of the Authorized Officer, the cattle permit would either be suspended until the resource has recovered, or converted back to winter sheep use at the original authorized level.

Alternative 3 – Proposed Action

Analysis of Alternative 2 (See Chapter 4) indicates that converting all four shares could have undesired effects and that converting fewer WWR, LP shares would be prudent. As it is safer for the affected environmental components to slowly increase the number of animals rather than reduce once damage is detected, it was decided to start with the conversion of a single share. Once BLM judges that it knows just what the affects of converting a single share are, it will be better able to project what the potential impacts of additional conversions may be. Therefore, additional conversions will be analyzed on the basis of known impacts and allow BLM to minimize the risk to the Carter Lease Resources.

This alternative preserves most of the current Carter Lease livestock management practices (see Alternative 1). The existing effective conversion of summer cattle-to-spring and summer sheep use is made permanent. The applied-for conversion of winter sheep use to dual use would be partially granted because the required management plan to protect the riparian areas and provide water sources (portable water tanks) required by the RMP ROD is in place and has proven successful in the past (See section 3.7.a). This approval would be granted with the following conditions attached to the approval:

1. The cattle authorized by this decision would utilize DJR L&L's current, operator-committed use of using portable steel tanks for water-controlled movement used by the applicant during past TNR Conversions (See Section 3.7.a; page 20).

2. The KFO would authorize conversion of one WWR, LP share's worth of preference to dual-use at the rate of 1.8 sheep AUMs to one cow AUM. This authorizes the applicant to run 133 cattle over a 169-day grazing season (5/16 – 10/30). The cattle would consume a total of 744 cattle AUMs. When multiplied by 43% (Public Land), 320 public cattle AUMs would be available should the applicant choose to make use of the cattle option.

3. The permittee and the KFO would establish exclusion cages at reasonable sites throughout the proposed DJR L&L use area to monitor utilization levels of the upland vegetation. The cage locations would be moved within the broader sites each year to avoid creating artificial microsites with plant and soil conditions that no longer represent the conditions outside the cages. The applicant should monitor the utilization levels when he trucks water to the tanks. The cattle will be moved when the calendar move date arrives or the average plant height outside of the cages reaches 50–60% of the ungrazed vegetation inside the exclusion cages (whichever comes first). When the season end date

arrives, or use in the final pasture of that years' rotation reaches the move criteria, the cattle should leave the allotment.

4. Established WWR, LP monitoring transects in the proposed use area would be read every four to five years to monitor long-term trend. If it is determined that additional transects may be necessary, the permittee, any consultant they may hire, and BLM would cooperate in the site selection.

5. If apparent signs of resource damage or decline are observed, the BLM would suspend further use of this cattle permit and cause the cattle to be removed immediately. At the discretion of the Authorized Officer, the cattle permit would either be suspended until the resource has recovered, or converted back to winter sheep use at the original authorized level of 576 public sheep AUMs. In this instance, an apparent sign is defined as: Composition of indicator grass species shows a decrease equal to or greater than 10% on existing WWR, LP transects in the proposed use area, the creation/expansion of denuded areas that extend more than 10 feet from any water tank sites or salt licks, or the formation/ of new, or expansion of existing, gullies in the proposed use area due to cattle use.

This alternative also incorporates Annual Grazing Adaptive Management by adding the following In-Season Triggers and Endpoint Monitoring Indicators to the Carter Lease permit language for Spring Sheep and Summer Cattle:

- An average of 5" – 7" stubble height of sedges and rushes in riparian/wetland areas should remain at the end of the summer grazing season. If the riparian stubble height, reach the move-on-use or end-of-season trigger point(s) prior to the traditional end-of season date, the permittees should move or remove their livestock immediately (See Trigger and Endpoint section below).

- Upland community grass stubble should average 50%-60% (or more) of that season's potential vegetative height for key grass species at the end of the summer grazing season. If the utilization level for the Key Upland Species (Indian Ricegrass, Needle & Thread grass and Thickspike Wheatgrass) reach the move-on-use or end-of-season trigger point(s) prior to the traditional end-of season date, the permittees should move or remove their livestock immediately (See Trigger and Endpoint section below).

Additional Terms and Conditions are incorporated to control or mitigate potential impacts that may result from either winter or spring/summer sheep use:

- Sheep camps and salt and/or mineral supplement placement sites will be at least ¼ mile away from water troughs, riparian areas, cedar stands, sensitive plant species, and historic trails and monuments or other identified culturally important areas..
- Sheep herds will not be allowed to loiter in riparian areas. If watering at springs or creeks is necessary, the herders may bring the flock in to water. They would then push the animals well away from the riparian area once all the animals have watered.

- No sheep camps or other disruptive human activity will be permitted within 6/10 (0.6) mile of active sage-grouse leks between 8pm and 8am during the March 1 – May 15 1ekking season to prevent disruption of grouse display and breeding activities.

Reasoning for new Spring Sheep/Summer Cattle Annual Grazing Adaptive Management Triggers and Endpoints:

- It is not appropriate to implement vegetative use levels as Terms and Conditions (University of Idaho, 2004, U.S. Dept of Interior, BLM, 2005) when the criteria are not absolutely essential to achieve management goals. Given that the Standards and Guides assessments of 2003 and 2010 determined that the Wyoming Standards for Rangeland Health had been met for all criteria with the exception of the springs' riparian areas, altering the upland use levels and riparian stubble height may not be essential to achieve S&G compliance. However, these criteria should improve the resilience and recovery rates for all components of both riparian and upland communities. Therefore, Alternative 3 (proposed action) is incorporating both riparian stubble height and upland use levels as triggers (which are intended to prompt the permittees to change the current use area) and endpoints (which are intended to prompt removal of livestock from the allotment). Though stubble height of riparian species (such as sedges and rushes) is not the only factor in maintaining bank stability or sediment capture, it is a very important indicator of acceptable use levels (Hall and Bryant, 1995). The weight of research-based evidence indicates that 10 cm (4 in.) is the minimum height necessary for sustained bank stability under prolonged flow (Warren and Leininger, 2000). The Muddy Creek and Blacksfork River reaches are universally 'F' channel types, (entrenched floodplain). Little Muddy and Dry Muddy Creeks are much closer to 'G' channel types with very limited to no floodplain development (University of Idaho, 2004). While Muddy Creek has a good amount of floodplain development in the form of point bars and limited channel-side floodplains, the Blacks Fork appeared to have lost most of its floodplains (2010 PFC, Appendix 4). Due to non-existent to limited floodplain development inside the Little Muddy and Dry Muddy channels, high flow events, and their associated energy, are often trapped and unable to disperse the impact they carry. Because the channels are almost entirely in fragile alluvial soils, and therefore rely solely on vegetation for protection, additional stubble height may be needed to ensure long-term stability. Because cattle grazing patterns are not uniform, an average stubble height over 300' greenline transects may be the most practical solution until WWR, LP and BLM agree on placement of permanent Winward Greenline or Multiple Indicator Monitoring (MIM) Designated Monitoring Areas (DMAs) for long-term trend studies.

- Similarly, sustaining the health of upland herbaceous species, particularly in dry environments, requires the plants' root masses to be maintained so that the plants may maximize capture of any precipitation. The short growing season and frequent summer dry periods in the high desert, in addition to the physiology of many native grasses, produces grass communities that are relatively intolerant of heavy grazing pressure. Research (Sheley and Svejcar, 2009) found that repeated defoliations of Bluebunch Wheatgrass can reduce the species' growth and ability to compete for resources. Similarly, some varieties of Indian Ricegrass show reductions in root crown biomass following repeated defoliations, (Orodho and Trlica, 1990). A 50% by height use standard for upland grasses corresponds roughly to 'Moderate' use (30%-40% utilization by weight). Moderate

use levels are considered to sustainable use levels that allow forage species to retain enough of the current year's standing crop to maintain soil productivity, livestock diet quality, wildlife habitat, forage plant vigor (including healthy root growth). Limiting upland use to 40-50% (of potential height) also accommodates varying growth potential due to climatic conditions. The threshold for Moderate (sustainable) use levels by vegetative communities are: Salt Desert Shrub (25-35%), Semi-Desert Grass and Shrubland (30-40%) and Sagebrush Grassland (30-40%) (Holochek, 1988). Since cattle use is very sparse in Salt Desert Shrub environments, retaining 50%-60% by height standard is likely to be a valid measure for acceptable upland use levels in this allotment.

The DJR L&L upland use area will be monitored according to the provisions mentioned above. The remaining summer cattle use is likely to occur in the vicinities of the Carter Lease creeks and livestock-accessible springs. Use monitoring for these other areas will consist of small (approximately 4' X 4') exclusion cages near the agreed-upon riparian monitoring sites. The cages would provide both BLM and the permittees a reference for actual growth at the sites, allowing them to quickly estimate or measure what the current use levels are at each area. The cages would be moved on an annual basis to avoid creating artificial protected 'microsites' within the cages, surrounded by magnified impact sites (due to cattle scratching on the cages), that no longer reflect the conditions in the surrounding area.

Although utilization levels may vary from year to year, utilization levels which consistently exceed 50% use (by height) would not be expected to meet watershed and vegetation management objectives for Carter Lease.

- Carter Lease does have some INNS species present (See INNS section in Appendix 5). Of these plants, Cheatgrass (Downy Brome or *Bromus tectorum*) carries the highest probability of becoming a threat to the health and productivity of the allotment as a whole. Because Cheatgrass can sprout both in early spring and fall (moisture permitting) it is capable of taking advantage of both fall and spring precipitation. Cheatgrass can use surface to shallow moisture either before or after the existing native plants, or their seeds, are actively growing; "cheating" them of the valuable surface moisture resource and hindering their ability to expand, reproduce and withstand the stresses from livestock grazing (University of Nevada, 1987). Literature indicates that strategically-timed livestock grazing can reduce the competitiveness of, and seed production by, existing cheatgrass stands. Therefore, any early spring-to-summer sheep use authorized by Alternative Three may be taken in an intensive-grazing program where the sheep are held in tight groups atop cheatgrass infestations.

Reasoning for new winter and spring sheep use Terms and Conditions:

- Sheep camps and supplements, like water sources, create a zone of magnified impact to both the vegetation and soil surface. Placing the attraction at least ¼ mile from other attractions, sensitive sites or identified culturally important areas should protect those areas from the magnified impact. There may be ongoing degradation in the juniper stands within the Carter Lease as WGFD expressed concerns about understory depletion in the Carter Cedars area that the agency believes may be the result of impacts from sheep camps and

grazing within the wooded area. Adding this condition may provide the understory vegetation in public lands the opportunity to recover.

- During Greater Sage-grouse breeding season (March 1 to May15), the birds gather around leks (natural or man-made openings within the sagebrush community) (Cagney et al. 2010). The surrounding area up to 0.6 miles from the leks is used for mating, feeding, resting and cover (Cagney et al. 2010). Construction, drilling and other surface disturbing and disruptive activities could disrupt the breeding activities of sage-grouse; therefore, the 2010 KFO RMP Decision #4041 (USDI 2010a, 2010b) established a ¼ mile buffer around the leks to protect the courtship and mating process. On December 29, 2009, the Wyoming Instruction Memorandum (IM) WY-IM-2010-012 (Greater Sage-Grouse Habitat Management Policy on Wyoming Bureau of Land Management (BLM) Administered Lands including the Federal Mineral Estate) was signed by the State Director of the Wyoming BLM (USDI 2010e). This IM instructed the BLM Wyoming Field Offices to consider and evaluate the following sage-grouse habitat conservation measures related to timing, distance, and density for all proposed projects both within and outside of Core Areas;

    - Sage-grouse leks inside Core Areas: Surface disturbing activity or surface occupancy is prohibited or restricted on or within a six tenths (0.6) mile radius of the perimeter of occupied or undetermined sage-grouse leks.

      Disruptive activity is restricted on or within six tenths (0.6) mile radius of the perimeter of occupied or undetermined sage-grouse leks from 6 pm to 8 am from March 15 – May 15.

    - Sage-grouse leks outside Core Areas: Surface disturbing activities or surface occupancy is prohibited or restricted on or within one quarter (0.25) mile radius of the perimeter of occupied or undetermined sage-grouse leks.

      Disruptive activity is restricted on or within one quarter (0.25) mile radius of the perimeter of occupied or undetermined sage-grouse leks from 6 pm to 8 am from March 15 – May 15.

    - Sage-grouse nesting/early brood-rearing habitat inside Core Areas: Surface disturbing and/or disruptive activities are prohibited or restricted from March 15– June 30. Apply this restriction to suitable sage-grouse nesting and early brood-rearing habitat within Core Areas.

    - Sage-grouse nesting/early brood-rearing habitat outside Core Areas: Surface disturbing and/or disruptive activities are prohibited or restricted from March 15– June 30. Apply this restriction in suitable sage-grouse nesting and early brood-rearing habitat within mapped habitat important for connectivity or within 2 miles of any occupied or undetermined lek.

- Sage-grouse winter habitat/concentration areas: Surface disturbing and/or disruptive activities in mapped or modeled sage-grouse winter habitats/concentration areas that support Core Area populations, are prohibited or restricted from November 15–March 14.

Surface disturbing and disruptive activities are defined in the WY BLM Information Bulletin (IB) *Guidance for Use of Standardized Surface Use Definitions* (WY IB 2007-029) (USDI 2007). For non-emergency actions, to determine if activity proposed in sage-grouse nesting habitats is "disruptive", the activity would require people and/or the activity to be in nesting habitats for durations of 1 hour or more during a 24 hour period during the nesting season in a site-specific area. The IM also directed the field offices to account for anthropogenic features from development and transmission on the landscape and analyze any development actions. These development actions must analyze, in the site-specific or project-level National Environmental Policy Act (NEPA) documentation, an alternative that limits development to one disturbance location per 640 acres within the State's Core Areas to coincide with the Governor's Executive Order (EO 2008-2). The disturbance criteria set in the IM are;

- maintenance of sagebrush communities by maintaining or reducing the existing level of density of energy production and/or transmission structures on the landscape, or

- to not exceed one energy production location and/or transmission structure per 640 acres. The one location and cumulative value of existing disturbances in the area will not exceed 5 percent of sagebrush habitat within those same 640 acres.

As observed, or noted, from the above information, the IM was focusing on project development. Subsequently, the Wyoming BLM issued WY-IB-2010-22, Grazing Influence, Management, and Objective Development in Wyoming's Greater Sage-grouse Habitat (USDI 2010d). This IB was transmitted in lieu of setting statewide policy for livestock grazing management within sage-grouse habitats and described in IM WY No.2010-012. The IB attached the University of Wyoming Bulletin B-1203 (Cagney et al. 2010) and directed the document should be used as a Wyoming BLM approved source of information for managing livestock grazing. This IB instructs federal land managers on proper stocking rates, habitat transition and season of use, but does not discuss distance or disturbance requirements for typical grazing regimes.

The project area contains both sage-grouse "core areas" and non-core habitat for sage-grouse (EO 2011-5). Enforcement of 0.6 mile from the perimeter of an occupied lek within "core" and 0.25 mile outside of "core" would place an extra management burden on both the BLM and the permitees. Therefore, to stay consistent throughout the allotment with the sage-grouse strategy and for management purposes, sheep camps or other disturbing and disruptive human activities would not be permitted within 0.6 mile of the perimeter of an occupied sage-grouse lek between 8pm and 8am during the March 1 – May 15.

Alternative 4 - No Grazing; Cancel or Allow Existing Permits to Expire.

Under this alternative, the existing Carter Lease grazing permits would be canceled or allowed to expire without renewal and BLM would require the permittees to remove livestock from the allotment. Under this alternative, livestock grazing on the Carter Lease would not be authorized by the BLM and none of the available forage on BLM lands would be allocated to livestock. BLM would not collect fees associated with the grazing permits. BLM would have limited regulatory and land management authority on this allotment if the grazing permits were not renewed. Implementation of this alternative would not allow BLM to meet its legislative mandates under the following federal laws:

1) The TGA of 1934 provides the basic legislative authority for livestock grazing on public lands, with provisions for protection of the lands from degradation and for orderly use and improvement of public rangelands. The TGA established a system for the allotment of grazing privileges to livestock operators based on grazing capacity and use priority, and for the delineation of allotment boundaries. It also established standards for rangeland improvements and implemented grazing fees.

2) FLPMA and PRIA mandate the management of public land for multiple use and Sustained yield. Specifically, the regulations implementing these acts call for rangeland management strategies that provide forage for economic use as well as for the maintenance or restoration of watershed function, nutrient cycling, water quality, and habitat quality.

3) The Kemmerer RMP/Final Environmental Impact Statement (FEIS) has been finalized and the ROD was signed in May, 2010. The FEIS can be reviewed on the BLM web site. BLM's Proposed Action in the FEIS (USDI 2010a) demonstrates that livestock grazing is appropriate on designated lands in the KFO based on analysis and decision.

However, to create a basis for a comparison of ecological impacts, KFO is comparing the likely impacts of a no-grazing alternative to the available action alternatives.

Chapter 3: Affected Environment

Through the Standards and Guidelines (S&G) for Livestock Grazing Management for the Public Lands in the State of Wyoming (USDI 2010c), Wyoming BLM strives to manage the four fundamentals of rangeland health (watersheds, water, nutrient, and energy cycles, water quality and habitat for special status species.

BLM determined the following issues were not relevant, or not likely to be affected by, the renewal of these grazing permits and were excluded from further analysis in this document: Fire and Fuel Management (due to limited availability of fine fuels needed to carry a fire), Areas of Critical Environmental Concern, Wild and Scenic Rivers (absent from Carter Lease), and Environmental Justice (Absent). The following issues are analyzed in more detail due to their relevance to renewal of grazing authorizations on the Carter Lease.

Recreation (limited availability due to land-ownership patterns inside Carter Lease), Lands and Realty (unaffected by grazing policies) and Minerals are discussed only in Chapters Three and Five because they are not affected by livestock grazing policies. However, they can or do affect livestock grazing, as well as the Cumulative Impacts that affect Carter Lease.

3.1 Biological Resources

3.1.a Invasive, Non-Native Species (INNS)

INNS Species are exotic plant species that possess the ability to out-compete native species in their natural habitat, contribute to the decline of both native plant populations and any wildlife that depend on them. The primary INNS of concern in the Carter Lease Area are: Tamarisk (Salt Cedar), Halogeton, Downy Brome (Cheatgrass), Musk and Canada Thistles, and Black Henbane (See Appendix 5). These plants are typically found in or near disturbed areas or places where the native species are stressed and less able to compete.

3.1.b Riparian and Wetland Vegetation

Conditions of riparian areas are evaluated using a PFC Assessment. Assessments conducted in 1998 found that both Little Muddy Creek and Muddy Creek (on public lands) were Functioning at Risk (FAR) with Trend Not Apparent. A 2003 S&G analysis of the Carter Lease allotment found that the streams and creeks in the allotment met the standards, while the springs did not.

PFC assessments of Little Muddy and Muddy Creeks, as well of the portions of the Blacks Fork River within the Carter Lease, were conducted in July of 2010. These assessments found the Little Muddy Creek to be FAR, with an upward trend. The Muddy Creek segments were found to be FAR with trend not apparent, while the Blacks Fork River segments were judged to be FAR with an apparent downward trend. Little Muddy Creek showed signs of improving vegetative and hydrologic condition. Muddy Creek was found to be exhibiting an improving vegetative trend though the hydrology was thought to still be questionable. The Blacks Fork segments were questionable on both vegetative and hydrologic features. It is quite possible that the high levels of both erosion and sedimentation caused by the extraordinary runoff levels experienced in 2010 exaggerated the appearance of sedimentation and erosion, negatively impacting the team's assessments of the Muddy Creek and Blacks Fork River.

One spring near the Little Muddy Creek in the NE ¼ of the SW ¼ in Section 10 – Township 18 North– Range 115 West (NESW S10 – T18N – R115W) was assessed by this team and found to be FAR, with Trend Not Apparent. This wetland area showed high levels of forage utilization, the spring source and much of the wet area was heavily trampled, with extensive hummocking and post-holing. The trampling seemed to have diverted the surface flow water from its former course; Water was observed to be flowing into a dry saline upland community while the soil surface in the sedge/rush community of the former flow area appeared to be drying.

PFC assessments of the other springs within the Carter Lease were conducted in August of 2010. It was found that all of the springs were either FAR or Non Functional. All except Roberson Spring and a small spring in S4 – T18N – R116W were found to be in a downward trend, with high levels of forage utilization, trampling, hummocking and evidence of channelization and drying of formerly wet areas. The spring at NENW, S10 – T19N – R115W was found to be little more than mingled water-and-mud in a bare dirt circle. Roberson Spring seemed to consist of a series of small pools in the bottom of an incised drainage. The area showed almost no evidence of cattle use, minor levels of use by antelope and no apparent trend. The Section 4 spring appears to be almost unused, yet there are no sedges, rushes or other expected riparian vegetation

species. It is possible that the water has a chemical content that makes it incompatible with most vegetation or animal use.

A small spring in SENW, S18 – T19N – R113W was visited by two KFO staff members prior to the August, 2010 PFC assessment tour. They found it to be in a state of degradation similar to the spring in NENW, S10 – T19N – R115W. Because time was limited during the August PFC Assessments, this spring was not visited by the full team.

All members of the spring assessment ID team agreed that all of the springs currently used by livestock need be protected (see Appendices 3 and 4). . The teams also agreed that Mulkay Spring, Little Round Mountain Spring and the spring at NWNW, S24 – T20N – R116W could feasibly be developed with spring boxes, pipes and gravity-fed tanks. The exclosures should protect the springs and surrounding wetlands from livestock impacts, while the developments would still provide water sources for domestic livestock away from the springs. See Appendix 4 for full write-up of 2010 Carter Lease PFC Assessments.

3.1.c Upland Vegetation

Desert shrub- and Wyoming big sagebrush-dominated communities make up the vast majority of the vegetation in the Carter lease, with some shrub-dominated riparian found along the Muddy Creek and Blacks Fork River riparian zones. Some juniper woodland sites are found in the southwest portion of the allotment on the steep or rocky hills. Isolated greasewood fans and flats can be found in the Carter Lease as well as occasional badlands/bare rock/soil sites.

The dominant private landowner, WWR, LP established 38 permanent upland vegetation composition transects in 1984 on 38 of their private sections throughout the Carter Lease Allotment. Of these, 27 are still in place and undisturbed (See Appendix 1, Figure 2). These transects are read at intervals by a private range consultant. Twenty-seven of these sites, on six different ecological sites, were all sampled in 1984, 1998 and 2007. In comparing the condition scores (which compares % composition of the current plant community species with Potential Natural or Climax Plant Communities.) from each year, a change of 10% or more was considered to be 'significant' for the purposes of determining trend (Laycock, 2008). Based on this criteria, six sites had an upward trend from 1984 to 2007, twelve showed no trend, and nine had a downward trend. The author of the study points out that "A significant drought occurred in the Carter Lease area in 2006 and 2007, as well as two of the previous four years (2002-2005), which may have impacted apparent condition on the ground in 2007" (Laycock, 2008). Since there are no internal fences in the Carter lease, with the exception of the ROW fences along the Carter Highway (Highway 412), it is presumed that the transect readings reflect not only the conditions on the private land where they are located, but also indicate the conditions on the neighboring federal lands as well.

The 2003 and 2010 S&G Assessments of the Carter Lease both found that the upland vegetative resource conditions within the Carter Lease Allotment met the Standards for Rangeland Health. Though quantitative vegetation composition and forage utilization data has not been collected by the BLM on this allotment, 2009-2010 field observations suggest moderate to heavy forage utilization in riparian areas and varying levels of utilization in upland areas. The sagebrush and other winter browse species, in areas relatively close to sheep camps tend to have moderate to severe hedging, while more inaccessible areas have less inhibited growth patterns. Allotments

set aside for winter use often exhibit excellent vegetation production from the spring and summer growing season, suggesting adequate forage availability for the upcoming winter grazing season.

During scoping, WGFD expressed concern over alterations in the vegetation classes and conditions in the Carter Cedars area. According to the comments, the vegetative understory in the area of concern was altered to the point that mule deer no longer use the area. WGFD requested that a buffer to exclude sheep camps and grazing be established around the Carter Cedars to facilitate recovery by the herbaceous vegetation.

Non-quantitative field observations in the summer of 2010 noted that several locations in and around the Carter Cedars (juniper stands north of Highway 412 and west of Carter.) had depleted, or nearly-absent, understories. Some of the sites, particularly those near the highway, coincided with where sheep camps or temporary corrals had been observed on private land during the winter sheep use season of 2009/2010. Even though these private lands are within the borders of the Carter Lease Allotment, BLM has no authority to regulate the surface uses that occur on them. Therefore, BLM restrictions on camp placement or livestock use are unlikely to effectively correct the problem.

Telephone and email conversations with Mark Zornes (Zornes, 2010), Wildlife Management Coordinator of the Green River Region, confirmed that the specific area WGFD's scoping comment letter addressed is a privately-owned section. Mark provided BLM some photographs of juniper trees stripped of bark and lower limbs, shrubs broken or chewed down to their heavy basal limbs and soil stripped of nearly all herbaceous vegetation. However, in a telephone conversation, he qualified the photographs by saying they had been taken in early spring of 2008 and that the heavy snowfall of the previous winter had forced the sheep herds to remain close to the highway. The same situation, (heavy snowfalls making the interior of the allotment inaccessible) occurred again in the 2010/2011 winter season.

A search of scientific literature links reduced herbaceous production on range sites with the entrance or 'filling-in' of juniper woodlands (Belsky, 1996) and that thinning the stands with fire or mechanical means is often necessary to effectively restore understory production (Bates, et al, 2000 and 2005). However, the juniper stands in the Carter Cedars area are still fairly open. If the permittees are agreeable to resting those areas it is possible that the understory could be restored without burning or cutting.

3.1.d Wildlife, Viable Populations of Native Plants and Animals

Field observations suggest the plant communities within the Carter Lease are capable of sustaining viable populations and diversity of native plant and animal species appropriate to the area. In addition, the BLM has conducted a field investigation of the proposed action to determine the potential impacts on identified wildlife species. The following section provides an overview of only those species that may be affected by the Proposed Action.

Special Status Species

Special Status Species (SSS) include those species federally listed under the ESA by the US Fish and Wildlife Service (USFWS) and the Wyoming BLM Sensitive Species (WBSS) designated by the BLM Wyoming State Director.

In accordance with Section 7 of the ESA, as amended, the lead agency in coordination with USFWS must ensure that any federal action to be authorized, funded, or implemented would not adversely affect a federally listed species, or its designated critical habitat. Within the Kemmerer Field Office boundaries, the USFWS requires eight threatened or endangered animal species and two plant species to be analyzed for all proposed actions (USFWS 2011). Of those ten species, Ute ladies'-tresses, black-footed ferrets and the Colorado River fishes would potentially be affected by the implementation of the Proposed Action. The other four species (gray wolf, canada lynx, grizzly bear and blowout penstemon) were not present nor did potential habitat exist within the project boundary; therefore, these four species will not be discussed further within this EA.

SSS Management Policy 6840 requires the BLM not only to manage species listed under the ESA, but to also manage WBSS to prevent the need for future listing under the ESA. A total of 41 WBSS animals potentially occur within the KFO, eighteen (18) are either known to occur or the habitat is present for the species to potentially occur within the action area (BLM 2010f). The other twenty-two (22) species will not be discussed further within this EA.

Table 1. Special Status Species potentially affected by the Proposed Action.

Species	Scientific name	Status	Habitat	Habitat Type
pygmy rabbit	*Brachylagus idahoensis*	SSS[2]	habitat present	basin-prairie and riparian shrub
white-tailed prairie dog	*Cynomys leucurus*	SSS[2]	habitat present	basin-prairie shrub and grasslands
black-footed ferret	*Mustela nigripes*	SSS[2]; Endangered[1]	potential habitat present	grasslands and prairie dog towns
Idaho pocket gopher	*Thomomys idahoensis*	SSS[2]	potential habitat present	shallow stony soils
sage sparrow	*Amphispiza belli*	SSS[2]	habitat present	basin-prairie shrub and mountain-foothill shrub
burrowing owl	*Athene cunicularia*	SSS[2]	habitat present	basin-prairie shrub and grasslands
ferruginous hawk	*Buteo regalis*	SSS[2]	habitat present	basin-prairie shrub, grasslands and rock outcrops
Greater Sage-grouse	*Centrocercus urophasianus*	SSS[2]; Candidate[3]	habitat present	basin-prairie shrub and mountain-foothill shrub
mountain plover	*Charadrius montanus*	SSS[2]; Proposed[3]	habitat present	grasslands and prairie dog towns
loggerhead shrike	*Lanius ludovicianus*	SSS[2]	habitat present	basin-prairie shrub and mountain-foothill shrub

Table 1. Special Status Species potentially affected by the Proposed Action.				
Species	**Scientific name**	**Status**	**Habitat**	**Habitat Type**
long-billed curlew	*Numenius americanus*	SSS[2]	potential habitat present	Grasslands, plains, foothills and wet meadows
sage thrasher	*Oreoscoptes montanus*	SSS[2]	habitat present	basin-prairie shrub and mountain-foothill shrub
Brewer's sparrow	*Spizella breweri*	SSS[2]	habitat present	basin-prairie shrub
bluehead sucker	*Catostomus discobolus*	SSS[2]	potential habitat present	Bear, Snake and Green River drainages
flannelmouth sucker	*Catostomus latipinnis*	SSS[2]	potential habitat present	Colorado river drainages
humpback chub	*Gila cypha*	SSS[2]; Endangered[1]	None – no habitat present	Colorado river drainages
bonytail chub	*Gila elegans*	SSS[2]; Endangered[1]	None – no habitat present	Colorado river drainages
roundtail chub	*Gila robusta*	SSS[2]	potential habitat present	Colorado river drainages
Colorado pikeminnow	*Ptychocheilus lucius*	SSS[2]; Endangered[1]	None – no habitat present	Colorado river drainages
razorback sucker	*Xyrauchen texanus*	SSS[2]; Endangered[1]	None – no habitat present	Colorado river drainages
northern leopard frog	*Rana pipiens*	SSS[2]	potential habitat present	Pond margins, wet meadows and riparian areas
great basin spadefoot	*Spea intermontana*	SSS[2]	potential habitat present	Spring seeps, permanent and temporary water
large-fruited baldderpod	*Lesquerella macrocarpa*	SSS[2]	habitat present	gypsum-clay hills and benches
ute ladies'-tresses	*Spiranthes diluvialis*	SSS[2]; Threatened[1]	potential habitat present	moist streambanks and wet meadows
[1] USFWS ESA-listed species [2] Wyoming BLM Special Status Species [3] Proposed for listing as threatened under the ESA				

White-tailed Prairie Dog

A formal petition was filed on July 11, 2002 by a collaborative group to list the white-tailed prairie dog under the ESA. On November 9, 2004 the USFWS released a 90-day finding (USFWS 2004) and a 12-month finding on Tuesday, June 1, 2010 (USFWS 2010b) indicating that current information did not warrant listing of this species at this time.

White-tailed prairie dogs generally occur in shrub-steppe and grassland environments in cool intermountain basins at altitudes ranging between 5,000 and 10,000 feet. While they inhabit western Colorado, eastern Utah, and southern Montana, the largest remaining complexes (occupying more than 5,000 acres each) are found in western Wyoming. A prairie dog complex consists of two or more neighboring prairie dog towns less than 7 km from one another. These highly social, colonial rodents dig their own burrows which contain extensive underground tunneling and multiple entrances. Many species reside in prairie dog burrows including black-footed ferrets, burrowing owls, snakes, lizards, mice and a variety of insects. At this time, approximately 44,714 acres (17%) of suitable habitat, for white-tailed prairie dogs, is contained within the 257,313 acre allotment (See Appendix 1, Figure 3). Approximately 9,980 acres of the suitable habitat is part of the Moxa prairie dog complex's western edge. Mapping of all prairie dog towns within the BLM KFO is not complete at this time. Therefore, more prairie dog towns may be present than what is currently known at this time.

Black-footed Ferret

Black-footed ferret habitat overlaps with that of prairie dogs, with which they have co-evolved (Fagerstone 1987). They inhabit shortgrass and mid-grass prairie ranging from the mid-west to the western United States as well as semi-desert shrublands where prairie dogs are present. They only exist within high-density prairie dog complexes because they use prairie dog burrows to live in and rear their young, and more than 90% of the ferrets' diet is made up of prairie dogs. The project area is located within one mile of the Moxa prairie dog complex. The western edge of the Moxa prairie dog complex lies within the allotment and thus is considered potential habitat. In 2004, a letter was issued by the USFWS indicating that black-footed ferret surveys would no longer be required in all black-tailed prairie dog colonies statewide or in white-tailed prairie dog towns except those noted in an attachment (USFWS 2004). The Carter Lease allotment contains approximately 174,429 acres of potential black-footed ferret habitat within the Moxa non-block cleared area.

Burrowing Owl

Burrowing owl habitat consists of open, dry, treeless areas on grasslands, shrublands, and desert floors. They prefer gentle slopes, short vegetation, high percentages of bare ground, and close proximity to other nesting burrowing owls. Although they are capable of digging their own burrows, they often use burrows dug by other mammals such as prairie dogs and are therefore often found in areas that exhibit current burrowing mammal activity and contain a high density of burrows. These burrows can be several meters long, with numerous twists and turns, and may be lined with manure in order to attract insects. The project area contains suitable habitat for burrowing owls and there are fifteen (15) currently known nesting burrows within the allotment. Many of these were identified during surveys for other projects and will continue to be monitored now that the burrows have been identified.

Mountain Plover

Mountain plover are small terrestrial shorebirds that inhabit shortgrass prairie and shrub-steppe landscapes. Unlike other members of the plover family, they are rarely found near bodies of water or riparian areas. These birds are migratory, arriving in Wyoming in early April to breed and departing for their wintering grounds during September. Their nests are located on the ground, often in areas used historically or currently by prairie dogs, bison, domestic livestock or pronghorn antelope. Other positive indicators for mountain plover habitat include near-level terrain with less than 5% slope, bare ground, cactus, sparse or widely spaced plants, and short vegetation (<10cm). Potential mountain plover habitat occurs within the allotment boundary, and a breeding pair was observed during surveys for the Ruby Pipeline in section 23, township 20 west, range 115 north. Plover habitat mapping is currently ongoing within the BLM KFO. At this time the exact habitat acres is unknown, however, it could be construed that there is a minimum of 44,714 acres (17%) of suitable habitat (acres of prairie dog towns) for mountain plover within the allotment boundary.

Greater Sage-grouse

Sage-grouse were originally proposed for protection under the endangered species list on July 2, 2002. Most recently, after several 90-day findings, the USFWS issued a proposed rule of, "Warranted, but precluded by higher priority listing actions" (USFWS 2010a). Due to this rule, the sage-grouse is not listed at this time; however, precautions should be taken to avoid listing. Several factors could move the species higher on the ranking list and closer to listing.

Currently, Greater Sage-grouse distribution and sagebrush habitat encompasses parts of 11 states in the western United States and 2 Canadian provinces, occupying approximately 56% of their historical range (Schroeder et al. 2004). Sage-grouse distribution is strongly associated with distribution of sagebrush (*Artemisia* spp.), and in particular, big sagebrush (*A. tridentata*) (Schroeder et al. 2004). Sage-grouse show high fidelity to an area. During the breeding season (March–May), male sage-grouse gather together to perform courtship displays at know locations called "leks." Leks are generally areas of little or no vegetation or cushion plant communities. Leks can be formed opportunistically or near nesting habitat (USFWS 2010a). Females have been documented to travel more than 12.5 miles to their nesting site after mating (Connelly et al. 2000), however, studies conducted in Wyoming indicate that 45% of sage-grouse hens nest within 1.86 miles of the lek while 64% nest within 3.11 miles (Holloran and Anderson, 2005). Sage-grouse nesting habitat is generally described as sagebrush that has a canopy cover between 15 and 30%, and heights between 11 and 32 inches (BLM 2004c). During the first 2-3 weeks, hens rear their broods in what is considered early brood-rearing habitat (within 1.2 miles of the nest in Wyoming, on average (Cagney et al. 2010). Typically this area has sufficient cover and is adjacent to foraging areas containing forbs and insects.

By using information about the Greater Sage-grouse Core Population Areas (EO 2010-4), the proposed project partially lies within the 'Sage' sage-grouse Core Area encompassing approximately 634,129 acres. There is approximately 115,778 acres (18.3 %) of the 'Sage' sage-grouse Core Area within the Carter Lease allotment (See Appendix 1, Figure 4). There are 12 known sage-grouse leks within the allotment boundary, of which 8 are within the core area. The 10-year average for the leks within the core area are 60.7, 35.5, 44.8, 30.1, 2.1, 25.1, 32.7 and 1.6 for Little Round Mountain North, Little Round Mountain South, Little Muddy Rim, Mulkay Springs North, Dry Muddy 3, Desertion Point, Hampton East and Mulkay Springs, respectively.

The 10 year average for the other four are; 4.4, 32.4, 3.6 and 8.3 (Zieglers Wash North, Zieglers Wonder Wash, Roberson East and Roberson North, respectively).

Ferruginous Hawk

Ferruginous hawks prefer arid and semiarid grassland habitat with open, level or rolling prairies and foothills. Although they tend to avoid forest interiors, narrow canyons and high cliffs, they do inhabit areas with shallow canyons and riparian corridors. Ferruginous hawks hunt in early morning and late afternoon from low flights and perches, such as poles, lone trees, knolls, rocky outcrops or large boulders. Their prey consists primarily of small mammals but they also feed on small birds and reptiles. Ferruginous hawks often nest in open areas on the ground or in isolated trees but they will also nest on ledges, buttes or rock outcrops or on man-made structures such as power poles (Tesky 1994). The project area is suitable foraging and nesting habitat for ferruginous hawks and there are seventeen (17) known ferruginous hawk nests within the allotment.

Sage obligate songbirds

Sage thrashers, Brewer's sparrows, sage sparrows and loggerhead shrike are considered sage-obligate species, meaning they require sagebrush ecosystems for reproduction and survival. Loggerhead shrikes are shrub-nesting sagebrush obligates meaning they require sagebrush for successful reproduction but not necessarily for food or other resources. Slight variation in habitat preference exists among these species. Though all these species use shrub-steppe habitats, sage thrashers may also utilize piñon-juniper woodlands and arid to semi-arid shrubs and grasslands whereas sage sparrows prefer contiguous areas of tall, dense sagebrush. Even with slight variability, all of these species inhabit prairie and foothill shrublands where sagebrush is present, often using tall shrubs with low grass cover and clumped sagebrush in a patchy landscape. This type of habitat occurs throughout the allotment. In addition, sage sparrows, Brewer's sparrows and sage thrashers were observed at different locations throughout the allotment during surveys for a large pipeline project.

Long-billed curlew

Historically, the breeding range of the long-billed curlew (*Numenius americanus*) was the western U.S. and the southern Canadian Prairie Provinces from California north to British Columbia and east to southern Manitoba and Wisconsin, northern Iowa and eastern Kansas (Fellows and Jones 2009). However, this breeding distribution has contracted and long-billed curlews have lost about 30% of their historical range (Fellows and Jones 2009). Today, the species is considered vulnerable throughout its range, and continued habitat loss is thought to be the greatest threat to population stability (Dark-Smiley and Keinath 2004). Long-billed curlew numbers in Wyoming have also decreased over the last century (Dark-Smiley and Keinath 2004). The long-billed curlew has been documented as breeding in only a few locations in Wyoming (less than 10) within the last 15 years (Dark-Smiley and Keinath 2004). It now only breeds regularly on the irrigated meadows of the upper Green River basin near Pinedale, and has recently been extirpated from habitat converted to housing developments near Sheridan and Casper (Dark-Smiley and Keinath 2004).

The Long-billed Curlew inhabits a variety of grassland types ranging from moist meadow grasslands to agricultural areas to dry prairie uplands, usually near water (WGFDb). It prefers a

complex of shortgrass prairies, agricultural fields, wet and dry meadows and prairies, and grazed mixed-grass and scrub communities (WGFDb). It nests on the ground in habitat that usually includes grass less than 30 cm (12 in) high (WGFDb). Breeding locations are thinly scattered across the state in suitable habitat (Dark-Smiley and Keinath 2004). It appears that higher concentrations of long-billed curlews (breeding and non-breeding) can be found in the far western portion of the state, and this is probably related to habitat availability (Dark-Smiley and Keinath 2004, WYNDD 2003). The best Long-billed Curlew population in the state at this time can be found in the upper Green River basin, from Merna to Pinedale (on the Horse Creek and New Fork Rivers) (Dark-Smiley and Keinath 2004, WYNDD 2003).

Recent populations have also been documented at Chapman Bench near Cody (on the south fork of the Shoshone River), on the Ham's Fork River drainage north of Kemmerer, at the Bear River marshes near Cokeville, and in Grand Teton National Park (hayfields) (Dark-Smiley and Keinath 2004, WYNDD 2003). At this time long-billed curlews have not been documented on the allotment. However, they have been documented approximately 4.5 miles southeast.

Pygmy rabbit

The pygmy rabbit (*Brachylagus idahoensis*) is the smallest of any North American rabbit Species (Keinath and McGee 2004). The pygmy rabbit is distinguishable from other Leporids by its small size, short ears, gray color, small hind legs, distinctive hopping motion, and lack of white on the tail (Keinath and McGee 2004). Pygmy rabbits are distributed across most of the Great Basin and parts of adjacent areas in the intermountain western United States (Keinath and McGee 2004). Pygmy rabbits depend upon stands of tall, dense sagebrush in conjunction with deep, friable soils, the combination of which provides cover, food, and burrows (Keinath and McGee 2004). Purcell (2006) found that pygmy rabbits occurred within areas mostly comprised of Wyoming big sagebrush, however, habitats dominated by mountain big sagebrush, shrub dominated riparian, blacksage steppe, or desert shrub also had pygmy rabbit occurrences. The distribution of this species is not continuous but is patchy within this range, thus the distribution of pygmy rabbits likely shifts over time in response to disturbances such as fire, flooding, grazing, and crop production as well as weather patterns (Keinath and McGee 2004). Currently, there are approximately 2.3 acres of pygmy rabbit habitat mapped within the allotment. However, efforts are ongoing to map more habitat and gather distribution data.

Large-fruited bladderpod

Large-fruited bladderpod (*Lesquerella macrocarpa*) typically occurs within sparsely-vegetated habitat of Gardner saltbush-squirreltail (*Atriplex gardneri – Elymus elymoides*) communities, or at the unvegetated margins of them, on barren, fine-textured soils (Heidel 2009). *L. macrocarpa* populations occur on light-colored, barren substrates on gentle slopes (Fertig 1995). These sites are exposed to high levels of solar radiation and wind, and are likely to be drier and have higher surface temperatures than adjacent, more highly vegetated, sites (Fertig 1995). *L. macrocarpa* flowering occurs from mid May to late June, depending on spring moisture conditions (Fertig 1995). Fruits are needed for positive identification (Heidel 2009), and Fertig (1995) observed fruiting from late May to July.

There is one known location of *L. macrocarpa* in the north central portion of the allotment. This area also contains any potential habitat for the species to exist. In this localized population, Heidel (2009) found that this population was stable with approximately 500 plants.

Idaho pocket gopher

There are several species of pocket gophers in Wyoming and the surrounding states. All look very similar, making it difficult to distinguish specimens to species. Reliable identification has to involve chromosomal analysis (i.e., karyotyping to count chromosome number), with supporting information from geographic location, pelage characters, and overall morphology (Beauvais and Dark-Smiley 2005). Idaho pocket gophers (*Thomomys idahoensis*) are very small, with yellowish to dark brown fur; they lack ear patches and contrasting cheeks, and dorsal regions are uniform in color (Clark and Stromberg 1987). *T. idahoensis*, along with other members of the pocket gopher family are highly adapted to fossorial (underground) living (Beauvais and Dark-Smiley 2005, Griscom et al. 2010).

T. idahoensis occurs from southwestern Montana, through eastern Idaho to southwestern Wyoming. Little is known about its habitat but its distribution suggests a preference for mountain foothill shrubland and a higher tolerance for rocky soils (Griscom et al. 2010). The species occupies shallow, stony soils and has been documented in open sagebrush, grassland plains, and subalpine mountain meadow habitats in Wyoming (Beauvais and Dark-Smiley 2005). The Biotics database maintained by the Wyoming Natural Diversity Database (WYNDD) contains only 33 known occurrences of *T. idahoensis* in Wyoming, all falling within the sagebrush foothills zone of the Wyoming Range, Uinta, and Wind River Mountains (Beauvais and Dark-Smiley 2005, Griscom et al. 2010). Very little is currently known about its biology and ecology (Griscom et al. 2010), but the species is assumed to be rare and has a limited distribution (Beauvais and Dark-Smiley 2005). Even though Idaho pocket gophers have not been observed, current habitat projections indicate that the species has the potential to occur, mainly in the western half of the allotment.

Northern leopard frog

On June 5, 2006 the USFWS received a petition to list the northern leopard frog (*Rana pipiens*) as threatened under the ESA (USFWS 2009b,). On July 1, 2009 the USFWS published a 90-day finding (USFWS 2009b), in which information for the status review was to be submitted to the USFWS by August 31, 2009. On October 28, 2009, the USFWS again published a 90-day finding extending the information soliciting period to November 27, 2009 (USFWS 2009a). The USFWS would typically publish the 12-month finding for this species by December 31, 2010. It is classified as a sensitive species by the Bureau of Land Management (BLM) in Wyoming due to recently observed declines in abundance and distribution across its range in the Rocky Mountains (Smith and Keinath 2004, BLM 2010f).

R. pipiens is a formerly abundant frog that has experienced significant declines across its range and is considered endangered in some parts of the range but still abundant in other parts of the range (Smith and Keinath 2004). The northern leopard frog is basically a species of cooler climates, with a range that encompasses most of the northern states of the United States and far north into Canada (Smith and Keinath 2004). The species ranges southwards only in the western United States, in the higher elevations of the Rocky Mountains (Smith and Keinath 2004).

Northern leopard frogs require a broad range of habitats in close proximity due to their complicated life histories (Smith and Keinath 2004). Northern leopard frogs breed and lay eggs in stock ponds, semi-permanent ponds, in the margin of larger lakes, and beaver ponds (Smith and Keinath 2004). However, when streams are used for reproduction, eggs are deposited in backwaters out of the main flow of the stream (Smith and Keinath 2004). Following reproduction, adult northern leopard frogs move into upland habitat in which they may feed for the summer (Smith and Keinath 2004). However, this portion of the life history for the northern leopard frog has been frequently neglected (Smith and Keinath 2004). In the fall, subadult and adult frogs migrate to overwintering sites in order to hibernate under water in ponds (Smith and Keinath 2004).

Currently, no known occurrences of northern leopard frogs exist within the allotment. However, habitat does occur due to the riparian areas of the Blacks Fork and Hams Fork Rivers, Muddy, Little Muddy and Dry Muddy Creeks and their tributaries, as well as the few natural springs/seeps that occur on the allotment.

Great basin spadefoot

The Great Basin spadefoot toad (*Spea intermontana*) is currently recognized by the Canadian government as a threatened species (Buseck et al. 2005). In addition, some state agencies recognize S. intermontana as a sensitive species, often because too little is known about it to provide evaluations on population status and viability throughout its range (Buseck et al. 2005). The Wyoming BLM lists *S. intermontana* as a sensitive species (BLM 2010f).

In Wyoming, *S. intermontana* distribution is patchy, with sightings recorded mostly west of the Continental Divide (Buseck et al. 2005). *S. intermontana* have been documented at 44 sites in Sweetwater County, six sites in Freemont County, and one site in Uinta, Lincoln, and Natrona Counties over the past 94 years (WYNDD 2005, Buseck et al. 2005). Little to no information exists on the abundance of *S. intermontana* across its range, in part, this lack of information is due to the behavior of *S. intermontana* during non-breeding months (i.e., it is active nocturnally only on humid/rainy evenings and spends inactive periods within inconspicuous burrows; Buseck et al. 2005). Also, the naturally fluctuating populations and sporadic breeding habits of *S. intermontana* make it difficult to monitor populations (Buseck et al. 2005).

S. intermontana are a xeric-adapted amphibian (Buseck et al. 2005). They require a water source for breeding and larvae/tadpole development in the spring and summer months and loose, sandy soil within arid habitats during the nonbreeding season with adequate vegetative cover to provide foraging sites and climate protection to retain soil moisture (Buseck et al. 2005). In Wyoming, *S. intermontana* are probably found within the soil orders Aridisols (a soil type with distinct horizons that occurs in desert basins and that has accumulations of clay, calcium carbonate, gypsum, and/or soluble salts) and Entisols (soils that are young and have little or no profile development, such as those that occur on eroding slopes and along ephemeral streams, (Knight 1994) based on associated vegetation (Buseck et al. 2005).

S. intermontana use both ephemeral and permanent water sources, which is unique when compared to other spadefoot toads which breed in ephemeral sources (Buseck et al. 2005). For

example, Hovingh et al. (1985) reported that *S. intermontana* utilized every type of water source available in the Bonneville Basin (only 8% were entirely natural), as long as the total dissolved solids were less than 5000mg/L. The most successful breeding sites (i.e., little or no dead tadpoles observed) were at water sources that desiccated during the summer, had large draw-downs of water, or had stream beds scoured by flash floods (i.e., lacked littoral vegetative growth).

At this time there are no known observations within the Carter Lease allotment. However, habitat does occur due to the riparian areas of the Blacks Fork and Hams Fork Rivers, Muddy, Little Muddy and Dry Muddy Creeks and their tributaries, as well as the few natural springs/seeps that occur on the allotment. In addition, there are numerous areas (playas) that collect rain water and moisture from runoff events that could provide habitat for this species.

Ute ladies'-tresses

The Ute ladies'-tresses (*Spiranthes diluvialis*) grows on moist sub-irrigated or seasonally flooded soils in valley bottoms, gravel bars, old oxbows, or floodplains bordering springs, lakes, rivers, or perennial streams at elevations between 1,780 and 6,800 feet (BLM 2010). Populations have been documented from alkaline sedge meadows, riverine floodplains, flooded alkaline meadows adjacent to ponderosa pine-Douglas-fir woodlands, sagebrush steppe, and streamside floodplains (BLM 2010). The Ute ladies'-tresses is well adapted to disturbances from stream movement and is tolerant of other disturbances, such as light grazing, that are common to grassland riparian habitats and reduce competition between the orchid and other plants (USFWS 1995).

Ute ladies'-tresses, a federally listed threatened species, has not yet been identified in western Wyoming, although potential habitat for the species does exist (BLM 2010). In Wyoming, *S. diluvialis* occurs at four locations on the Western Great Plains in Converse, Goshen, Laramie, and Niobrara counties (Fertig 2000). The populations closest to the planning area are found in the Brown's Park area along the Green River in northeast Utah and along the Snake River in eastern Idaho.

Colorado River Fishes

Four federally endangered fish species, the bonytail chub (*Gila elegans*), Colorado pikeminnow (*Ptychocheilus lucius*), humpback chub (*Gila cypha*), and razorback sucker (*Xyrauchen texanus*) occur downstream in the Green River. These fish were once abundant in the upper and lower Colorado River Basins but their distributions are currently limited to a small portion of their historic range. Habitat for these species include backwaters, sloughs, oxbow lakes, seasonally inundated flood plains, and reservoirs. The nearest habitat for the endangered Colorado River fishes occurs downstream of the project below Flaming Gorge Reservoir, Utah in the Green River and its associated 100-year floodplain; this area has been designated by the USFWS as critical habitat (USFWS 1994). Even though these species do not occur within the project area, they are sensitive to water depletions and upstream degradation.

Bluehead sucker, flannelmouth sucker and roundtail chub

Bluehead suckers (*Catostomus discobolus*) are usually found in the main current of streams, although its streamlined body form indicates adaptation to living in the strong currents of larger rivers (Baxter and Stone 1995). Bluehead suckers prefer turbid to muddy streams often with

high alkalinity and are rarely found in clear water (WGFD, 2005b). The BLM in Wyoming considers the bluehead sucker a sensitive species. WGFD has assigned this species a state rank of NSS1, suggesting that its presence is extremely isolated and its habitats are declining or vulnerable (Ptacek et al. 2005). According to Bezzerides and Bestgen (2002), bluehead suckers historically occurred in the Colorado River Basin (CRB) above the mouth of the Grand Canyon in mainstem and tributary habitats of Wyoming, Colorado, Utah, portions of New Mexico and Arizona. Bluehead suckers are now uncommon in Wyoming, with extant populations in Muddy Creek, tributary to the Little Snake River, the Ham's Fork River, tributary to the Black's Fork River flowing into Flaming Gorge Reservoir, and several small tributary streams and lakes of the upper Green River drainage (Bezzerides and Bestgen 2002).

The flannelmouth sucker is usually found in slower, warmer medium to large streams in the upper Colorado River Basin (Rees et al. 2005a). Flannelmouth suckers in Wyoming are known from the Green River and associated tributaries as well as streams within the Little Snake River drainage (Rees et al. 2005a, Weitzel 2002). The WGFD has regulations regarding flannelmouth sucker habitat loss. This agency's objective is to permit projects in a manner that avoids alteration and degradation of functioning flannelmouth sucker habitat (Rees et al. 2005a, Weitzel 2002). In addition, the BLM considers the flannelmouth sucker a sensitive species in Wyoming.

Historically, roundtail chub were known to commonly occur in most medium to large tributaries of the Upper Colorado River Basin (Rees et al. 2005b). In Wyoming, it is common in the Green River and Little Snake River Drainages (Baxter and Stone 1995). Currently, roundtail chub are found in the Blacks Fork River and the Green River drainage as well as the Big Sandy River, the Hams Fork River, Fontenelle Creek and Reservoir, and Halfmoon, Burnt, Boulder, Little Halfmoon, Willow and Fremont lakes (Rees et al. 2005b). The BLM also considers the roundtail chub a sensitive species in Wyoming.

Of the eight big-river species once found in the CRB, Colorado pikeminnow, bonytail, humpback chub, and razorback sucker are rare and federally listed as endangered. The other four big-river species (roundtail chub, flannelmouth sucker, bluehead sucker, and speckled dace) occupy a greater proportion of historical habitat than the endangered fishes, but are also declining in many areas (Bezzerides and Bestgen 2002). Ongoing recovery efforts to restore populations of Colorado pikeminnow, razorback sucker, humpback chub, and bonytail seek to identify and correct factors limiting critical life-history stages. Unfortunately, status and ecology of the roundtail chub, flannelmouth sucker, and bluehead sucker remain comparatively unstudied, so limiting factors are poorly understood (Bezzerides and Bestgen 2002).

To date, these three species have not been documented within the allotment. However, roundtail chubs and flannelmouth sucker have been documented on the eastern edge of the allotment in the Blacks Fork River. The potential does exist for all three species to exist within the Carter Lease due to the Blacks Fork and Hams Fork Rivers, Muddy, Little Muddy and Dry Muddy Creeks and their tributaries.

General Wildlife and Fish

Additional wildlife and fish species are present in the project area but their population sizes are stable on average and do not currently exhibit declining density or distribution trends which

would warrant additional protection under the ESA. Mammals potentially occurring in the project area include: badger, red fox, coyote, desert cottontails, white-tailed jackrabbit, ground squirrels, chipmunks, mice, voles, shrews, northern pocket gopher and big game species. Additional information is provided below on big game species managed by the WGFD and migratory birds that may be present in the study area for brief periods.

Big Game

Pronghorn Antelope

The pronghorn antelope (*Antilocapra americana*) is the predominant ungulate of the high sagebrush-steppe ecosystems in western North America (Reeve 1984). Pronghorn populations were estimated at 45 million prior to European settlement (Clark and Stromberg 1987). By 1924, the population was approximately 14,000 (Clark and Stromberg 1987). Since then their numbers have increased (Clark and Stromberg 1987), and today there are approximately 500,000 within Wyoming alone (WGFD 2009b). Pronghorn occur throughout western North America from Canada to northern Mexico (Clark and Stromberg 1987). In Wyoming they occur in all habitat types except timbered areas and alpine tundra areas (Clark and Stromberg 1987). *A. americana* require at least 50% vegetative cover within their occupied habitats (Clark and Stromberg 1987). Pronghorn require a wide variety of foods, though shrubby plants are essential the entire year and most critically during the winter (Clark and Stromberg 1987). Browse make up 62%, 44% forbs, 7% grasses and other items 10% on an annual basis (Clark and Stromberg 1987).

Pronghorns are social and form herds that contain all age and sex classes, and may reach a thousand or more animals (Clark and Stromberg 1987). Although pronghorn tend to winter in large herds, they tend to isolate themselves in spring. Females become sexually mature at 16 months, giving birth while lying down, usually to twins (Clark and Stromberg 1987). After giving birth, female will band together in small groups with their new fawns. Mature bucks are typically solitary during the spring. By early summer however, they will either defend a territory and a harem of does or form non-territorial bachelor herds. Migration between spring and summer ranges to winter range may involve distances of 18 km (11.2 mi) to 160 km (99.4 mi) (Clark and Stromberg 1987).

The project area is located within antelope herd unit 419. This is a large area beginning where Interstate 80 crosses the Wyoming-Utah state line; easterly to the junction of I-80 and US highway 30; north, northwest to US highway 189; north along US highway 189 to the Hamsfork river; northerly along the Hamsfork river and Hamsfork creek to Commissary Ridge; northwesterly along Commissary Ridge to the divide between the Smith's Fork and Greys River; southwesterly along the divide to the divide between the Salt River and Smith's Fork; westerly along the divide to the divide between the Bear River and Salt River along the Wyoming-Idaho state line; southerly along the Wyoming-Idaho state line to the Wyoming-Utah state line; southerly along the Wyoming-Utah state line to Interstate 80 (WGFD 2011). The entire herd unit encompasses approximately 1.7 million acres, of which 238,797 acres (14.1%) lie within the project area.

The allotment contains antelope range that is classified by the WGFD as spring/summer/fall, winter/yearlong and crucial winter range (WGFD 2009a). According to the most recent WGFD

Job Completion Report (JCR) (WGFD 2009a), the herd contains 7,107 individuals and is therefore, 18% above the population objective of 6,000. By using WGFD data for big game, there is approximately 47,200 acres of antelope crucial winter range located along the southern and eastern edges of the allotment.

Mule Deer

Mule Deer (*Odocoileus hemionus*) occur throughout western North America in a wide variety of habitats from deserts, riparian areas, broken grasslands, shrublands, foothills, forests to tundra (Clark and Stromberg 1987). In Wyoming, mule deer provide recreational, aesthetic, and economic values to hunters, wildlife enthusiasts, and local business throughout the state (Olson 1992). More than 100,000 hunters annually pursue this species in Wyoming, spending an average of more than 336,000 days in the field to harvest more than 60,000 animals (Olson 1992). Based on hunter harvest reports, mule deer are the most frequently taken big game animal in Wyoming (Clark and Stromberg 1987).

Mule deer food varies seasonally (Olson 1992). During the spring, mule deer will feed on forbs and grasses during spring "green up" (Olson 1992). During the summer, the diet is comprised mainly of forbs as grasses dry and cure (Olson 1992). During the fall the diet is mainly forbs and shrubs, and during the winter will be almost entirely shrubs and trees (Olson 1992). Studies conducted in Wyoming indicate that the following plants are especially important to mule deer in winter: sagebrush (*Artemis*ia *spp.*), antelope bitterbrush (*Prushia tridentata*), mountain mahogany (*Cercocarpus spp.*), and rabbit brush (*Chryosthanmus spp.*) (Olson 1992).

The project area is located within mule deer herd units 131 and 423. The herd unit boundaries lie on Highway 412 (Carter cut-off). Herd unit 131 is on the north-northeast side while unit 423 is on the south-southwest side of the highway (See Appendix 1, Figure 5). Herd unit 131 (Wyoming Range mule deer herd) begins at the junction of US highway 30 and Interstate 80; westerly along I-80 to Wyoming highway 412; northwesterly to US highway 189; southerly to Muddy Creek; westerly to the Amoco Sulfur Haul Road; southwesterly along the Sulfur Haul Road to the Whitney Canyon Road; westerly to the Uinta County Road 103; southerly to Wyoming highway 89; northerly to the Wyoming-Utah state line; northerly to the Wyoming-Idaho state line; northerly to the Snake River; easterly to Bailey Creek; southerly to Dry Wash Draw; easterly to the top of Greyback Ridge; southerly to the head of the South Fork of South Cottonwood Creek; easterly to South Cottonwood Creek; easterly to Cottonwood Creek; easterly to the Green River; southeasterly to Fontenelle Dam and the Fontenelle Dam Road (Lincoln County Road 313); westerly to Lincoln County Road 316; southerly to Wyoming highway 372; southeasterly to I-80; westerly to the US highway 30 and I-80 junction (WGFD 2011). This herd unit encompasses approximately 3.6 million acres, of which approximately 216,882 acres (6.1%) lie within the project area. There is approximately 3,000 acres of mule deer crucial winter range, all of which is located along the southwest edge, within the allotment. The current estimated population for herd unit 131 is 29,435 individuals which is 41.1% below the population objective of 50,000 (WGFD 2009b).

Mule deer herd unit 423 (Uinta deer herd) begins at the junction of Interstate 80 and Wyoming highway 412; easterly along I-80 to the Green River; southerly down the east bank of the Green River to Flaming Gorge Reservoir; southerly along the east shore of the reservoir to the

Wyoming-Utah state line; westerly then northerly along the state line to the junction of Wyoming highway 89 and the Wyoming-Utah state line; southeasterly to the junction with Uinta County Road 103; northerly to the Whitney Canyon Road; easterly to the Amoco Sulfur Haul Road; easterly then northerly to Muddy Creek; easterly to US highway 189; northerly to Wyoming highway 412 southeasterly back to I-80 (WGFD 2011). This herd unit is approximately 1.7 million acres in size, of which approximately 21,915 acres (1.3%) lie within the project area. Herd unit 423 does not have a population estimate, but the population objective is 20,000 (WGFD 2009a). The WGFD (2009a) states that, "there is no working population model for this herd, since the herd is highly migratory and significant portion of the herd spends time in both Utah and Wyoming."

Elk

Elk (*Cervus elaphus*) once ranged from northern Canada southward along the California coastline, and throughout much of the United States (Clark and Stromberg 1987). Today, the range has been reduced, however, due to reintroduction efforts, the elk is being restored in many parts of the historical range. In Wyoming, they occur from deserts to timbered areas, and occupy habitats dominated by shrubs and grasses to high mountain meadows of grasses and forbs (Clark and Stromberg 1987). The elk diet is variable and depends on availability of local food plants (Clark and Stromberg 1987). Elk eat the same plants consumed by other members of the deer family as well as cattle (Clark and Stromberg 1987). Grasses and forbs comprise the major part of the winter diet while grasses are largely consumed during the spring (Clark and Stromberg 1987). During the summer, the diet shifts from grass to forbs (Clark and Stromberg 1987). Shrubs are consumed at anytime, especially on winter ranges (Clark and Stromberg 1987).

Elk are gregarious, but group size depends on age, sex, time of year and vegetation type (Clark and Stromberg 1987). Rutting (breeding) occurs in the fall, usually in September. Rutting groups often consist of 2 to 26 elk, including an adult bull associated with cows, calves and occasionally a yearling bull (Clark and Stromberg 1987). A single calf is usually born each year the following May or early June (Clark and Stromberg 1987). Yearling cows sometimes breed, but the adult cow (two years old or more) pregnancy rate is usually over 90% (Clark and Stromberg 1987).

The project area lies entirely within elk herd unit 428. The herd unit has an estimated population of 3,878 individuals which is approximately 25% above the current population objective of 3,100 (WGFD 2009a). Even though the allotment is within herd unit 428, designated habitat has not been set. Therefore, elk will not be discussed further within this document.

Moose

Moose (*Alces alces shirasi*) is the largest member of the deer family. In North America, they occur from Alaska to the northeastern United States and south along the Rocky Mountains to Colorado (Clark and Stromberg 1987). In Wyoming, moose are found from high spruce-fir zones down to willow and riparian communities (Clark and Stromberg 1987). Moose range is determined by winter availability of food plants and snow depth (Clark and Stromberg 1987). Their long legs and tolerance of deep snows allow moose to survive winters in habitats that are inhospitable to other species (Clark and Stromberg 1987).

Moose are primarily browsers and depend on a diet of shrubs and young deciduous trees for much of the year, but they are often associated with river bottoms, ponds, and lakes with an abundance of shrubby and aquatic vegetation. The Carter Lease allotment lies completely within moose herd unit 417. The herd unit begins where Interstate 80 crosses the Wyoming-Utah state line; northerly to the Wyoming-Idaho state line; northerly to the divide between the Salt River and Bear River; easterly to the divide between the Salt River and the Smiths Fork; southeasterly to the divide between the Greys River and LaBarge Creek; easterly to the Green River; southeasterly to the Fontenelle Reservoir Dam Road (Lincoln County Road 313); easterly to the County Line Road (Sweetwater County Road 52); southerly to the Lower Farson Cutoff Road (Sweetwater County Road 8); easterly to Wyoming highway 28; easterly to the continuation of the Lower Farson Cutoff Road (Sweetwater County Road 8); southerly to the Blue Rim Road (Sweetwater County Road 5); southerly to I-80; westerly to the Wyoming-Utah state line. Herd unit 417 is approximately 2.8 million acres, of which approximately 238,797 acres (8.5%) lies within the project area. The current estimated population is 700 individuals. This is 57.6% below the population objective of 1,620 (WGFD 2009b). WGFD data indicates that the only habitat within the allotment is along the Blacks Fork and Hams Fork rivers and Muddy Creek. These areas are considered year long habitat, of which approximately 19,358 acres lie within the Cater Lease boundary.

Migratory Birds

The Migratory Bird Treaty Act (MBTA), as amended, was implemented for the protection of migratory birds. Unless permitted by regulations, the MBTA makes it unlawful to pursue, hunt, kill, capture, possess, buy, sell, purchase, or barter any migratory bird, including feathers or other body parts, nests, eggs, or migratory bird products. In addition, Executive Order 13186 sets forth the responsibilities of federal agencies to implement the provisions of the MBTA by integrating bird conservation principles and practices into agency activities and by ensuring that federal actions evaluate the effects of actions and agency plans on migratory birds. Wyoming BLM non-sensitive migratory birds that could nest in the project area include: vesper sparrow, horned lark, black-billed magpie, common raven and various raptor species.

Raptors are protected under the MBTA and there are 127 known nest locations within the project area. Of the 127 known nests, 1 is an American kestrel, 42 are golden eagle, 1 great-horned owl, 4 prairie falcon, 2 red-tailed hawk, 4 Swainson's hawk and 73 are undetermined for the species that built the nest. In addition to nesting habitat for these and other raptor species, the project area could also provide foraging habitat for migratory raptor species, such as northern harriers and rough-legged hawks.

3.2 Heritage Resources

3.2.a Cultural Resources

A full Cultural Resources Data Review (File Search) was completed for the Carter Lease Grazing Allotment to authorize grazing for 10 years between 9/30/2010 and 9/29/2020. This dat review was conducted by BLM KFO Archaeologists between April 1, 2010 and May 8, 2010. Previous cultural resource inventory coverage within this large allotment is variable and depends primarily on the amount of energy exploration and development that has occurred in a particular area. The majority of the previous inventory coverage has been conducted in the eastern half of

the allotment, corresponding to those portions of this allotment that are within or adjacent to the Moxa Arch Oil & Gas Field. Although the western portions of the allotment have received some cultural resource inventory coverage, the sample size is considerably smaller.

Approximately 511 previous cultural resource inventories and related projects had been conducted within the applicable sections. Projects include block and linear inventories, various construction monitors and open trench inspections, and various site testing, evaluation and excavation projects. Approximately 722 sites had been documented within the applicable sections. Recorded sites include prehistoric camps and lithic scatters, historic ranches and irrigation ditches, stockherder camps, various railroad grades, spurs, and alignments, expansion era roads, highway alignments, and various segments of the National Historic Trails (NHT) System (i.e. the Hams Fork Cutoff of the Oregon-California Trail, the Blacks Fork Cutoff of the Oregon-California Trail, as well as portions of the main route of the Oregon-California Trail). Segments of NHT corresponding to the Oregon-California-Mormon Trail are located within about 1-2 miles south of the southeastern edge of the allotment (Appendix 1, Figure 8).

The route of the Hams Fork Cutoff of the Oregon Trail (48LN947) is located adjacent to the northeastern edge of this grazing allotment. Although the site is listed as Eligible for the National Register of Historic Places, the segment associated with the current project area has been impacted/destroyed by modern development. No special stipulations are required for this segment of trail for this project.

Segments of the main route of the Oregon-California Trail (48UT261) and the Blacks Fork Cutoff of the Oregon Trail (48UT666) are located within the southern half of the allotment. Both of these historic properties are listed as Eligible for the National Register of Historic Places and special stipulations are included in the Proposed Action to avoid adverse impacts to these remaining trail ruts and those areas within a ¼ mile buffer zone along these NHT segments.

The segments of the Oregon-California Trail (48UT261) and the Blacks Fork Cutoff (48LN946) located within this grazing allotment retain good to fair integrity of place, workmanship, design, and setting. Trail condition is currently classified as Class II & Class III (Tanner 2005) in this vicinity. The Oregon-California Trail and Blacks Fork Cutoff are Eligible for inclusion in the National Register of Historic Places (NRHP).

Domestic livestock grazing has occurred for over 100 years in southwestern Wyoming. No impact to significant cultural resources has been reported in the area as a result of authorized, dispersed livestock grazing within the allotment boundaries. As has been documented in the past, the greatest potential for range and livestock grazing practices to impact historic properties in this area comes from unauthorized construction associated with range improvement and/or range management projects (e.g. bladed fenceline routes, waterlines, spring & reservoir construction projects, redirecting natural drainage channels, etc.). Any such unauthorized development on federal land within this allotment is a violation of applicable federal regulations.

The Results of this investigation state: “No effects on any historic properties are documented as attributable to authorized grazing use”. Any grazing permits issued as a result of this Environmental Assessment will be subject to the regulations contained in the Federal Land

Policy and Management Act (FLPMA) which contains language under FLPMA 303(a) and FLPMA 303(c)(2)(g) that can be used to protect cultural resources and prosecute the permit holder if violations of cultural resources statutes occur, related to permit use. Additionally, FLPMA 318(a) allows for suspension or revocation of the grazing permit if permit conditions are not met.

3.3 Land Uses

3.3.a Lands and Realty

The surface ownership of Carter Lease is almost entirely 'checkerboard'. The odd-numbered sections are privately owned and the even-numbered sections are owned by the BLM or the State of Wyoming. This intermingled land-ownership pattern makes landscape-level management challenging because BLM, the State of Wyoming, and private landowners each have different rules regarding development and management of their lands.

The greatest single factor affecting the Carter Lease is the Moxa Arch Gas Field. The Moxa Core Area underlies the eastern-most four miles of the Carter Lease and the Western Flank extends another four miles into the allotment. Currently, only 27 of the 238 active or unreclaimed oil/gas wells inside the Carter Lease are outside of the Moxa Arch. All of the federal mineral rights in the Moxa Area are currently leased and 'infill' development is expected to increase. This will mean more wellpads, collector pipelines and other structures will be installed, taking more acres out of those currently available for forage production.

Currently, 4,608 acres {capable of producing approximately 1sheep AUM/12 acres (384 AUMs) or 1 cow AUM/17 acres (271 AUMs)} of the Carter Lease are disturbed due to existing pipelines, improved roads, wellpads, pumping stations and unimproved two-track trails. The number of acres and AUMs lost due to oil and gas development is expected to continue to grow as infill development proceeds.

The presence or absence of livestock grazing is unlikely to affect any decisions regarding the development of mineral resources, rights-of-way or other realty actions and will not be discussed further.

3.3.b Livestock Grazing Management

Historically, domestic livestock use on Carter Lease has consistently been primarily winter (November until May) sheep. Prior to the 1971 adjudication decision, the Carter Lease portion of the Granger Unit allocated 9.9% of the available livestock-designated AUMs for summer cattle use. The remaining 90.1% were allocated for winter sheep. Though the livestock numbers were reduced through the adjudication process, the cuts were equal for each permit and maintained the cattle/sheep proportions. The current summer cattle to winter sheep allocation ratio is 9.6% cattle - 90.4% sheep.

The Carter Lease billed AUMs records (Appendix 2) from the 1988-2010 grazing years show a wide degree of variation. The total billed AUMs (sheep + cattle) for each year range from a high of 14,005 in 1999 to a low of 6,362 in 2003. These figures do not include Exchange-of-Use (which is based on livestock-available forage produced on private land inside the allotment) or AUMs which a permittee took authorized non-use on.

One important consideration when looking at these numbers is that the vegetative communities in Carter Lease are much more suitable for sheep use than for cattle. The range surveys conducted immediately prior to the adjudication process indicated that, on average, approximately 8 sheep could be supported on the ground that would support 1 cow. The Taylor Grazing Act designated that 1 cow or 5 sheep per month = 1 AUM. Therefore, converting a Carter Lease cattle permit to sheep would increase that permit's AUM harvest by 1.6 times. This could create an appearance of over-utilization on paper even though the impacts to the vegetation would be neutral in terms of forage consumed versus forage available. Converting a sheep permit to cattle would reverse the process and produce a permit that has 37.5% fewer AUMs. This could create an impression of under-allocation, even though the utilization of forage available to that kind of animal is at the highest allowable level for that permit.

Another factor requiring consideration is; despite high levels of historic livestock use, the Carter Lease vegetation communities are apparently healthy and vigorous. Because the vast majority of the livestock use (both historic and current) has occurred during the winter, when most vegetation is entirely dormant and 'evergreen' species like winterfat and sagebrush are not actively growing, the upland plants have the full growing season to maximize their growth, build root reserves and produce seed.

3.3.b.1 Permittee Practices

Western Wyoming Operating (WWO), an association comprised of most of the members of WWR, LP who hold grazing permits on the Carter Lease, has divided the Carter Lease into use areas. The size of the use areas is based on the number of shares each of the permittees owns or leases. The goals of establishing the use areas are to prevent or minimize opportunities for mixing sheep bands belonging to different owners as well as reducing the likelihood of forage over-utilization in any one area.

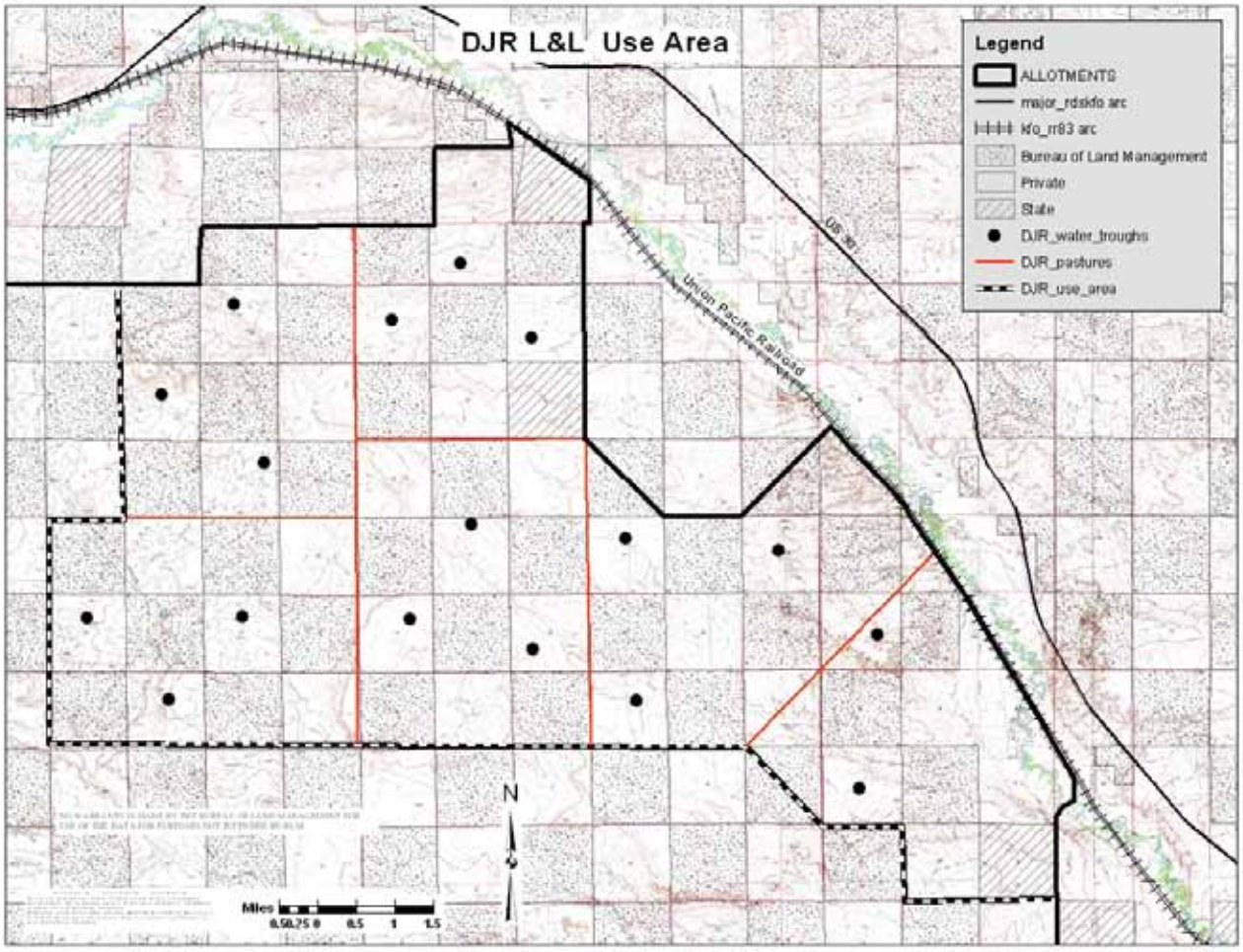
The winter sheep use permittees typically put their sheep in bands of 1200-2000 animals. Each band has one herder, one camp wagon and one (horse) feed wagon, two or three horses and four to six herd dogs. The sheep camps are dispersed throughout each permittee's use area. The herders drive the sheep out to feed during the day and bring them back close to the camp at night. The camp's move schedule is variable, depending on feed availability and weather.

The majority of current summer cattle use is unherded. The majority of the cattle are put into the allotment on or shortly after the first day of the grazing season and removed on or before the grazing season end date. However, some permittees ask for a shorter grazing season, sometimes with a rest period between two or more grazing periods within the allotment, in exchange for the ability to turn out more cattle.

All of the grazing permits currently authorized on the Carter Lease are summarized in Table 2.

Table 2. Carter Lease Grazing Permits Authorization Levels and Expiration Dates.							
Authorization Number	**Livestock type and no.**	**Federal AUMs**		**Season of Use**		**% Federal AUMS**	**Expiration**
		(Active)	**(Suspended)**	**Start**	**End**		
4900005	S 1200	432	108	12/01	4/30	36	10/31/2013
4900132	C 2	9	0	6/01	10/15	100	2/28/2017
4900132	C 45	226	46	5/16	10/15	100	2/28/2017
4900235	S 2839	1212	0	12/01	4/30	43	4/30/2013
4904064	C 51	255	45	5/16	10/15	100	4/30/2011
4904105	S 1173	288	72	12/01	4/30	33	4/30/2014
4904119	S 2923	900	225	12/01	4/30	31	2/28/2017
4904121	S 1200	432	108	12/01	4/30	36	10/31/2011
4904166	C 30	181	45	5/01	10/31	100	2/28/2017
4904197	S 1349	576	144	12/01	4/30	43	10/31/2012
4904204	S 6069	2592	648	12/01	4/30	43	2/28/2019
4904207	S 4050	1728	458	12/01	4/30	43	9/16/2017
	S 910	147	0	5/01	5/31	79	2/28/2017
4912976	C 38	190	50	5/16	10/15	100	2/28/2017
4912983	S 1340	576	144	12/01	4/30	43	2/28/2019
4914306	S 1148 S 1212	224 160	93	12/01 3/01	2/28 4/30	33 33	4/30/2014
4914307	S 1148 S 1212	224 160	93	12/01 3/01	2/28 4/30	33 33	4/30/2014
4913076	C 80	345	0	5/01	10/15	78	9/01/2012
4913903	S 4020	1716	494	12/01	4/30	43	9/01/2012

Figure 1: DJR L&L Use Area and Approximate Trough Placement Points



DJR L&L owns four shares of WWR, LP, with winter sheep-only preference attached. In the past, TNR sheep to cattle conversions have occasionally been granted. DJR L&L has used a water truck to fill three portable, steel-bottom water tanks to control cattle use and distribution throughout the WWO-designated DJR L&L use area (Redden, 2011). By placing the tanks on the private sections, DJR L&L created 6 unfenced 'pastures' (See Figure 1, above) of about 7,000 acres each. DJR L&L has reported that selectively moving and filling the tanks worked to successfully rotate the cattle through the 'pastures' without creating trails or the heavy impact sites associated with permanent water facilities or having animals stray into the Blacks Fork or Muddy Creek riparian areas. DJR L&L has reported that, because the use area is close to facilities on private land along the Hamsfork River, they have been able to drive their entire permitted cattle numbers either onto, or off of, any portion of the use area within one day. DJR L&L has submitted a plan to resume using this system, starting in a different 'pasture' each year, if the request for a dual-use conversion is approved

3.3.b.ii BLM-Identified Issues

The BLM strives to manage livestock grazing according to provisions of the grazing regulations and the Standards for Healthy Rangelands and Guidelines for Livestock Grazing Management for the Public Lands Administered by the BLM in the State of Wyoming. The BLM has

completed the process of conducting the Wyoming Rangeland Standards Conformance Review Summary for the Carter Lease Allotment analyzed in this EA.
Field observations conducted by BLM range management specialists identified two important grazing management challenges in the Carter Lease Allotment. The first is the predominance of non-federally-owned land in the allotment. Table 3 (below) summarizes land ownership in the Carter Lease. Landscape-level management in areas with intermixed land ownership (See Figure 2 below) is very difficult to implement because the BLM has no regulatory authority on private or state-owned lands

The second management challenge is livestock distribution: In normal years, when there is sufficient snow to provide water for the sheep yet still allow for movement of the camps, winter sheep use can spread browse utilization throughout the allotment. However, if the snow is too deep to allow for camp movement, the herds tend to congregate on the private sections adjacent to Highway 412 and/or some of the plowed gas field roads, potentially creating a pattern of over-use in those areas. If there is insufficient snow, the herds resort to using the available surface water sources within the allotment causing impacts to the vegetation and soils in the riparian areas when there is no chance of recovery before the high flows associated with spring runoff occur.

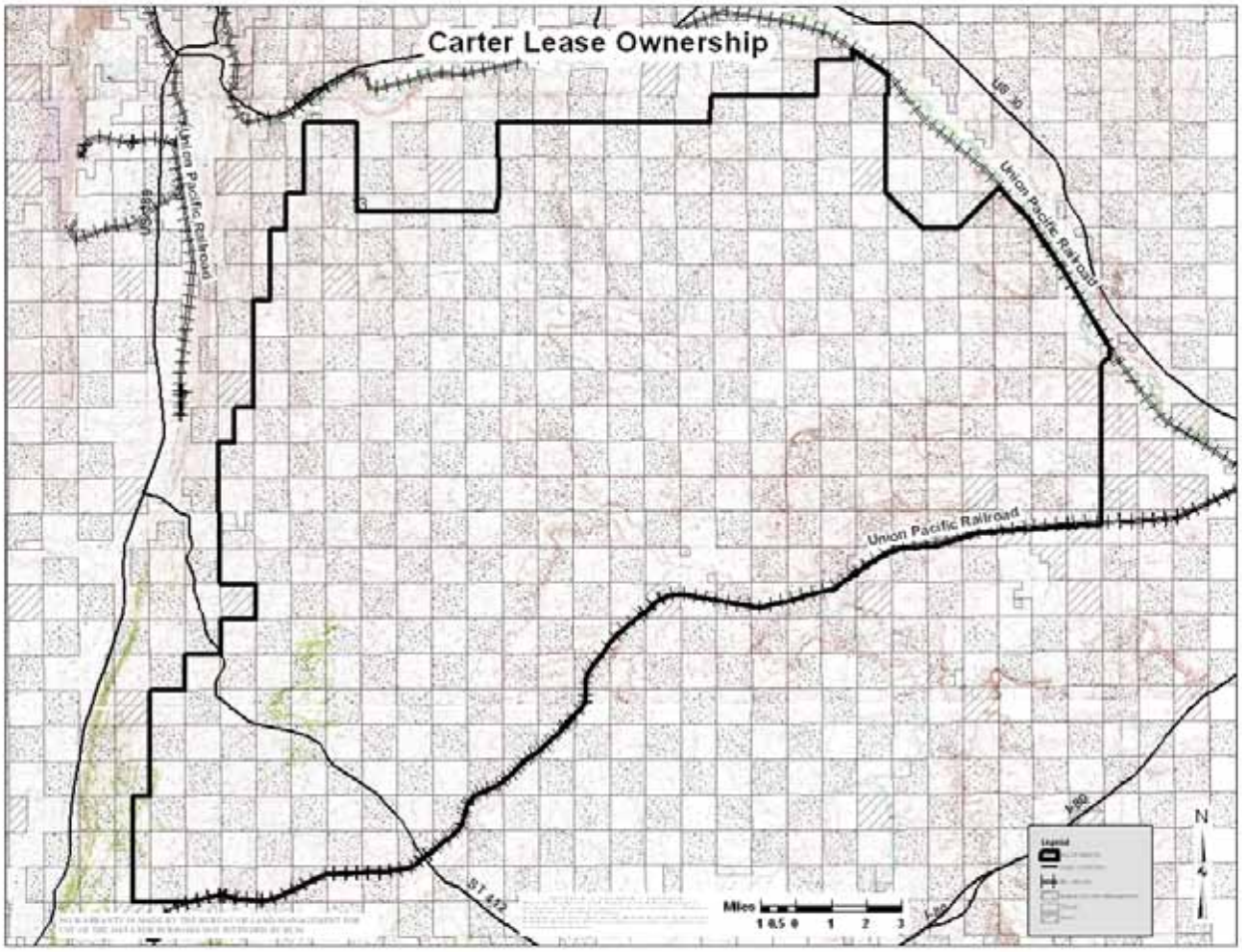
Summer livestock use is more problematic. The large size of the allotment and scarcity of freely available water effectively prevent even livestock distribution and concentrate the impacts of free-ranging summer cattle use to the areas in and near the reliable water sources, resulting in disproportionally intensive forage utilization and physical impacts. The naturally-available surface water in the allotment is concentrated along Muddy Creek, Little Muddy Creek and Blacks Fork River. There are a few springs within the allotment that offer alternative water sources. However, most of them are isolated by distance, terrain or palatability from Muddy, Little Muddy and Dry Muddy Creeks (See Appendix 1, Figure 6), where most of the summer livestock use occurs.

Because sheep are actively herded, it is possible for the herder to drive the animals to a water source and push them out of the riparian area to feed and loaf. However, the majority of the current cattle permittees turn their animals loose in the allotment in May or June and round them up in September. The cattle range freely over the allotment; eating, drinking and loafing wherever they please. Since cattle tend to stay within a few miles of reliable water, this can create a disproportionate impact to the areas within that zone (Holochek, 1988).

Table 3. Land ownership in the Carter Lease Allotment

Allotment	Public Acres	Percent Public	Private Acres	Percent Private	State Acres	Percent State
Carter Lease	118114	42.1	131745	53.8	7454	4.1

Figure 2: Carter Lease Land Ownership.



3.3.c Mineral Resources

Portions of the Moxa Arch Gas Field Core and West Flank, totaling 60,006 acres, underlie the eastern part of the Carter Lease Allotment (See Appendix 1, Figure 1). At this time, the public lands portions of the Moxa Arch inside Carter Lease are almost completely leased. Current projections anticipate infilling of the currently-developed areas comprising the bulk of future drilling activities, with very little development of new areas occurring. The 2006 Moxa Infill Development Project Draft EIS, available at (http://www.blm.gov/wy/st/en/info/NEPA/kfodocs/moxa_arch.html), the 2006 Final Reasonable Foreseeable Development (RFD) Scenario for Oil and Gas Assessment and the 2010 KFO RMP & ROD (http://www.blm.gov/wy/st/en/programs/Planning/rmps/kemmerer.html) all address potential future development and environmental impacts from oil and gas development in the Kemmerer Resource Area. Approximately 281 wells and their associated roads, collector pipelines and other infrastructure have been developed on both federal and private land within the Carter Lease Allotment. These disturbances, primarily in the Moxa Core Area, in combination with other pre-existing two-track roads in the allotment, have removed an approximate total of 5,308 acres, equaling approximately 2.06% of the allotment from vegetative production.

An EIS for the entire Moxa Arch is currently being developed. Potential new development in the Moxa Arch area as a whole could be anywhere from 670 wells drilled over seven years, to 5,165 wells drilled over 25 years (Depending upon which alternative is selected). Assuming that the proposed new infill wells are equally disturbed throughout the Moxa formation, about 12.6% of the new drilling activity, approximately 84 to 650 wells, disturbing approximately 10 acres/well over the short term and 3 to 5 acres/well in the long term, may be expected to occur within the Carter Lease.

BLM Range Management Specialists' field observations and conversations with some of the sheep producers indicate that the improved gas field roads are used for winter access the northeast portion of Carter Lease because those roads are plowed regularly. The sheep producers that do use the Moxa Area inside the allotment have stated that they do not park their camp wagons on wellpads. However, they do occasionally park their wagons in or near the gas fields to facilitate resupply efforts. No sheep bands were observed in the more densely-developed portions of the Moxa when herd counts were conducted in December and January 2009/2010. However, sheep bands were observed and counted inside the gas fields of neighboring allotments. It is possible that the relatively light snowfall levels of 2009-2010 allowed prolonged use of the allotment's interior. The 2010 PFC ID team members observed cattle, as well as their tracks and droppings, inside the Carter Lease gas field. These sightings were typically confined to grassy swales, riparian areas, or paths that connected the vegetation to water sources. As cattle are typically observed only in these sites, it is unlikely that the presence of the gas fields had any influence on the cattle's behavior.

3.3.4 Recreation/Travel

Due to the checkerboard land ownership pattern in the Carter Lease, prospective recreation users must the private lands within the allotment are required to obtain a permission slip from certain WWR, LP Shareholders. Most Carter Lease recreation consists of, but is not limited to: 4-Wheel Drive Vehicle (Pickup, SUV and ATV) use and short-term camping assiciated with rock-hounding, antelope and deer hunting and other dispersed recreation activities.. Higher-use levels seem to be restricted to unauthorized ATV (4-wheeler) use in the federal lands bordered by Highway 412.

3.3.5 Lands with Wilderness Characteristics (LWC)

Continued policy of the Federal Lands Policy and Management Act (FLPMA) of 1976 directs the BLM to look at lands with wilderness characteristics and make a determination as to the affects of the project on those lands. This project was reviewed against the existing inventory criteria wilderness characteristics which are defined to include: size, apparent naturalness, outstanding opportunities for solitude, as well as primitive and unconfined type of recreation.

The Carter Lease does not meet the size requirement (contiguous federal acreage) due to the checkerboard land ownership pattern, nor does it meet the naturalness criteria due to the extensive disturbance levels associated with the Moxa Arch Gas Field (with existing well locations and associated field roads, collector pipelines, other gas facilities such as pumping or processing plants and delivery pipelines), overhead power lines, two branches of the UP railroad, US Highways 30, 189 and 412, the Elkol Coal Mine and nearby power plant, as well as the municipalities of Kemmerer/Diamondville, Opal and Carter. In addition the planned Haystack

Coal Mine just west of Highway 189 near the southwest corner of Carter Lease is likely cause additional impacts that would decrease wilderness characteristics.

3.4 Physical Resources

3.4.a Air Resources

A November 3rd email from Carrie Chitty, Data Manager/Natural Resources Program Principal, State of Wyoming DEQ - Air Quality Division - Monitoring Section, informed this office that available air quality data indicated that the Carter Lease area located in Lincoln and Uinta counties is in attainment for State and National Air Quality Standards at this time.

3.4.b Energy and Mineral Resourcess

Mineral resource concerns within the Carter Lease are concentrated within the Moxa Arch (See Appendix 1, Figure 1) natural gas formation. Due to intermingled land and mineral ownership (Private, State and Public) and the inconsistency of the laws regarding development and reclamation (depending upon ownership), landscape-level management is difficult to achieve.

The presence or absence of livestock grazing within the Carter Lease is not likely to influence whether or not drilling occurs in the Moxa Arch. However, Oil and Gas activity does influence grazing because surface disturbance due to pipelines, roads, pads and other associated activities does reduce the total amount of forage available within the allotment and therefore affects the amount of livestock grazing that can be allowed within the allotment. Currently, approximately 4,608 acres (271 cow AUMs or 384 sheep AUMs) are disturbed within the boundaries of the Carter Lease.

3.4.c Soils

The Carter Lease Allotment straddles the boundary between the Overthrust Belt and the Green River Basin geologic provinces. The Overthrust Belt is most visibly present in the highly-folded hogback ridges on the western edge of the allotment. The Green River Basin consists of relatively flat-lying sedimentary formations is most visible in the steep-sided river valleys and badland bluffs. Locally, deposits of alluvium (water-deposited sediments), colluviums (unsorted deposits deposited in landslides), and terrace gravels (heavier river rocks) occur. Carter Lease soils vary from shallow to moderately deep thickness and often have mixed mineralogy. Many formed in slope alluvium (water-carried materials at the bottoms of slopes) or residuum (Material formed in place from chemically- or physically-decomposed shale or sandstone).

The dominant soil temperature regime is Frigid: (Mean Annual Temperature at 50cm is less than 8ºC, and the mean summer temperature is more than 6º C higher than the mean winter temperature) (USDA/ NRCS/ SSS, 2010).

The dominant soil moisture regime is Aridic: (Dry in all parts for more than half of the cumulative days per year when the soil temperature at a depth of 50 cm below the soil surface is above 5º C & Moist in some or all parts for less than 90 consecutive days when the soil temperature at a depth of 50 cm below the soil surface is above 8º C) (USDA/ NRCS/ SSS, 2010).

Of the 12 Soil Orders in soil taxonomy, only three occur in the Cater Lease allotment: Mollisols, Entisols and Aridisols.

- Mollisols are the soils of grassland ecosystems. They are characterized by a thick, dark surface horizon. The fertile surface horizon results from the long-term addition of organic materials derived from plant roots. Mollisols are among some of the most important and productive agricultural soils in the world and are extensively used for this purpose. However, Mollisols in this region of Wyoming are in the suborder Ustolls, which are located in semiarid climates and are less suitable for use as farmland (USDA/ NRCS/ SSS, 2010).

- Entisols are soils of recent origin with usually no genetic horizons except an A horizon. All soils that do not fit into one of the other 11 orders are Entisols. They are characterized by great diversity, both in environmental setting and land use. Many Entisols are found in steep, rocky settings (USDA/ NRCS/ SSS, 2010).

- Aridisols are soils formed in an arid or semi-arid climate. Aridisols have a very low concentration of organic matter; reflecting the scarcity of vegetative production on these dry soils. Water deficiency is the major defining characteristic of Aridisols. Also required is sufficient age to exhibit sub-soil weathering and development. Limited leaching in Aridisols often results in one or more subsurface soil horizons in which suspended or dissolved minerals have been deposited: silicate clays, sodium, calcium carbonate, gypsum or soluble salts. These subsoil horizons can also be cemented by carbonates, gypsum or silica. Accumulation of salts on the surface can result in salinization (USDA/ NRCS/ SSS, 2010).

All soils in this allotment, regardless of Soil Order, are considered fragile (easily broken or destroyed without protection) (USDA/NRCS, 1996). Some type of protection in the form of rocks, soil crusts or plant parts (both above and below-ground) is critical to protect these fragile soils from erosion. Steep topography in parts of the Carter Lease prevents uniform livestock distribution. As a result, unherded livestock tend to congregate in the lowlands, particularly along the riparian areas near permanent water.

The 2003 and 2010 S&G Assessments both found that the soils resource in the Carter Lease does meet the Standards for Rangeland Health.

3.4.d Water Resources

The lower Blacks Fork, from its confluence with the Hams Fork upstream to the Smiths Fork, is on the 303(d) List for exceeding the E. coli criterion associated with its contact recreation use. UCCD has monitored water quality at 12 sites on the Blacks Fork as part of a Section 319 project. WDEQ found no E. coli exceedances below the Smiths Fork, but did extend the impairment upstream to Millburne. The source(s) of the contamination in the Smiths Fork and Blacks Fork watersheds still remain unknown. The Blacks Fork and Smiths Fork Watershed Management Plan, sponsored by the Uinta County Conservation District is aimed at finding and controlling the problem.

No other flowing systems within the Carter Lease have any known water quality issues. Thus, the segment of the Blacks Fork River within the Carter Lease is the only flowing water listed on Document #10-0230, the Water Quality Assessment and Impaired Waters List (2010 Integrated 305(b) and 303(d) Report for 2010 (WYDEQ. 2010).

S&G Assessments conducted in both 2003 and 2010 both found that the water quality standards within the allotment had probably been met, though quantitative water quality data for the Carter Lease is still unknown.

By combining the information gathered during the 2010 PFC Assessment (Appendix 4) and 2010 S&G Assessments (Appendix 3), an overall evaluation of the watershed units either confined totally, or partially, inside the Carter Lease Allotment was obtained. The wshed56 Unit layer in the KFO GIS Database shows that 15 wshed56 units (Appendix 1, Figure 2) are either entirely or partially within the allotment.

A total of 12 factors were identified that could alter the functionality of a Carter Lease wshed56 Unit:

1. Existence of bridges, culverts and other instream structures.
2. Union Pacific Railroad (UPRR) - Impacts caused by presence of railbed and railroad structures not within stream channel.
3. Highways (US or State) - Impacts caused by presence of road cut/berms, ditches, pavement and other structures not within stream channel.
4. Unpaved Roads – Impacts caused by bladed (unimproved) roads and two-track vehicle paths.
5. Moxa Arch Gas Wells – Impacts caused by presence of the wells, pipelines, roads and other structures directly associated with gas exploration and extraction.
6. Municipalities/Gas Processing Facilities – Impacts caused by presence of towns and large gas processing or pumping facilities.
7. Climate – Effects caused by prevailing natural temperature and moisture regimes in the Carter Lease area. This factor was considered a constant throughout all of the units.
8. Soils - Effects caused by the soils present in each unit.
9. Native Vegetation
    a. Upland - Effects caused by the species and density of vegetation present in upland sites.
    b. Riparian – Effects caused by the species and density of vegetation present in riparian sites.
10. Hayfields – Effects caused by the presence of hayfields (primarily in the Hamsfork River Valley).
11. Invasive/Non-Native Species (INNS) - Effects and extent of the following INNS species inside the Carter Lease.
    a. Tamarisk
    b. Halogeton
    c. Downy Brome (Cheatgrass)
    d. Thistles (Canadian & Musk)
    e. Black Henbane
12. Domestic Livestock – Impacts to the health and function of the 15 wshed56 Units due to grazing domestic livestock in the Carter Lease Allotment.
        a. Winter Grazing
        b. Summer Grazing

The conclusions drawn by the Watershed Assessment (Appendix 5) are:

1. The hydrologic units inside the Carter Lease appear to in stable or improving condition. This conclusion is based on the fact that no signs of accelerated erosion or other disturbances severe enough to impair the function of the watersheds were observed in 2009 or 2010.

2. The presence of various INNS in the Carter Lease (and neighboring areas) has not yet reached the point where the health and productivity of the ecosystems have been damaged.

3. With two exceptions, the functioning springs within the Carter Lease are in declining or non-functioning condition. One exception is protected by topography, the second is apparently unpalatable. The PFC and S&G ID teams agreed that the remaining springs need to be physically protected to allow recovery.

3.5 Social and Economic Conditions

According to statistics published by the USDA National Agricultural Statistics Service in the 2009 revised edition of the 2007 Census of Agriculture (NASS, 2010a), Uinta County had 344 active farms and ranches operating on a total acreage of 742,809, acres with a total net income of $7,086,000. Lincoln County had 535 active farms and ranches operating about 342,630 acres with a total net income of $8,638,000. Of the total agricultural acres, 672,543 acres of Uinta County and 237,796 acres of Lincoln County were classified as pasture. In 2010, agricultural operators in these two counties ran approximately 81,000 cattle and 76,000 sheep and lambs (NASS, 2010b). In 2007, gross receipts from sale of cattle, sheep, and their products in Lincoln and Uinta Counties totaled $43,637,000. The data clearly shows the economies of both Lincoln and Uinta Counties benefit from livestock grazing operations, the related capital spent to establish and maintain ranching operations, and contributions to the labor force. Additionally, the Carter Lease is in a largely undeveloped and rural area. Tourism is an important industry, attracting visitors who enjoy the rural isolated nature of the area. For some of these tourists, livestock grazing compliments the frontier setting they seek in their visits to this area.

A 1991 study by economists at the University of Wyoming revealed that agriculture is an important source of export income for the state's economy. The study also showed that the great majority of inputs to agricultural production come from within the state, and that profits and other income from agricultural production tend to stay within the state. Taken together, these findings indicate that agricultural production is an important contributor to the state's economy (Moline et.al 1991). In a 2000 study, economists at the University of Wyoming compared the income provided to county governments and public schools to the financial demands on community services by agricultural and residential developments. The study shows that on average in Wyoming, ranching activity generates nearly twice as much income for the community services as it requires in expenditures on community services, whereas residential development generates about half as much income as it requires in expenditures (Taylor and Coupal, 2000). These findings underscore the importance of agricultural production in terms of contributions to local economies. Ranching operations that utilize federal forage in the Carter Lease Allotment contribute to this local and statewide trend.

Public lands in the Carter Lease allotment are integral to multiple family ranching businesses, both large and small. The grazing permits allow these ranches access to public lands, thereby consolidating the livestock operations and contributing to livestock production, which is the main source of income for these ranching families. The grazing permit also contributes the rancher's lifestyle and the cultural image of Wyoming as the "Cowboy State."

Public Lands contribute to the receipts of the county in which they are located through "Payment of In Lieu of Taxes" by the federal government. The Carter Lease was established under Section 3 (allotments inside a grazing district) of the Taylor Grazing Act. Monies generated from public land grazing fees on the allotment (approximately $18,346.50 in 2010) are distributed as follows:

- 50% - Range Improvement Fund. This money is used to implement range improvements (i.e. water developments, fence construction, spring developments, etc…) in the area where the grazing fees were generated.
- 12.5% - State of Wyoming to be proportionally redistributed to the counties in which the allotment resides.
- 37.5% - U.S. Treasury

Counties also collect taxes on the ranches' livestock and real property based on the assessed taxable values.

The Wyoming Economic Analysis Division (2010b, 2010c) estimates that the population of Lincoln County increased by approximately 2,422 persons (16.6%) from April in 2000 (14,573) to July in 2009 (16,995). The population of Uinta County increased by 1,185 (6.0%) from 19,742 to 20,927 over the same time period. In response to this population growth, housing units in Lincoln County increased by approximately 1,725 (25.25%) between April in 2000 (6,831) and July in 2009 (8,556), while those in Uinta County increased by 916 (11.4%) from 8,011 to 8,927 units over the same time period. This demonstrates that there are increasing pressures in both Lincoln and Uinta Counties to expand the acres dedicated to housing development. If the proposed Haystack Mine near the southwest corner of Carter Lease does open, this pressure will probably increase.

Chapter 4 Environmental Consequences

4.1 Biological

4.1.a INNS

Currently, the number of INNS sites and acreage infested are relatively small (See Appendix 5) in relation to the allotment. Given that the Halogeton within Carter Lease appears to not be aggressively spreading beyond the currently- or formerly-disturbed sites, it is unlikely that the week will invade other areas and therefore not considered a priority concern. However, the other species (See section 3.1.a) are more aggressive and invasive than Halogeton and are causes for concern because those weed species are known for their tendencies to crowd native plants out of currently infested sites, expanding the infestations' size until they eventually dominate the landscape. Of these, Cheatgrass is the greatest current cause of concern. It is adapted to take advantage of both spring and fall moisture, it will produce seed (up to 478 #/acre that are viable for up to five years) even in drought years, and will out-compete native species by 'stealing' the

moisture from the upper 50cm of the soil profile before the native species break dormancy (Pellant, 1996).

Impacts of Alternative 1- Authorize Continuation of Current Management
The perpetuation of current on-the-ground management would likely facilitate the continuation of current INNS infestation areas and trends. The current emphasis on winter sheep use has aided the native perennials by suppressing the sagebrush and subjecting the grasses to use primarily during their dormant season (Bork et al. 1998).

Impacts of Alternative 2 – Increased Cattle Use
Increasing the summer cattle utilization experienced by the upland vegetation and the areas near the riparian sites may favor Cheatgrass over native species in the long run. Cheatgrass seeds can sprout either after the cattle are removed in the fall or in the early spring, prior to the summer use period (Pellant, 1996). Therefore any Cheatgrass in the summer use areas may escape livestock use because the cattle may miss the time period when Cheatgrass is more palatable and vulnerable and the winter sheep use usually occurs when the Cheatgrass is hidden under snow. Because Cheatgrass high palatability levels occur in such a short timeframe, it is possible that cattle use it at very low levels (Pellant, 1996) if at all. However, the increased summer use of native grasses may decrease the ability of those plants to compete against Cheatgrass, while an increased number of cattle may provide additional seed-transport mechanisms, increasing the total acres infested.

Impacts of Alternative 3 – Proposed Action
The proposed action will increase summer use in the DJR L&L use area by approximately ¼ of that allowed in Alternative 2. Therefore, the factors that may favor the invasion or spread of Cheatgrass in the uplands will not be as strong. Similarly, the summer cattle to spring sheep conversion will be granted, thereby providing at least one band of sheep on the Carter Lease during the time period between when the majority of the sheep leave (April 30) and when the cattle come on (June 1). This coincides with the early growing season when Cheatgrass is growing rapidly and highly palatable. Because sheep herders can control where their flocks feed, it would be possible for them to focus their herds on areas of Cheatgrass invasion. Heavy spring grazing pressure, for short periods of time (Mosley and Roselle, 2006) can reduce the numbers of seeds produced and may keep those sited from crossing the threshold into a Cheatgrass-dominated landscape (Pellant, 1996)

Impacts of Alternative 4 - No Grazing Alternative
This action would eliminate livestock grazing on public lands. However, it is unlikely that it would make any difference in the level of Cheatgrass infestation seen in the Carter Lease. Once Cheatgrass becomes established on a site, it will persist, and potentially expand its dominance level on that site absent any human influence whatsoever (Pellant, 1996). Given that grazing will continue on private and state-held lands within the Carter Lease, it is quite possible that no discernable change in Cheatgrass will occur.

4.1.b Riparian and Wetland Vegetation

Impacts of Alternative 1- Authorize Continuation of Current Management
Winter sheep use is currently the dominant use within Carter Lease and typically has very little effect on riparian vegetation. However, If the herds are allowed to loiter in the riparian zones,

the vegetation can be consumed or trampled to the point that it will no longer protect the soil against drying or the high flow levels caused by spring snowmelt, exposing the riparian areas to increased risk of erosion.
In a typical winter, there is sufficient snow in the upland swales to provide the sheep with sufficient water. However, dry winters can force the sheep herds to use flowing springs or perennial streams as water sources. Because the soils are usually frozen and the plants are dormant, the streamside vegetation has some protection against physical disturbances such as trampling and the physiological effects caused by consumption. However, high levels of physical and utilization impacts to the riparian areas are likely unless the bands are pulled away from the streams or springs after watering.

Because riparian areas are the only available water source in the spring and summer, growing-season sheep use is much more likely to produce potentially damaging impacts on riparian and wetland vegetation in the Carter Lease than traditional winter sheep use. Sheep use during the growing season is likely to result in physical impacts to the soils and herbaceous plants within the riparian areas due to trampling and consumption, especially if the herder allows the sheep to loiter around the water for extended periods of time. However, it is likely that these effects will have a lower magnitude than unherded cattle would.

Unherded livestock, regardless of species, will tend to congregate around springs and streams because the vegetation is thicker and remains green longer and because water is readily available. The prolonged presence of domestic livestock can damage or remove plants, compact or physically disturb the streambanks resulting in higher erosion risks along the more accessible areas of Little Muddy Creek, Muddy Creek and the Blacks Fork River. When livestock do venture up onto the steep slopes, the resulting impacts from grazing and hoof action can loosen soil particles, making these fragile soils more susceptible to erosion.

This can result in lower stubble heights, trampling, compaction, erosion, sedimentation, and fecal contamination (Clary and Kinney, 2002). Summer cattle use can produce high levels of impacts in the riparian areas, especially after the weather becomes hot and/or the upland vegetation dries. Reauthorizing the current management practices is likely to perpetuate the current levels of cattle congregation and impacts seen in the riparian areas. Field observations by BLM range management staff have documented livestock congregations which have resulted in some areas of extensive forage utilization in both privately- and publicly-owned riparian areas, particularly later in the grazing season when upland vegetation becomes less palatable.

The checkerboard land ownership pattern in this allotment makes landscape-level management difficult because the BLM has a very limited ability to regulate use on private- or state-owned riparian areas. Renewing or converting the existing grazing permits to authorize the continuation of the existing management practices on the Carter Lease would perpetuate current condition trends within the allotment. The conditions that led to the 2010 PFC and Standards of Rangeland Health Assessments would continue

Impacts of Alternative 2 – Increased Cattle Use

The 2010 PFC ratings of the Carter Lease flowing riparian systems were between a slight upward to slight downward trend (Appendix 4) and all the livestock-accessible/palatable springs in Carter Lease were rated as declining or non-functional due to livestock impacts (Appendix 4).

Denying any future applications by Larson Livestock to convert their summer cattle permit to summer sheep may encourage Larson Livestock to lease or sell the permit to a cattle producer. The introduction of an additional 47 free-ranging cattle would represent an increase of over 23% in unherded cattle numbers. An increase of this relative magnitude may be expected to have a correspondingly greater effect on the riparian and wetland vegetation in the Carter Lease because sheep are actively herded, allowing their use areas to be controlled. Cattle use pattern mapping indicates that forage utilization is heaviest close to water and decreases rapidly as distance increases (Oberlie & Bishop, 2009, Harris & Asner, 2005, Holochek, 1988).

A 23% increase in uncontrolled cattle (see Section 4.1, Alternative 2) is likely to result in proportionally higher impact levels to herbaceous riparian vegetation, due to both trample and utilization potentially resulting in reduced vegetative cover, higher soil surface temperatures and the soils drying more quickly (Kauffman and Kreuger, 1984). If cattle have a choice, they typically target upland vegetation early in the season (Clary and Leininger, 2000). Therefore, a 23% increase in unherded cattle numbers on Carter Lease would likely result in the upland vegetation near the riparian areas being depleted at a proportionally earlier date. Because quantitative studies predict that impacts to the condition of both riparian vegetation and soil physical stability will increase cumulatively as increasing temperatures and relative lack of palatable upland vegetation effectively cause the cattle to concentrate along riparian areas (McInnis and McIver, 2009, Clary and Leininger, 2000).

Because riparian vegetation such sedges and wetland grasses decrease in both vigor and number under repeated defoliation (Clary and Leininger, 2000, Kauffman and Krueger, 1984), heavy grazing can result in riparian species being gradually replaced by upland species (Kauffman and Krueger, 1984). Upland species have lower biomass production (both above- and below-ground) when compared to riparian species (Clary and Leininger, 2000) and are less capable of withstanding erosion and compaction (Kauffman and Krueger, 1984). Therefore, an upland community provides; less potential forage for livestock and/or wildlife, less soil protection against physical impacts from livestock or erosive forces and drying from either surface evaporation or subsurface drainage (Clary and Leininger, 2000, Kauffman and Krueger, 1984).

When herbaceous streamside vegetation is grazed below 3-4 inches in height, cattle will often shift to browsing the leaves and young stems of riparian shrubs and small trees, and the likelihood of unacceptable impacts to riparian areas increases greatly. (Hall & Bryant, 1995, Clary & Kinney, 2002, Clary & Leininger, 2000). During the 2010 PFC (Appendix 4) and S&G (Appendix 3) surveys, small, isolated clumps of Coyote Willow saplings were observed in some parts of Muddy and Little Muddy Creeks, particularly in the areas that are naturally protected from grazing. With an increase in the numbers of uncontrolled cattle it is likely that the accessible herbaceous vegetations' critical height will be reached more quickly. This could result in higher utilization levels on palatable shrub species (Clary and Leininger, 2000).

The dual-use conversion contained in this alternative could authorize up to 532 additional summer cattle. However, these animals would be unlikely to leave the DJR L&L use area and are considered unlikely to directly impact riparian vegetation due to the distance and terrain obstacles separating the DJR L&L use area from the riparian areas (Holochek, 1988, Harris and Asner, 2003, Oberlie and Bishop, 2009). Potential impacts to public riparian vegetation from the dual-use conversion are likely to be confined to the results of runoff or erosion rates in the

uplands. Increased runoff or sediment volumes from the proposed upland use area may result in altered sedimentation and erosion patterns in the Dry Muddy Creek, Muddy Creek and Blacks Fork River riparian zones.

Impacts of Alternative 3 – Proposed Action

This alternative could produce increased riparian vegetation health and vigor when compared to Alternatives 1 and 2. The Proposed Action adds minimum riparian stubble height requirements to the terms and conditions of the Carter Lease permits. This will provide the permittees a guideline they can measure the current on-the-ground conditions against. It may also motivate them to participate in both upland and riparian monitoring activities on federal land (or private ground if they so desire).

As a result of the stubble height requirements, riparian forage utilization levels could be reduced either by moving the livestock to less utilized portions of the allotment, or removal of the animals. The reduction of livestock impacts through dispersion of forage utilization or removal of the animals may result in improving both stream channel characteristics and functioning condition. In addition, modifying the terms and conditions to require that all livestock-concentrating substances and activities (supplements, sheep camps, etc) be placed a minimum of ¼ mile from any water source has been shown to reduce disproportionate impacts to riparian areas or other water sources by giving the animals a reason to leave the water source areas (McInnis and McIver, 2009).

Granting a limited form of the proposed conversion of winter sheep AUMs to dual-use could result in improved conditions for the riparian vegetation. The plan submitted to BLM calls for the cattle to remain in the uplands and obtain water from portable metal stock tanks filled daily by water trucks and placed solely on private land. The number of cattle authorized by this alternative will make trucking the water economical, and keep the cattle use levels low enough to meet the 30-40% use (by weight) level likely to produce a neutral or improving condition trend when compared to no grazing (Holochek, Pieper and Herbel, 2004). By invigorating the uplands, light to moderate summer grazing may reduce the volume of runoff, thereby reducing the amount of sediment carried into the Muddy Creek or Blacks Fork River systems.

Impacts of Alternative 4 - No Grazing Alternative

Removal of livestock from BLM owned lands in the Carter Lease would likely result in reducing livestock congregations on federal land, leading to reduced utilization of riparian areas and a resulting improvement in the PFC assessments. However, due to the checkerboard land-ownership pattern in this allotment, livestock grazing on private and state owned lands in the checkerboard areas of these allotments would continue to produce direct effects in riparian areas equivalent to, or greater than, those observed under Alternative 1. Higher impact levels to private riparian areas may result in more severe impact levels and degradation that can spread to adjacent public lands both up- and downstream.

On BLM-managed riparian areas, plant populations within the communities that are commonly grazed would have an opportunity to complete all phenological stages. Riparian vegetation would be available for wildlife only, potentially resulting in wider, and more productive riparian areas. Indirect impacts to the ecological function of these plant communities would continue to be

associated with the environmental perturbations associated with fire, insect, and invasive species. Vegetation near streams would only be grazed by wildlife, leaving more biomass to filter the natural sediment carried into the waterways by precipitation.

On most streams, removal of livestock would likely decrease channel width, promote more stable banks, decrease water temperature, promote woody vegetation growth and development, raise the water table, promote more continuous water flow, and reduce sediment loads (Kauffman & Krueger 1984, Doblin *et al* 1998, Myers & Swanson 1995). In many cases, total removal of livestock may provide the greatest protection for riparian and wetland systems (Balky et al 1999, Fleischer 1994).

4.1.c Upland Vegetation

The checkerboard land ownership pattern throughout the Carter Lease Allotment limits BLM's ability to manage the allotment on a landscape basis. Any BLM management decision is enforceable only the public land, making implementation unwieldy and often not sufficient to produce effective changes in the successional stages of the landscape as a whole. Carter Lease met the S&G standards for upland vegetation in both 2003 and 2010, indicating that the allotment uplands are consistently supporting the kinds, classes and amounts of vegetation needed to protect soil stability as well as provide food and shelter for both wildlife and domestic livestock.

Impacts of Alternative 1- Authorize Continuation of Current Management

If this alternative is chosen, it is likely that the current 'on the ground' management practices will continue. Carter Lease upland vegetation will probably continue to be dominated by late seral stage plant communities with mature stands of grasses and shrubs. Single age-class vegetative communities often have limited capabilities to support broad spectrums of wildlife species when compared to a mixed age-class mosaic landscape. Re-colonization of some disturbed areas by desirable grasses or forbs could be limited, resulting in areas of bare ground or undesirable weeds.

In other areas of the allotment, the current livestock grazing management emphasis on winter sheep use has produced a trend toward a generally healthy, though late seral stage, sagebrush-bunchgrass community. The low use levels received by a majority of the Carter Lease uplands during the growing season has consistently allowed full growth potential to be expressed by the plants each year. In some areas, particularly near sheep camp sites that are used every year, the sagebrush does present a clubbed or hedged growth pattern. However, the plants still appear to be healthy and relatively vigorous. These observations are supported by research conducted at some long-term study sites at the U.S. Sheep Experiment Station (near Duboise, ID). Studies (Bork, et al, 1998) have shown that long-term exclusive fall use or spring use by sheep on three-tip sagebrush/grass communities have resulted in:

- Exclusively Fall Use – Lower standing dead shrub cover, greater herb and forb cover; greater perennial grass cover.
- Exclusively Spring Use - Higher live shrub (three-tip sagebrush, bitterbrush and horsebrush) cover, greater annual grass composition.

Continuing current management practices of emphasizing winter sheep use should continue to produce similar effects.

Summer sheep use are likely to produce lower impact levels relative to summer cattle use because sheep are more likely to take a portion of their diet from shrubs and forbs as well as the grasses that form the bulk of cattle diets. However, grass forms the vast majority of both sheep and cattle diets during the spring and summer (Ngugi, et al, 1992). Therefore it is likely that any improved conditions observed in upland vegetation following spring and summer sheep use, relative to cattle use, would depend upon the sheep being herded out of the riparian zones and into areas with lower use levels.

Impacts of Alternative 2 - Increased Summer Cattle Use

This alternative has the potential to produce increased health and vigor in the upland vegetation in many portions of Carter Lease Allotment. Due to reduced winter sheep numbers, some upland areas are likely to see decreased levels of winter shrub species' use. Those areas within the Carter Lease isolated by distance (over one-to-three miles) or topography (slopes of 30%+) (Oberlie and Bishop, 2009, Harris and Asner, 2003, Pinachek et al, 1991, Holochek, 1988) from reliable natural or artificial water sources are less likely to be used by cattle. Therefore any use of the herbaceous vegetation is likely to come from wildlife. Conversely, the relatively flat (<30% slope) portions of the allotment within one to three miles of reliable water sources may experience declines in the health, vigor and density of grasses and other cattle-preferred vegetation due to increased utilization and physical impact levels from the higher numbers of cattle allowed by this alternative.

The herbaceous vegetation in the areas cattle are unlikely to use under this alternative may not show much change because those sites are not currently utilized by livestock during the growing season, or utilized only at relatively light levels. Browse species across the entire allotment could exhibit higher levels of health and vigor, including increased leader retention, reducing the 'clubbed' (hedge-like growth pattern) that can result from repeated browsing. The retention of more/longer leaders on the browse plants may allow the woody species to add additional height and more extensive root systems, The presence of fewer sheep bands, with their attendant camps and horses may result in reduced trampling and utilization levels surrounding some existing sheep camp sites because they may be used for shorter time periods or not used at all.

This option would likely produce higher health and vigor in effect on the browse species throughout the allotment and the herbaceous species in portions of the allotment ungrazed by cattle. However, it is likely that approving this alternative would result in the grasses and other cattle-preferred forage in the designated use area being utilized at higher levels than under the current management program (Alternative 1), resulting in decreased plant health, vigor, biomass production and competitiveness against shrubs (Sheley and Svejcar, 2009, Bork, et al, 1998, Orodho and Trlica, 1990).

The cattle currently authorized on the Carter Lease show a tendency to wander further from the creeks and springs in the spring and early summer while the temperatures are still relatively cool and the upland vegetation is more palatable. When the temperatures climb and the upland forage matures, it becomes less palatable to cattle, causing cattle use to be focused in the more lush areas close to the water sources. The addition of 47 uncontrolled cattle is likely to produce a proportionally higher level of impact to the grasses, sedges and forbs during their growing season.

The borders of the DJR L&L use area (see Section 3.7) encompass 42,285 acres. Using the estimated production figures derived from the method described in Chapter 2, the designated DJR use area produces about 1 AUM per 15.55 acres; for a total of 2,732 cattle AUMs. If the application to convert all four WWR, LP shares to dual use is granted, up to 532 cattle would graze in the DJR use area, utilizing a total of 2,977 cattle AUMs. The potential utilization exceeds the adjudicated production by approximately 245 cattle AUMs, indicating that the upland grasses could be over-utilized. In addition, the acreage and forage lost to roads, wellpads and other Moxa Arch disturbances have not been subtracted from the available forage total for the DJR L&L use area. Therefore, it is likely that there is less forage available in the DJR L&L use area than the current figures suggest and the deficit would be greater. However, because there are no existing or proposed fences to confine the animals to the designated use area, the cattle could access up to 15 additional sections of land (9600 acres, producing approximately 617 cattle AUMs) while still remaining within one to three miles of a water tank.

It is possible that the portions of Carter Lease relatively close to water sources, and therefore likely to be used by summer cattle, (including the unmanaged cattle along the creeks and the cattle managed by water availability in the DJR use area) would exhibit a pattern of higher use levels and physical impacts close to water. The impact intensity is likely to gradually decrease as either distance from water or slope increase (Harris & Asner, 2003, Holochek, 1988, Oberlie and Bishop, 2009). Because the water tanks are not permanent, the concentrated use areas can be varied each year, reducing the likelihood of causing long-term soil and plant damage. Repeated use of preferred forage species over one grazing season can repress an individual plant's health, vigor and ability to compete for water and space (Sheley and Svejcar, 2009, Curtin, 2002, Jones, 2000, Orodho and Trlica, 1990). If this treatment is repeated over multiple years, it may eventually result in plant mortality. Unless care is taken to not place the tanks within range to create an overlap zone when moving the cattle, the potential exists to produce disproportionate impacts to the forage in that area, resulting in suppression or loss of the preferred species (Adler, et al, 2005). This alternative has the potential to selectively repress the cattle-palatable forage plants relative to the other alternatives. These impacts could lead to reduced plant vigor, above- and below-ground biomass production (Sheley and Svejcar, 2009, Orodho and Trlica, 1990) and soil infiltration rates (Castellano and Valone, 2007). These impacts, particularly in the water-limited environment of Carter Lease, may further inhibit plant growth, resulting in decreased health and reduced biomass production. This could start a reinforcing feedback loop between reduced infiltration and plant production, and may result in a trend toward desertification (Castellano & Valone, 2007). However, the dry climate usually causes the cool-season grasses to senesce between mid-June and early July. Therefore, it is likely that the herbaceous plants will not produce sufficient regrowth to encourage damaging levels of re-grazing.

DJR L&L proposes to utilize movable tanks, with the option of placing them anyplace near currently existing roads, within any private section within the proposed use area. This would give them the ability to prevent the establishment of magnified impact zones commonly associated with fixed water-sources. They plan to not re-use any tank placement site as long as impact signs are still visible. DJR, L&L plans to monitor the use patterns and will place the tanks in each succeeding 'pasture' to avoid potential overlap resulting from use patterns in the previous area (Redden, 2011). DJR L&L has also stated that the WWR, LP-approved perennial range seed mix will be broadcast on the impact areas approximately two days prior to moving

their livestock. They believe this will allow the cattle to incorporate the seeds into the loose soil and effectively 'plant' the seeds with good seed to soil contact.

Impacts of Alternative 3 - Proposed Action

This alternative has the potential to lead to healthier upland vegetation communities when compared to Alternatives 1 and 2. Instituting a preferred upland utilization level equal to 40-50% (50% - 60% remaining) of the current year's growth (by height) is likely to result in improved health and vigor for upland herbaceous plants. Research literature cited in Range Management, Principles and Practices (Holecheck, Pieper and Herbel 2004) indicates that arid shrublands under a 'Light to Moderate' (30-40% use by weight) rate showed high rates of recovery for perennial grasses in deteriorated ranges and higher perennial production in the long term. The Utilization Gauge (1980, US Forest Service, Rocky Mountain Forest and Range Experiment Station) was designed to measure the % utilization (by weight) of grasses. For most grass species, the 50% (by height) mark is between 30 and 40% by weight. Therefore, retaining 50% - 60% by height should facilitate achieving and maintaining the healthy and vigorous upland communities associated with moderate use rates in scientific literature.

In addition, a 'by height' use guide is far simpler to understand, visualize and use than a by biomass' standard. The relative simplicity of this method should encourage Carter lease permittees to become more actively engaged in managing their livestock and resources. This management could contribute to grazing impacts being more uniformly distributed across the allotment, allowing the plants in areas that traditionally see heavy use to recover and retain sufficient stubble to protect the soil. Light to moderate grazing rates have been shown to be most beneficial for restoring grass species in sagebrush communities (Holecheck, et al, 2004).

The 40% by weight use level also corresponds to the typical level at which cattle first begin to utilize the under-canopy tussocks that may provide visual cover to nesting sage-grouse (France, et al, 2008). Therefore, a 50% (by height) utilization guideline and ¼ mile sheep camp buffer, on federal land, could facilitate the recovery or reestablishment of the desirable herbaceous and woody undergrowth species in the Carter Cedars area. Successful understory recovery in the Carter Cedars area would provide improved forage, as well as visual and thermal cover for both wildlife and livestock. However, because the Carter Cedars are primarily on private land, the BLM's ability manage this habitat is limited.

The Proposed Action (alternative 3) is likely to produce greater impact levels on the upland grasses, specifically in or near the proposed DJR summer cattle use area when compared to alternatives 1 and 4. Current cattle use in the designated DJR use area is very limited because it is isolated from the natural riparian areas by both distance and topography. The southern edge of the DJR L&L use area is relatively flat and the proposed tank placement areas are separated from the natural riparian areas by well over one mile of rough and broken terrain, making it less likely that cattle will leave the known and reliable water in the tanks. In addition, the DJR L&L use area is separated from the natural riparian areas by rough and steep topography, further reducing the likelihood that the animals would wander away (Harris & Asner, 2003, Holochek, 1988, Oberlie and Bishop, 2009). Increasing growing-season use in the DJR L&L upland use area and providing water to keep those animals there would probably cause the grass plants there to experience higher impact levels under alternative 3 than under Alternative 1. However, this may not necessarily be a damaging impact if the use levels are monitored closely. Light to moderate

use levels can stimulate and maintain grass community health (Holocheck, et al., 2004, Loeser, et al, 2004). For this reason, it is quite possible that alternative 3 could stimulate herbaceous plant growth beyond what may be expected in Alternatives 1 and 4.

Alternative 3 converts only one share of WWR, LP from winter sheep to dual-use. This limitation on the cattle numbers would help avoid potential over-utilization (See Section 4.7, Alternative 2) and help assure that moderate use levels (mentioned above in this section) can be reliably achieved throughout the grazing season.

Impacts of Alternative 4 - No Grazing Alternative

Removal of livestock from BLM owned lands in this allotment would result in the elimination of domestic livestock congregations on federal lands, excluding 13,184 AUMs of public lands forage previously allocated for livestock use would be reserved for wildlife. Protection from livestock grazing might lead to an increase in the density and vigor of the upland vegetation growing on public lands in the Carter Lease. The resulting increase in fine fuel load and continuity could lead to increases in fire frequency, severity and extent; a combination that can produce greatly increased dominance by Cheatgrass in post-fire communities (Davies, et al, 2009).

There are also indications that excluding livestock from sagebrush/grass communities may have no discernable effect or lead to increases in sagebrush and corresponding losses in herbaceous components (Holocheck, et al., 2004). Comprehensive, qualitative tests of primary research literature have revealed that a common shortcoming among studies of the effects caused by domestic livestock grazing is inadequate experimental design that often considers only one variable (presence or absence of domestic livestock) while ignoring other factors, such as geography, climate or topography (Curtin, 2002, Jones, 2000).

However, the BLM has no authority to regulate the presence or intensity of livestock grazing on private or state-owned lands within grazing allotments. Due to the checkerboard ownership pattern of this allotment, grazing could legally continue in every odd-numbered section, producing direct effects on upland vegetation equivalent to those observed under the No Action Alternative. It is also very possible that the impacts would be much greater than those currently seen if the private landowners increase their stocking rates in an effort to meet their operations' financial obligations. Another potential result of closing the federal land in the Carter Lease to domestic livestock could be that the private landowners in the Carter Lease would fence their lands, resulting in issues related to wildlife passage and heavy impact areas associated with fence lines. The private landowners could also deny the BLM passage across their private land, potentially resulting in a severe hampering of the BLM's ability to regulate and administer the public lands in the Carter Lease Allotment.

4.1.d Wildlife, Viable Populations of Native Plants and Animals

For efficiency throughout the alternatives, wildlife species, including threatened and endangered and sensitive species, are discussed together.

Impacts of Alternative 1- Authorize Continuation of Current Management

Understanding the influence of domestic livestock upon native ecosystems is a problematic process. Ascertaining the potential natural vegetation of most Western ecosystems is difficult

because ungrazed land is extremely rare (Fleischner 1994). Continuation of current grazing management would allow all species currently using the allotment to sustain current population levels. White-tailed prairie dog colonies would fluctuate in size based on normal population dynamics. Thus, the potential for black-footed ferrets and other prairie dog colony species (i.e. badger) would still persist along with and habitat for burrowing owls and other small mammals. Mountain plover habitat, both potential and occupied, would persist at the same rate that currently exists on the ground.

Habitat for ferruginous hawks, long-billed curlew, migratory birds and raptor species, Idaho pocket gopher, large-fruited bladderpod and Great basin spadefoot would remain intact and not be negatively impacted. Even though Ute-ladies'-tresses, northern leopard frogs, bluehead sucker, flannelmouth sucker and roundtail chub have not been documented within the allotment or the field office boundaries, potential habitat would still exist with continued grazing management.

Average number of grouse within the area is hard to predict due to normal fluctuations in the population. Yearly average for all leks within the allotment are; 22.5, 19.4, 30.7, 18.3, 31.3, 20.8, 40.7, 14.6, 17.75 and 8 for years 2001-2010, respectively. By identifying only these numbers it would appear that the grouse population is declining. However, not all leks were observed each year. Thus, in any given year that a lek was not surveyed, a zero is entered as the default. Adding a zero would skew the numbers and lower the average. Therefore, only 2001 and 2006 can actually be compared. The average for 2001 was 22.5 while the average in 2006 was 20.8. This is a reduction of approximately 2 birds in a five year period. The factors that lead to the difference in years is unknown at this time, but could be contributed to any number of conditions including but not limited to climatic conditions, number of animals present during surveys or predators. Low growing season use levels, received by a majority of the Carter Lease uplands, has allowed full growth potential to be expressed by the plants each year. Therefore, impacts to sage-grouse, sage obligate bird species and big game are not expected to increase beyond current population fluctuations.

Using alternative watering locations could create small site-specific impacts to the surrounding area and watershed. However, these impacts would be reduced by reducing grazing pressure on the riparian zones. Riparian zones that are left to recover from disturbance would have the capability to catch sediment and be able to provide a root structure capable of withstanding runoff events. By locating salt/mineral supplements a minimum of ¼ mile from any water source, riparian area or aspen stand would also reduce impacts to the riparian zone for the same reasons as just described. Any reduction in sediment loads would benefit the downstream populations of the four Colorado River fish species as well as flannelmouth and bluehead suckers and roundtail chub.

The pronghorn herd is currently 18% over population objective, indicating that current management is not negatively impacting this species. The mule deer and moose herds are approximately 41% and 58% below objective, respectively. The WGFD has indicated that the low population numbers for deer are due to climatic conditions, while the low population numbers for moose are, or at least partially, contributed to a parasite, the carotid artery worm (WGFD 2009b). It is possible that livestock grazing is contributing to the sparse understory

within the Carter Cedars. However, due to the land ownership pattern it would be difficult for the BLM to manage the entire area for deer. Thus, impacts to mule deer from continuation of current grazing practices would remain the same. Moose habitat could be improved by reducing the grazing pressure in the riparian areas. Reducing grazing within the riparian areas would allow the plant species to recover, thus providing more forage for moose throughout the year.

Impacts of Alternative 2 – Increased Cattle Use

Under this alternative, the conversion from summer cattle (47) to summer sheep would not be authorized. The current conversion is eight sheep to one cow AUM. This could be beneficial within the allotment by reducing the likelihood that sheep would browse some of the shrub species, such as sagebrush. In addition, the conversion of 5,360 sheep that graze the allotment during the winter would also be converted to either winter sheep or summer cattle use. Again, removing the sheep would produce beneficial impacts to the shrub species and the wildlife that depend on those shrubs for a part, or all, of their life cycles.

Conversely, not authorizing the summer cattle to summer sheep conversion could result in additional impacts to the streams, riparian areas and the uplands adjacent to those areas. Sheep are typically herded to areas that have forage, and thus can be herded to water sources and away again afterwards. Cattle on the other hand, tend to stay within approximately 1 to 3 miles of a water source (Harris and Asner, 2003, Oberlie and Bishop, 2009), thereby reducing the beneficial effects that riparian areas play within the ecosystem (capturing sediment, steambank stabilization, and providing overhead and nesting cover for migratory birds and fish where willows are present). The conversion of 5,360 winter sheep to allow either winter sheep or summer cattle (up to 532) would probably produce impacts in the same way. However, the impacts could be greater due to this alternative authorizing up to almost three times the number of cattle that are currently authorized.

The proposal does consider this issue and contains provisions to limit such impacts by the use of portable water tanks. If the water tanks were to be used every year to rotate the cattle (section 3.7.a. of this EA) overall habitat quality and quantity could increase. Assuming maximum cattle use within the allotment, it is possible that there would be an increase in potential habitat for mountain plover. Plover prefer areas of low growing vegetation such as cushion plant communities. Grazing the native grass species by cattle could reduce the overhead cover creating an area with shorter grasses, thus creating potential habitat for mountain plover. Negative impacts could also be observed. Grazing could reduce the grass height and potential litter on the ground. Reducing the amount of grass and the potential ground litter could cause insect populations to decline, thus impacting the food source that plover rely upon.

Prairie dogs tend to prefer areas with short grass, or create these areas when establishing a colony. Areas with short grasses allow prairie dogs to observe and avoid potential predators. Cattle grazing the area could reduce the overhead cover allowing more prairie dogs to observe and consequently avoid predators. This would be beneficial by allowing more prairie dogs to survive. Increasing grazing pressure by cattle could have beneficial impacts to plover, prairie dogs, potential black-footed ferrets habitat, burrowing owls and other wildlife species that live in and near prairie dog towns and short grass/cushion plant communities.

Grazing has the potential to degrade sage-grouse nesting and brood-rearing habitats, or improve them under some circumstances by changing the composition, quantity, or quality of vegetation and litter. The proposed modifications to the Terms and Conditions outlined in Alternative 2 in addition to use of stock tanks could assist in more moderate levels of use, resulting in retention of plant residue in both upland and riparian sites within the Carter Lease, thereby improving overall plant community health (Cagney et al. 2010). Improved plant community health could result in improve stand density, diversity and vigor, resulting in more abundant food and cover for sage-grouse. Additionally, the same could be said for pygmy rabbit, pronghorn, mule deer and sage obligate bird species (sage thrasher, sage sparrow, Brewer's sparrow and loggerhead shrike). However, negative impacts could occur to the bird species due to removal of grass, thus reducing the numbers of insects available to forage upon. In addition, the water tanks would create an environment capable of sustaining mosquito eggs. The eggs would hatch, become larvae and finally become adults. This could increase the potential for West Nile Virus to persist and cause declines in the sage-grouse population. An increase in the potential for West Nile would not be the only concern. Raptors could use the water tanks as hunting perches. One of the tanks was placed approximately 855 feet from the Roberson North lek, while another was placed approximately 2,041 feet from the Ziegler's Wash North lek. Both leks and all tank locations are located on private surface. Control over placement of the tanks does not lie within jurisdiction of the BLM. However, the additional pressure of 539 cattle grazing the area and watering at the tank locations during nesting and early brood-rearing times could cause hens to abandon the nests and/or nestlings or could result in nest trampling of late nesting hens, in turn causing declines in the population. Additionally, an increase in the West Nile Virus could cause livestock (horses) to die at nearby ranches along the Hams Fork River.

Dispersing cattle into the uplands could improve riparian habitat as well, if the proposed water tanks are used. Dispersing the cattle into the uplands would allow a moderate use of plants in the uplands. Moderate use in the uplands would allow plants to retain the vigor needed to recover after grazing; thus, reducing sedimentation into the riparian areas from the uplands. Reduced grazing pressure in riparian areas would produce improved condition for the soils and vegetation in the riparian areas due to lower rated of defoliation and physical impacts. Compaction and erosion caused by repeated hoof action would be reduced, allowing the riparian vegetation to catch sediment and be able to provide a root structure capable of withstanding runoff events. Allowing the riparian vegetation to catch sediment and provide bank stability during runoff events would improve potential and known habitats for bluehead and flannelmouth suckers, roundtail chub, Colorado River fish species, Ute ladies'-tresses and moose.

Dispersing the cattle into the uplands more evenly throughout the allotment could cause negative impacts to the northern leopard frog, long-billed curlew and great basin spadefoot toad. The long-billed curlew prefers a complex of shortgrass prairies, agricultural field, wet and dry meadows and prairies and grazed mixed-grass and shrub communities. The northern leopard frog breeds and lays eggs in stock ponds, semi-permanent ponds and in the margins of larger lakes and beaver ponds. The great basin spadefoot toad requires both ephemeral and permanent water sources to breed. The uplands within the allotment contain natural springs and low lying areas that catch water which provide habitat for these species. Dispersing cattle grazing throughout the allotment could allow for degradation of these springs and playas from overuse if the cattle begin using these areas rather than the stock tanks. Increasing stocking rates of cattle

increases this potential. In addition, the seventeen stock tanks are located within 6 unfenced 7,000-acre 'pastures'. The potential does exist that cattle will not use the stock tanks and will congregate within the riparian areas. It is possible that if cattle, which are typically not herded, were allowed to range throughout the allotment without fences restricting movements, the riparian areas would be located and utilized more heavily with 539 additional cattle compared to the historical winter sheep use. Therefore impacts to riparian areas could potentially be three times that of Alternative 1.

The Terms and Conditions that would be authorized under this alternative would be the same as those authorized in Alternative 1. Therefore, impacts to ferruginous hawks, other migratory birds and raptor species, Idaho pocket gopher and large-fruited bladderpod would be the same as under Alternative 1.

Impacts of Alternative 3 – Proposed Action

Like in Alternative 1, the conversion from summer cattle (47) to summer sheep would be authorized, instead of authorizing the TNR permits annually. In addition, a portion of the winter sheep conversion to either winter sheep or summer cattle would be authorized. Instead of the full conversion, this alternative would reduce the actual number of cattle proposed under Alternative 2 (532) to 132 cattle over a 168-day grazing season (May 16 – October 30). Impacts from the summer cattle (49) to spring and summer sheep would be similar to those described under Alternative 1.

Impacts from a reduced conversion (132 cattle) could be beneficial for the allotment. Impacts to ferruginous hawks, other migratory birds and raptor species, Idaho pocket gopher and large-fruited bladderpod would be the same as under Alternative 1. Impacts to prairie dogs, black-footed ferret habitat, mountain plover, burrowing owls and other wildlife species that live in and near prairie dog towns and short grass/cushion plant communities, bluehead and flannelmouth suckers, roundtail chub, Colorado River fish species, Ute ladies'-tresses and moose would be similar to those described under Alternative 2.

Impacts to sage-grouse would be similar to Alternative 2, except that the negative impacts to the bird species due to removal of grass, thus reducing the numbers of insects available to forage upon, would be reduced. The reduction in this impact would be from the implementation of the conditions that cattle would be moved when average plant height outside of the cages reaches 50-60% use compared to the ungrazed vegetation inside the exclusion cages. By leaving 40-50% of the plant growth, the grazed/browsed plants have an opportunity to recover. In addition, this would allow standing vegetation to be carried into the winter, some of which would be available the following spring. Leaving standing vegetation for the following spring allows grouse and sage obligate bird species (sage thrasher, sage sparrow, Brewer's sparrow and loggerhead shrike) to use this vegetation for food, cover and nest material and concealment; in addition to providing forage the following spring for insects that sage obligate and other migratory birds feed upon. Impacts from leaving standing vegetation for food and cover would also improve habitat quality for pygmy rabbit, pronghorn and mule deer.

Impacts from disturbing nesting and brood-rearing sage-grouse around the water tank locations would be similar to Alternative 2. However, impacts would not be as great due to the large

reduction in proposed cattle use from Alternative 2 to Alternative 3 (539 and 135, respectively). The risk of West Nile Virus would be the same as in Alternative 2. In addition, impacts to grouse would be reduced by implementing the following term and condition; "No sheep camps or other disruptive human activity would be permitted within 0.6 mile of active sage-grouse leks between 8pm and 8am during the March 1 – May 15 1ekking season to prevent disruption of grouse display and breeding activities." By eliminating sheep camps or other disruptive activities around the lek from March 1 to May 15 would allow sage-grouse to breed without major disturbances. Grouse tend to be active on leks during the early morning hours; while sheep camps are also normally an active area in the early morning hours when the herder(s) is/are preparing for the daily activities. Keeping the human activities away from the leks would allow the grouse a chance to lek and breed without disturbances, which in turn could increase the number of hens that nest. However, the number of hens that nest would likely not be as high compared to an area where no disturbances were allowed during the entire nesting and brood-rearing season (March 1 – July 15, USDI 2010b). By increasing the number of hens that nest, the number of eggs that may hatch also increases, which also increases the number of young grouse that may survive to breeding age. Bobcats, badgers, red fox, coyotes and ravens (Heath et al. 1998) have all been identified as sage-grouse nest predators. Ravens are generalist omnivores eating live meat, eggs, insects, grains, fruit, garbage and carrion (Boarman and Hienrich 1999). Sheep camps may attract ravens due to foods (i.e. dog food and garbage) and carrion (i.e. livestock mortalities). Not allowing any sheep camps within 0.6 miles of a lek would potentially allow grouse to breed and then find a suitable nest location without being observed by predators such as ravens. State statue (23-1-101) designates red fox and coyote are designated as "predators" (Wyoming 23-1-101). This means that these two species may be taken without a license in any manner and at any time (Wyoming 23-3-103). Even if coyotes were to come near the sheep camps, it is highly likely that sheep herders and livestock owners would dispatch the animals as quickly as possible. Therefore; by not implementing this term and condition, it is possible that a sheep camp may be located on a lek for up to two weeks. Locating a sheep camp on, or very near a lek would reduce the number of grouse that breed and nest and could potentially cause grouse to abandon the lek location or increase nest predation. A reduction in productivity, or even lek abandonment, could negatively impact the population of the species.

Impacts on the northern leopard frog, long-billed curlew and great basin spadefoot toad from cattle grazing in the uplands would be similar to Alternative 2. However, this impact would be reduced. The reduction would not only be due to a reduced number of cattle, but due to the nature of cattle to find the nearest water source. Even if cattle were to "stray" outside of the unfenced 7,000 acre 'pastures', the likelihood of those cattle staying within the same riparian area would be reduced. Even if the cattle were to stay in the same riparian area, impacts from 132 cattle would not be as severe as impacts from 532 cattle. Any spring or playa that the cattle were to locate would most likely be used as a water source only when the cattle were grazing next to that particular source during normal grazing activity. It would be expected that, due to movements and grazing nature in cattle, a new water source would be used (i.e. water tank) within a few days. Therefore, it is expected that even if a spring or playa were to be used, the use would be of short duration; thus, reducing impacts to the leopard frog, spadefoot toad and curlew.

Impacts of Alternative 4 – No Grazing Alternative

Removal of livestock from the allotment analyzed in this EA would contribute to reducing livestock congregations leading to an improvement in wildlife habitat conditions over the short term, on federal lands. Private landowners may be inclined to fence private lands to prevent livestock trespass onto public lands and allowing livestock to graze private and state owned lands within the allotment area; therefore, the long term effects could be detrimental to wildlife habitat and populations. In the short term, all habitats would be allowed to recover from grazing pressure creating a more natural landscape environment. This type of environment would be a late seral stage vegetation community dominated by sagebrush. This would provide nesting habitat and thermal and hiding cover for terrestrial species (wildlife and birds). The riparian areas would be able to recover to provide bank stability and forage for many wildlife species, thus increasing PFC ratings. Recovery by all plant species within the area would reduce run-off and sedimentation loads, improving aquatic habitat for frogs, toads and fish species.

Long term, livestock pressure in the private and state lands could cause a decline in habitat health and reduction in wildlife populations. Grazing pressure on uplands could reduce plant vigor, which in turn could reduce the available nesting and foraging habitat for grouse. Currently, there are twelve sage-grouse leks within the allotment boundary. Of these twelve, five occur on private lands (Little Muddy Rim, Desertion Point East, Roberson North, Roberson East and Ziegler's Wash North). Reducing the available nesting and foraging habitat and canopy cover for thermal protection and predator avoidance could cause these five leks to be abandoned. Abandonment of these five leks could result in a loss of approximately 86 adult male grouse (10 year average), 173 females (10 yr male average multiplied by 2) and the nestlings that could be produced by the females. In addition, three leks (Little Round Mountain North, Little Round Mountain South and Mulkay Springs North) lie on section lines that separate federal from private surface ownership. These leks could move, experience declines or become abandoned. The Little Muddy Rim lek is within the governor's sage-grouse core area and the three that lie on section lines are also within the core area. If a worst case scenario was considered, there would be a loss of eight of the twelve leks (four leks within the grouse core area). The sage-grouse is currently listed as a BLM sensitive species. SSS Management Policy 6840 requires the BLM not only to manage species listed under the ESA, but to also manage WBSS to prevent the need for future listing under the ESA. Due to the current status of sage grouse (warranted for listing, but precluded), a worst case scenario loss of eight leks could contribute to the species being listed as threatened under the endangered species act.

Canopy cover could be reduced allowing more predation on grouse, big game and other wildlife species. If the private lands were fenced, fence posts could provide hunting perches for raptors hunting grouse and other small wildlife species. The fences themselves could negatively impact grouse due to collisions and restricting seasonal migration of some big game animals, especially pronghorn antelope (Spillett, J.J. et.al. 1967, Yoakum J.D. 1979, and JHWF 2001). An edge effect in which livestock would consume or trample vegetation would also be developed along fences. Livestock trailing along the fence would eventually create a path which could lead to increase erosion in the uplands. Riparian habitats could be heavily impacted due to the nature of cattle to be near a source of water. Grazing pressure on the private lands within the riparian areas could lead to increased bank erosion. All of these factors could impact fish and amphibians by increasing sedimentation loads throughout the watershed.

During a worst case scenario, all of these impacts from grazing could force wildlife to adjust behavior patterns in which only federally managed lands would be used by wildlife. Impacts would be similar between wildlife overgrazing federal lands and livestock grazing on private and state lands.

4.2 Heritage Resources

4.2.a Cultural Resources

In addressing potential impacts to significant cultural resources within this grazing allotment, properties that derive their significance all or in part from their surface expression/manifestations or the natural context and setting of the property require special consideration. These site types include, but are not limited to, segments of the National Historic Trails system, prehistoric or historic structures or structural remnants, prehistoric rock alignments, rock shelters, areas with known pictographs and/or petroglyphs, or sites or areas of known traditional significance to Native American or other recognized groups. Protecting these areas from impact can be accomplished by restricting the placement of supplemental feed, salt/mineral blocks, or other concentration-producing items that would artificially concentrate livestock to outside of ¼ mile buffers from such areas on public lands. In most cases, a dispersed grazing pattern in the vicinity of these cultural property types will have no or minimal affect on these resources. Should impacts associated with general grazing be detected in the vicinity of significant cultural properties, protective barriers will be required and/or some other mitigation of these adverse impacts must be conducted.

In general, other site types in this region derive their significance solely from the scientific information they can provide. In most cases, this significance would be derived from intact subsurface cultural deposits within these site areas. Generally, these site qualities will not be affected by standard grazing practices.

The Cultural Resource Data Review contained the following required stipulations, to prevent inadvertent adverse impacts to cultural resources within this grazing allotment. These terms and conditions apply to all four alternatives included in this document.

1. Authorization is for standard livestock grazing only. Any related projects (e.g. fence lines, water pipelines and troughs, spring developments, reservoirs, etc.) and locations for feed supplements (e.g. crystalyx and other mineral feed supplements etc.) within the allotment boundaries require separate authorizations.
2. In order to protect the remaining trail corridors within the Carter Lease Allotment, all supplemental feed, salt or mineral blocks or any other measures that would artificially concentrate livestock in one place should be kept to a minimum of ¼ mile from the Oregon/California Trail and related NHT variants, as shown in the attached map (Appendix 1, Figure 8). This stipulation applies specifically to federal surface as listed in the clearance. In addition, adherence to this ¼ mile buffer is recommended along those segments of NHT located on non-federal surface. Alternatively, a Class III inventory could be conducted of

any proposed salt lick site located within ¼ mile of the trail in order to minimize new impacts to the trail setting.

3. In order to insure that historic properties are not being impacted by livestock grazing, periodic inspections of known historic properties will be required. In addition, Rangeland Management Specialists will keep the Cultural Resource staff fully informed concerning areas of livestock congregation and all areas subject to impacts. This information will be disclosed to the cultural resource staff members as these areas become known.
4. If future grazing activity within the allotment boundaries should expose previously undetected cultural resources or if BLM determines that significant historic properties are being damaged by grazing activities within the allotment boundaries, the terms and conditions of the permit will be amended to protect any such historic properties until such time as protective barriers and/or mitigation of these adverse impacts can be conducted.

Impacts of Alternative 1- Authorize Continuation of Current Management

Finding of Effect for Project:

Pursuant to the Wyoming State Protocol IV A.1, Appendix B.2, & B.27, renewal of this plan for the same use previously authorized and which does not authorize or promote surface disturbance and where type of animals and seasons of use do not change, has no potential to affect historic properties and is exempt from further review. The undertaking may proceed as planned without further consideration of cultural resources other than the inclusion of the standard stipulation regarding the discovery of unanticipated cultural resources on the authorization.

Impacts of Alternative 2 – Increase Cattle Use

This alternative will maximize cattle usage of this area and could result in an increase in soil erosion, riparian impact, and other forms of environmental degradation. Selecting this alternative could adversely affect cultural resources within this allotment.

Impacts of Alternative 3 – Proposed Action

This alternative is designed to improve overall range conditions within this allotment, including a decrease in soil erosion, riparian impact, and other forms of environmental degradation. The monitoring of livestock use within the allotment will assure that ecological conditions do not change in a manner that would adversely affect cultural resources within this allotment.

Impacts of Alternative 4 - No Grazing Alternative

Implementation of this alternative would certainly protect the cultural resources on the public land. However, if the private landowners decide to fence their private land, cultural resources that exist on private land could be threatened by the construction process. In addition, if the private landowners bar the BLM from crossing their private land, it would make it difficult or impossible to conduct further inventories or ensure protection of known resources.

4.3 Mineral Resources

Impacts of all Alternatives

The presence, absence or numbers of livestock present on the allotment is not expected to have any impact on the number of oil or gas wells drilled, the rate at which they are drilled, or how

many miles of roads or pipelines installed in the Moxa Arch or any other potential oil or gas fields present inside the Carter Lease. Rather, the number of wells drilled, along with their associated developments, has an impact on the amount of forage available in the allotment boundaries that must be allocated between livestock and wildlife.

4.4 Land Uses

4.4a Livestock Grazing Management

Impacts of Alternative 1 – Authorize Continuation of Current Management

Under this alternative, the Carter Lease permittees would not experience any operational changes as they would not be required to make any changes to their current operations.

Larson Livestock would benefit from the conversion of Permit #4900132 from 5/16-10/15 spring/summer cattle to 5/1-9/30 spring/summer sheep which would provide a consistent basis for annual livestock management based on reliable sheep AUM numbers and season of use. However, DJR L&L would not gain the operational flexibility the dual-use conversion would have given them. However, their operation would retain the fiscal stability and relative security of lease-based income based on leasing the AUM use from their shares to other producers.

Impacts of Alternative 2 – Increase Cattle Use

This alternative would likely cause the greatest changes to the Carter Lease Permittees' Livestock Management practices.

Because this alternative would not allow the cattle-to-sheep conversion requested by Larson Livestock, it would effectively make permit #4900132 useless (as a sheep forage source) to Larson Livestock. Therefore, Larson Livestock may need to either modify its current management to absorb the lost forage, or locate and purchase/lease alternative pasture for the sheep that would be run on Carter Lease under Alternatives 1 or 3. This would likely result in the purchaser or lessee of that permit developing or modifying their own operation to accommodate the 47 head of summer cattle use which could increase the profitability and survivability of their operation. The other summer cattle permittees would be affected in that they would need to make adjustments due to the presence and impact of the 47 additional cattle introduced by the new permittee.

This alternative would give DJR L&L the ability to use the preference attached to their WWR, LP shares for either cattle or sheep. This would enable DJR L&L to take advantage of increased potential return in either the beef market (by running their cattle on Carter Lease) or the sheep/wool market (by leasing some or all of their shares to area sheep producers). The only constraint on their flexibility would be the requirement [43 CFR , section 4110.2-3(f)] for a minimum three-year duration on any leases DJR L&L may enter into or terminate.

DJR L&L's increased flexibility could cause the other Carter Lease permittees' operations to experience higher levels of uncertainty or instability. Some producers who have relied on leasing DJR, L&L shares for winter sheep use may find themselves without pasture if DJR L&L chooses to convert the animal kind (Winter Sheep to Summer Cattle) for that particular share at the end of their current lease period. Those lessees are likely to suffer some degree of economic hardship due to losing their lease(s).

Impacts of Alternative 3 – Proposed Action

This action is likely to produce a moderate level (compared to the other alternatives) of immediate impacts to current or desired Carter Lease Livestock Grazing Management programs, while offering the potential of reduced alterations to existing or desired Carter Lease Livestock Grazing Management programs when compared to the other alternatives.

If DJR L&L uses the sheep use option of this conversion, the expected impacts would effectively duplicate Alternative 1. Therefore the detailed analysis of the livestock kind dual-use authorization portion of Alternative 3 shall be restricted to the anticipated effects of the cattle use option.

The institution of mid-season triggers and end-of season goals for both riparian stubble height (5 – 7") and upland use {50%-60% remaining (by height)} would require the permittees and/or their employees to adjust their management practices, particularly those with a use period during the growing season.

The spring sheep and summer cattle permittees may be inconvenienced by the requirement to conduct occasional checks on the areas that receive higher use levels, particularly near the riparian zones and upland water tanks. However, the time and expense required to make occasional checks is not likely to impose an onerous burden on the permittees' operations.

Conducting Cheatgrass-control grazing efforts will require a more intensive use-monitoring effort because the native species cannot tolerate repeated intensive defoliation, particularly early in the growing season. Therefore, the use patterns must be carefully monitored to ensure that the grazing pressure is focused on the annual weedy species, rather than desirable native perennials.

Requiring all sheep herders (either winter or spring) to drive their sheep bands away from the riparian areas after watering will not impose any additional labor costs on the sheep operators, as the herders will be with the sheep bands anyway. However, the permittees may have to make some additional supervisory effort (depending upon the reliability of their herders) to ensure compliance with the new Terms and Conditions.

Adhering to the riparian stubble height and moderate upland utilization guidelines has the potential to improve the health, vigor and production levels of both the upland and riparian communities (Holochek, 1988). It is very difficult to predict when range conditions may improve because any changes are dependent upon favorable climatic conditions as well as moderate use levels. However, even before the range conditions improve, the permittees may realize lower death losses and higher gains per animal due to moderate use management, which can lower competition levels for the available forage. Eventually, the permittees should realize noteworthy gains in their gross income as the vegetative conditions in Carter Lease improve, leading to an increase in the amount and quality of forage available per head of livestock on the allotment (Holochek, 1984). The potential also exists that the vegetation's improved resilience would require lower levels of destocking (to prevent damage to the resource) during dry years, causing lower levels of financial loss to the permitees.

The sheep producer that currently leases whichever share DJR L&L chooses to convert to cattle use will probably face the same issues described in Alternative 2. Likewise, the permanent cattle-to-sheep conversion of permit #4900132 would grant Larson Livestock the same benefits outlined in Alternative 1. DJR L&L would gain the flexibility offered by the conversion of one share of WWR, LP to dual-use. However, the flexibility and potential for increased profitability would not be as great as that offered by Alternative 2. The monitoring efforts required by the terms and conditions attached to the dual-use conversion would raise DJR L&L's man-hour workload, but not to an onerous level.

Impacts of Alternative 4 - No Grazing Alternative

Removal of livestock from BLM owned lands in the Carter Lease is likely to result in reduced livestock congregations on federal lands. In the absence of domestic livestock use, BLM range management practices would shift to wildlife habitat management. Another direct consequence resulting from livestock removal would be that the BLM would no longer collect grazing fees on the Carter Lease. This would eliminate one source of funds used to build range improvements that are also used by wildlife, thereby reducing the agency's ability to manage and improve wildlife habitat.

However, livestock grazing on private and state-owned lands in the Carter Lease Allotment would likely continue to produce direct effects to those lands equivalent to, or greater than, those currently observed on the ground (Appendix 3). Because Carter Lease lacks any internal fences, the checkerboard ownership pattern vastly increase the chances that at least some BLM lands would be utilized at the same levels as neighboring private lands. To prevent their animals from trespassing upon federal lands, the former permittees would be forced to either: 1) hire enough herders to keep their animals actively herded away from federal lands, or 2) install boundary fences along the section lines. The man-hours and monetary investments required to pay and supervise the herders, or to build and maintain the fences, would place additional financial burdens on the permittees' operations. Another possible consequence is that the permittees may close their privately-owned lands within the allotment boundaries to BLM access, making it more difficult for the BLM to properly administer the public lands' resources.

The ranching operations and lifestyles for the Carter Lease permittees would be curtailed dramatically. Losing the management options and revenue associated with their Carter Lease grazing permits could potentially force the permittees to sell private lands associated with their Carter Lease operations, potentially including lands within the allotment as well. If the parcels are sold for residential or commercial purposes, the resulting development could result in further landscape-level habitat fragmentation. Implementation of this alternative would not allow BLM to meet its Congressional mandates for multiple use and sustained yield. It also would not allow the implementation of compatible land use decisions specified in the KFO ROD and RMP.

4.5 Physical Resources

4.5.a Air Quality

This section examines the probable impacts to air quality that can be expected from each of the four alternatives examined in this document. Impacts to air quality that do not stem from livestock are included in the Cumulative Impacts Section (Chapter 5).

Impacts of Alternative 1 – Authorize Continuation of Current Management
Given that the current livestock management program has not adversely affected air quality within or downwind of the Carter Lease, the continuation of these practices is unlikely to produce any changes in air quality.

Impacts of Alternative 2 – Increase Cattle Use
This alternative would reduce winter sheep use and increase upland summer cattle use. Therefore it may result in more exposed upland soils, leading to increased wind erosion and airborne soil particles which may result in measurably decreased air quality.

Impacts of Alternative 3 – Proposed Action
This alternative could result in up to ¼ of the upland cattle impacts from Alternative 2. However, the lighter use level, in combination with the utilization trigger points should protect the uplands from potential degradation.

Impacts of Alternative 4 - No Grazing Alternative
This alternative would be likely to reduce contaminants from public surface acres due to livestock. However, it would not produce any affects on contaminants from private or state lands.

4.5.b Soils
The 2003 and 2010 S&G assessments both determined that the soils met the standards. Because the Carter Lease soils are all considered fragile (meaning that they are readily eroded if disturbed), this indicates that the current impact levels are sustainable. Direct impacts to soils often result from domestic livestock's tendency to develop trails between preferred forage areas, water or mineral sources, and along fences. Physical impacts to soil and vegetation may result from changes in livestock type, numbers or impact areas authorized by the alternatives considered in this document have the potential to alter the Carter Lease soil resource; both directly and indirectly.

Grazing impacts to physical and erosional features of xeric soils is supported by statistical analysis of existing research (Curtin, 2002, Jones, 2000). Soils may experience surface compaction that may be attributed to livestock hoof impacts occurring over very long periods of time. Some sites inside long-term (multi-decade old) livestock exclosures in Arizona had lower surface soil densities, higher infiltration rates and higher vegetation densities than comparable sites outside the exclosures (Castellano and Valone, 2007). The authors noted that soils subjected to freeze-thaw cycles (both inside and outside the exclosures) tended to have lower surface densities than soils of the same type that did not freeze. Therefore, it is reasonable to assume that freeze-thaw action and frost heave caused by the relatively severe winters experienced in southwest Wyoming may alleviate any compaction caused by livestock.

Impacts of Alternative 1- Authorize Continuation of Current Management
This alternative would renew or modify the existing Carter Lease grazing permits to authorize the continuation of current livestock management practices. Maintaining winter sheep as the primary use within Carter Lease will ensure that most of the physical impacts occur while the ground is frozen and less susceptible to compaction. Therefore, winter sheep use typically results in lower impacts to the soil in terms of compaction, displacement and plant-provided

stability. In addition, because sheep can utilize snow as a water source during the winter, they are less likely to produce concentrated impact sites around water sources unless the area experiences a winter drought.

Winter use typically produces lower impact levels on preferred plant species when compared to use that occurs during the growing season. Because the herbaceous plants are dormant, their root systems are not depleted by regrowth efforts. During the winter, browse from winterfat, sagebrush and other brush species will compose much of the sheep diet. However, they still consume considerable amounts of the standing dead grass leaves and seed stalks (Ngugi, et al, 1992). This has been shown to not only preserve, but promote the growth and vigor of the grass and forb components in the sagebrush-steppe environment (Bork, et al, 1998).

Sheep flocks tend to remain relatively close together, as opposed to unherded cattle (which often disperse over wider ranges to feed). Therefore, making the existing spring and summer sheep use practice permanent may create the opportunity for the sheep to produce some localized soil compaction or displacement if the herder does not move the sheep to unused areas frequently. The potential exists for plant utilization levels, as well as the levels of physical disturbance or soil compaction to become unacceptable. Because there is no snow available for a water source, the sheep must come to one of the creeks or springs for water. When the flock is brought to water, it will probably come in a mass and it is inevitable that the soils on the channel banks and floodplain will be impacted (churned, loosened and trampled) at some level. It is important that the herder allow the animals enough time to drink and then drive them well away from the water. If the sheep are allowed to remain near the water for extended periods of time, it is quite possible that the utilization levels would exceed sustainable levels.

Given that this option would make currently existing management plans permanent, it is important to consider that the currently observed soil, vegetation and riparian conditions do not show the impacts discussed above (see sections 3.1, 3.4.a, 3.4.b & 3.7). Therefore, it is unlikely that making these practices permanent would result in new impacts.
The current effective management practices place a maximum of 199 cattle (See Table 2, Section 3.7.a) on the allotment if season-long use is utilized. The number of cattle on the Carter Lease at any one time during the summer grazing season may be more or less, depending upon whether a permittee is running more animals for a shorter period of time.

Remote sensing research on the Grand Staircase-Escalante National Monument (Harris and Asner, 2003) and other literature (Oberlie and Bishop, 2009, Cruz, et al, 1998, Holochek, 1998, Genskopp and Vavra, 1987) indicate that cattle are unlikely to utilize slopes greater than about 20-30% or wander over approximately one to three mile(s) from known water sources unless lack of feed or herding forces them to. When cool-season upland vegetation matures and dries, it becomes far less appealing as a food source when compared to the lush riparian vegetation. High summer temperatures add an additional disincentive for the animals to leave water. Livestock congregations in riparian areas often result in extensive hoof action (such as bank trample and compaction) and high forage utilization. Both of these consequences result in the loss of standing biomass and litter, both of which are needed for surface cover to protect soils from wind and water erosion. The incised nature of the Carter Lease streams puts steep

topography right next to the water, which increases the risk of soil displacement when livestock climb or descend the steep slopes.

Field observations by BLM range management and wildlife staff in 2010 did document instances of apparent soil compaction and displacement on the creek's channel sides and bottoms which were likely due to livestock trailing or congregation. However, the total percentage of stream length impacted was relatively minor. The implementation of Alternative 1 would be expected to maintain and continue the current use patterns and the resulting level of soil compaction and erosion conditions.

Impacts of Alternative 2 - Increase Summer Cattle Use

If the KFO chooses to not allow the proposed summer cattle-to-summer sheep conversion, while concurrently allowing the currently proposed sheep-to-dual-use conversion, there is a potential for impacts to the soil resources within the Carter Lease, particularly if the maximum number of potential cattle use is utilized. Alternative 2 would effectively more than triple the current number of cattle utilizing the Carter Lease Allotment during the summer. The unconverted cattle permit would effectively increase the uncontrolled cattle by 47 head (A 23.6% increase relative to the current use levels). It would also add 532 head of cattle within the proposed DJR use area described in Section 3.7.a.

If an additional 47 summer cattle were allowed to graze in an uncontrolled manner, the 1- to 3-mile area of typical cattle use around the riparian areas (Oberlie and Bishop, 2009, Harris, et al, 2003, Pinachek et al, 1991, Holochek, 1988) could be expected to experience a proportional increase in both vegetation utilization (decreasing the canopy and root mass protecting and holding the soils) and physical disturbance (compaction and physical displacement) to the soil. It is possible that the increased level of impacts would be sufficient to disrupt, or even reverse, the current vegetative trend (increasing % Riparian species) in Muddy Creek (See Appendices 4 and 5) and the similar vegetative and hydrologic (channel narrowing and floodplain-building) trends in Little Muddy Creek (2010 PFC Assessment, Appendix 4). An increase in cattle-induced impacts could cause the observed recovery by the riparian vegetation and the resulting streambank protection and floodplain-building process, to slow or even reverse (Clary and Kinney, 2002, Clary and Leininger, 2000, Belsky, et al. 1999, Fleischner, 1994, Kauffman & Krueger, 1984). Over-utilization of the riparian vegetation will also reduce those plants' root reserves, resulting in a decreased ability to hold the soil against erosion and compete against more grazing-tolerant species such as kentucky bluegrass (Kauffman & Krueger, 1984).

An increase in physical impacts (hoof action, compaction) will impact both upland and riparian soils. Hoof impacts can compact soils, causing increased density and reduced infiltration rates (Castellano & Valone, 2007, Jones, 2000,). In upland sites, this may result in reduced potential plant production and increased runoff rates and volumes, particularly in high intensity precipitation events, increasing the likelihood of water erosion (Fleishner, 1994).

Typically, dry soils are more resistant to displacement and deformation than moist soils because water acts as a lubricant, allowing the soil particles to slide around each other, increasing wetland soils' vulnerability to physical impacts. In wetland areas, a site's ability to absorb and hold water could be reduced by either vegetative or physical impacts, potentially resulting in vegetation shift and soil loss. The stability of alluvial streambanks depends upon the ability of

the plants growing in them to resist the erosive forces from the water and the physical impacts from livestock (Clary and Leininger, 2000). Research has shown that the dense foliage and root masses produced by sedges, rushes and other riparian species trap sediments and protect existing streambanks from erosion (Clary and Kinney, 2002, Clary and Leininger, 2000). Heavy or season-long livestock use results in depressed vigor and density of riparian vegetation, as well as progressive structural damage to the streambanks (Clary and Kinney, 2002, Clary and Leininger, 2000, Kauffman and Kreuger, 1984), resulting in increased bank sloughing and erosion, leading to reduced hydrologic function in the Little Muddy Creek, Muddy Creek and Blacks Fork systems. Because these systems are all in incised channels, an increase in the number of cattle accessing the water can be expected to disturb the soils on the steep channel sides, deepening or creating new paths. Runoff from rain or snowmelt can be expected to find and follow any paths leading from the uplands to the creeks, making them into channels for accelerated water flow and erosion (Jones, 2000, Fleishner, 1994).

The Carter Lease spring-fed riparian area soils are not as vulnerable to flow-induced erosion as the flowing systems are. However, the palatable ones all show degradation due to physical impacts and vegetation use from livestock grazing. Livestock grazing and hoof impacts produce the same impacts to the riparian vegetation and soils discussed above. The impacted streams all show indications of upland species (becoming) established inside areas of riparian vegetation. The meadows fed by the springs all show some extent of hummocking (caused by nearby soil displacement), channel formation (which allows the surrounding area to drain) flow diversion (which will cause the formerly watered area to dry), or total obliteration of riparian vegetation and reduction of flow. Drying of the former wet meadows will eventually change the chemical and microbiotic nature of those soils, accelerating the conversion from wetland to upland vegetation and potential.

The conversion of 5360 winter sheep (4,918 total AUMs - 2304 public sheep AUMs) to 532 summer cattle (2,956 total AUMs- 1271 public cattle AUMs) in the proposed DJR use area is also likely to impact the soil resource, particularly in the magnified impact areas close to the water tanks. The magnified impact areas can be expected to exhibit increased soil density, suppressed vegetative health and vigor, lower water infiltration rates and a higher percentage of bare ground. Because the tanks are to be placed on private property, the areas expected to receive the highest impact levels are unlikely to include federal land. However, all of the public land sections inside, as well as several that are outside, the applicant's use area are within three miles of at least one section where tank placement is expected to occur. Therefore, the soils on every public section can be expected to experience direct impacts in the form of physical hoof impacts and indirectly by the removal of vegetative cover. The applicant's proposed system would avoid the more severe impacts caused by permanent tank placements, by not placing them in the same place twice. Because the tanks would be checked and filled on a daily basis, they would be able to move any given tank if livestock-caused impacts to the soil or surrounding vegetation were becoming a cause for concern.

The increased bare soil/reduced plant cover and the potential of increased soil density anticipated with both parts of Alternative 2 offer the likelihood of increased runoff due to lower infiltration rates. There is also the possibility of an increased number or deepening of cattle trails capturing and channeling the overland flow, increasing the likelihood of water erosion deepening the trails into gullies. This erosion could result in increased sediment loads reaching the riparian areas

and, due to a degraded sediment trap, the sediment could enter the creek or river and increase the sediment load.

Impacts of Alternative 3 - Proposed Action

This alternative's impact on the soils resource is expected to result in improved soil condition compared to the other alternatives. This is partially due to the proposed additions to the Carter Lease terms and conditions which are outlined in Chapter 2.

Institution of riparian stubble height requirements and upland utilization criteria should provide the permittees an incentive to more actively manage their livestock during both winter and summer use periods in the Carter Lease in a manner that facilitates a more even distribution of grazing impacts. A minimum stubble height requirement in riparian areas, as well as upland forage utilization standards, should produce reduced trampling and compaction impacts in those areas. These changes should also lead to healthier plants and higher vegetative biomass production, resulting in improved soil protection above and below ground. Keeping at least 4 – 6" of riparian stubble will protect streambanks during high flow events, preventing erosion and increasing sediment capture (Kauffman and Krueger, 1984). However, implementation of the proposed action has some potential to damage soil conditions outside of the riparian zones by pushing cattle into regions where they have not traditionally ventured. As a result, there may be forage use and physical soil impacts in sites that have normally received lower impact levels. Compliance with the upland utilization standard (50% of current year's growth) should ensure that impacts to the vegetation (and the soil it protects) are not beyond sustainable levels.

The impacts of the application to convert summer cattle use to summer sheep use are already effectively visible and no current impacts to the soils in either the uplands or riparian areas may be clearly attributed to this conversion.

If this alternative is chosen, the KFO will partially grant the requested four (4) WWR, LP shares of winter sheep only-to-dual-use conversion by authorizing the conversion of one (1) share only. If the applicant chooses to run summer cattle, the plan outlined in chapter 3.7 of this document will be followed. It is not unreasonable to anticipate the same type of impacts mentioned under Alternative 2 (above), which includes the magnified impact zones around the water tanks, any mineral supplement sources, as well as the establishment of trails between these sites and preferred feed sources. However, because this alternative authorizes the conversion of only one WWR, LP share, as compared to the four shares examined in Alternative 2, both the magnitude and extent of the impacts are expected to be reduced proportionally.

Impacts of Alternative 4 - No Grazing Alternative

Selection of Alternative 4 would preserve approximately 13,184 AUMs worth of harvestable public lands forage within the Carter Lease. This increase in available plant biomass could provide an increase in ground cover and protection from wind and water erosion. Preserving the forage may also produce indirect improvements in the health of the watershed units through the potentially increased vigor of cool-season grasses and sedges within the public lands riparian zones. Improved health and vigor of the mesic and riparian plants may help stabilize the stream banks and increase filtration of sediment from runoff. Improved plant cover and re-colonization by bunchgrasses is likely to be slower in the uplands, where plant-available water supplies are

more limited. Increased ground cover should reduce rain-induced erosion, as well as increased infiltration, leading to reduced runoff.

Removal of livestock from public lands in the Carter Lease would probably result in decreased hoof compaction, especially in riparian areas where cattle tend to congregate. Over time, the lack of renewed compaction, combined with the annual freeze-thaw cycle, may lead to a decrease in surface soil density and improved soil condition in riparian areas (Kauffman and Krueger, 1984). The more heavily compacted areas such as livestock trails, and any associated erosion, should heal over time. Complete healing would not be expected because wildlife and people would continue to follow some trails established by livestock.

However, because this entire allotment has a checkerboard ownership pattern, livestock grazing on any private and state owned lands would be expected to continue producing direct effects on the soils at least equivalent to those observed under Alternative 1. If grazing were to continue on privately-owned lands in these allotments, fences would have to be built by the landowner(s) to prevent trespass onto federally-owned lands. Given the natural tendency of cattle to congregate and trail along fence lines, it is likely that trailing, as well as its associated compaction and forage depletion, would occur along the fences. The resultant decrease in canopy cover in those areas would result in increased soil surface exposure to wind and water erosive forces, while the trails would likely experience increased compaction, leading to increased runoff from both rain and snowmelt. These factors would combine to increase the likelihood of both wind and water erosion in the areas adjacent to fences. This may result in erosion or deposition areas which could impact the adjacent federal lands.

4.5.c Water Quality

The 2010 PFC Assessment found that the Little Muddy Creek system exhibited improved condition, the Muddy Creek system exhibited relatively static condition and the Blacks Fork River exhibited a degraded condition as measured by PFC in 2010 relative to the PFC Assessments conducted in 1998. During this time, the Carter Lease had either 246 head of uncontrolled cattle (1998 - 2003) or 199 head (2004 – 2010) on the allotment.

The water quality in the springs is not assessed and is therefore unknown. All but one of the active springs assessed during 2010 showed signs of animal (wildlife and/or livestock) use and the presence of aquatic vegetation so it is not unreasonable to presume that the water is safe for animal use. None of the assessed springs' water is likely to reach the Carter Lease stream systems because of distance, topography or man-made berms.

<u>Impacts of Alternative 1- Authorize Continuation of Current Management</u>

None of the streams in Carter Lease are listed in the State of Wyoming Department of Environmental Quality impaired waterbody list or in the 303(d) report, due to conditions within the allotment. The current livestock management program has been in place for several years. This strongly suggests that continuation of the current grazing management system is not likely to produce degradation of stream water quality.

However, the degraded condition in the Carter Lease springs causes concern that continuation of current grazing management practices will result in further degradation to the springs that are both accessible and palatable to livestock.

Impacts of Alternative 2 - Increase Summer Cattle Use

If alternative two is chosen, two facets of current Livestock Management in the Carter Lease, both of which can impact water quality, will change.

It is possible that if no further cattle to sheep conversions are authorized, the owner of permit #4900132 may sell or lease it to a cattle producer, resulting in an extended return to 246 uncontrolled summer cattle. It is possible that an additional 47 cattle (a 23.6% increase over current numbers) may degrade the flowing water systems' health and water quality. It is also possible that the springs, which are currently in declining condition, may suffer equally. Because there are no internal fences to control livestock movements, the cattle would be expected to remain in or near the riparian areas, particularly after the cool-season upland grasses mature and become less palatable. The increased number of cattle is likely to result in a proportionally increased volume of urine and feces being deposited in or near the creeks, leading to potential bacterial contamination. Increase stream sediment volume can result from bank shearing or trampling, which places soil directly into the stream, or as a result of increased erosion due to compaction and reduced vegetation in the uplands, which can increase sediments carried by runoff. In addition, repeated removal of streamside rush, sedge or willow re-growth can exhaust those plant's root reserves. This can often lead to bank erosion because the depleted root systems can no longer hold the soil in place (Belsky, et al., 1999).

The grazing system and use area (see section 3.7.a) included in DJR L&L's winter sheep to dual-use conversion application utilizes watering facilities in the uplands. Because cattle are unlikely to wander more than a few miles from known water sources (Harris, et al, 2003), this is likely to keep those cattle away from the riparian zones. DJR L&L used these tanks when TNR conversions of all four shares simultaneously were granted in the past. The anecdotal evidence indicates that cattle and wildlife all made extensive use of the tanks and that no DJR cattle were seen in or near the riparian areas. Though the tanks may have effectively prevented the direct impacts to stream water quality through physical impacts or animal waste materials when the TNR conversions were granted, these authorizations were not granted for multiple years in a row. Therefore, it is possible that cattle authorized by this alternative could wander down to the riparian areas.

The potential impacts this alternative could have on both the forage (see Section 4.4a) and soil resources (discussed in Section 4.1) could result in increased volume and intensity of runoff from the proposed use area. Given that a great majority of the proposed use area is within wshed-56 units 137, 149, 150 and 146 (which empty directly into the Hamsfork and Blacks Fork Rivers, as well as Dry Muddy Creek and Muddy Creek) there is an increased likelihood that rapid snowmelt or a high-intensity rain event could produce runoff volumes capable of eroding exposed soil and transporting the soil particles or other contaminants from the uplands to the nearby rivers or creeks.

Because Roberson Spring is in the bottom of a relatively deep ravine with near-vertical sides, it is unlikely that cattle would venture down to it. However, the wash is downstream of the DJR use area and high sediment loads could fill the small pools that collect the spring flow. Also,

high runoff volumes could potentially alter the ravine's floor in a way that the spring flow would no longer be captured.

Impacts of Alternative 3 - Proposed Action

Implementation of this alternative could contribute to improvements in water quality over alternatives 1 and 2. Implementing riparian stubble height trigger points and upland utilization standards (see Chap. 2, pp 10 & 11), should reduce the volume of runoff off the uplands and sediment loads that enter the creeks. The proposed 4-6" riparian stubble height trigger point, coupled with the 50% utilization standard in the uplands areas should result in reduced livestock impacts to both vegetation and soils. Lower impact levels are likely to lead to improved plant stands and vigor, as well as reduced soil erosion rates, in both upland and riparian sites. Improved riparian vegetation stands should provide increased sediment capture and bank stability, leading to lower sedimentation, nutrient and bacterial loading in the creek and river waters in the Carter Lease. Improvement of water quality in the Little Muddy Creek, Muddy Creek and the Blacks Fork River should lead to a healthier habitat for wildlife by maintaining or facilitating the restoration of riparian habitat.

The selection of this alternative over alternatives 1 and 2 should facilitate improved conditions in and around the springs within Carter Lease. The trigger points incorporated within alternative 3 provides the permittees an objective measure of when it may be time to move, or remove, their livestock. By alleviating forage over-utilization in both the uplands and riparian areas the allotment should show improved plant health and vigor, improved ground cover and reduced runoff.

The likely impacts of converting permit #4900132 from summer cattle to spring and summer sheep are discussed in alternative one and are included here by reference.

The sheep to dual-use conversion of one WWR, LP share authorized by this alternative is likely be far more sustainable than Alternative two. A maximum of 132 cattle would be authorized by this action, as compared to 532 in Alternative 2 and is likely to result in lower impact levels to both the vegetation and soil resources. The magnified impact areas around the water tanks, and the central portion of the use area, will be less compacted and retain more vegetation when compared to alternative two, but less than under alternative one.

Impacts of the Alternative 4 -No Grazing Alternative

In the absence of livestock, some improvements in water temperature, turbidity, and nutrient loads may be expected to occur due to livestock no longer utilizing the public land in Carter Lease. However, it is likely that the private and state lands will still be used for livestock production. It is also quite possible that the private lands will receive heavier use levels for longer periods of time, increasing the levels of contaminants from those lands. Therefore, implementation of this alternative could produce varying degrees or directions of impacts to water quality as compared to the No Action Alternative, depending on how the private landowners respond.

4.6 Lands and Realty

Impacts Common to all Alternatives
The authorization of livestock grazing, under the management practices contained within this alternative, is not likely to affect Lands and Realty activity within the Carter Lease.

4.8 Social and Economic Conditions

The economic and social impacts from any of the alternatives are all speculative to a certain extent because the gross returns from the sale of market animals or wool are completely dependent upon the highly volatile agricultural commodities market.

Impacts of Alternative 1 – Authorize Continuation of Current Management
Renewal or modification of the existing Carter Lease grazing permits to continue current management practices, with all other terms and conditions remaining the same, is not likely to either reduce or increase the economic impacts produced by ranching in the region. Under Alternative 1, livestock grazing, according to provisions of the KFO RMP & ROD, and under existing terms and conditions, would continue. There should be no measurable impact to the permittees or the larger ranching community, culture, or tradition which they contribute to with their presence or expenditures.

Impacts of Alternative 2 – Increase Cattle Use
This alternative would not allow Larson Livestock to convert permit #4900132 from cattle to sheep use. Therefore, the permittee would need to either find additional forage or reduce their sheep numbers. To offset the lost income or cost of alternative pasture, Larson Livestock may choose to sell or lease the cattle permit. The economic impacts to Larson Livestock depends upon the price and availability of alternative sheep forage sources and any offsetting income derived from the sale or lease of the cattle preference.

Current market forces do appear to favor beef production in dollars/pound of animal produced, indicating that a higher gross return/acre might be realized by converting from sheep to cattle. This alternative favors maximum beef production when compared to the other alternatives.

DJR L&L is likely to realize some economic benefit from having its four WWR, LP shares converted to dual use. (See Section 4.2, Alt. 2).

The impacts to the ranching community and culture to which the permitees belong may see some changes if this alternative is selected. If DJR L&L chooses to convert all their shares to cattle use, it is possible that the sheep producers who currently lease those shares will suffer economic reversals as a result of losing the public forage they represent. It is unknown whether the sheep producers could find alternative forage or if their operations could survive the potential loss of income. Therefore, it is certainly possible that the DJR L&L lessees would be unable to spend the amount of dollars they used to for operational supplies and personal goods or services. This could lead to those particular merchants experiencing reductions in cash flow and profits. In addition, the lessees may no longer need to hire the number of herders they currently employ, which would affect the herders' livelihoods, as well as the livelihoods of their families.

DJR L&L would be able to run over 500 head of cattle should they decide to exercise the dual-use option. This is likely to provide them with increased potential income, enabling them to

spend more on business and personal goods and services in the surrounding communities. The merchants and communities where DJR L&L does business could experience increased cash flow and profits. However, it is unlikely that DJR L&L's increased cash flow would benefit the same businesses or communities that their former lessees did. .

Impacts of Alternative 3 – Proposed Action

The implementation of this alternative has the potential to impose economic expenses on the permittees in the form of monitoring and potential limitations on use due to the institution of moderate-use guidelines for the allotment. In a worst-case scenario, if the use criteria are met throughout the allotment prior to the off date, the permittees would be advised to take their animals elsewhere. However, the full implementation of the new guidelines and modified terms and conditions included in this alternative could eventually lead to improved range condition and productivity, leading to improved animal health and productivity in years with normal to high rainfall and decreased reductions in drier years (Holechek, et al, 2004).

There would essentially be no economic impacts from granting Larson Livestock's requested summer cattle-to-spring/summer sheep conversion because it would make permanent the current management system for that producer and the surrounding community. The economic impacts of the proposed winter sheep-dual use conversion for DJR L&L would probably be very similar to the impacts discussed in Alternative 2, though of lower potential magnitude. While the individual producers making use of the shares in question may change, the dollars harvested from the Carter Lease, and spent by the producers in the regional community, are likely to be very similar. However, the dollars spent in each producer's immediately local community may change because one of the sheep producers would lose their leased share and DJR L&L would face the additional expenses (trucking water, feed, salt/mineral supplements and veterinarian bills) required to run cattle on their use area in the Carter Lease.

Impacts of Alternative 4 - No Grazing Alternative

This alternative would require the BLM to cancel the existing Carter Lease grazing permits. This action is likely to have substantial negative impacts to the operators' and the region's social and economic conditions. The forage harvested from Carter Lease is an integral part of the permittees' operations and often makes up a large share their annual feed budget. The economic impacts of closing the public lands inside Carter Lease are likely to include, but are not limited to:

- Reducing or eliminating the sustainability of the permittees' livestock operations or forcing them to incur additional expenses by paying the high costs of finding and securing replacement feed to preserve their long-term investments in their livestock.
- Causing the operators to downsize their operations; sacrificing a portion of their long-term investments in animal numbers or genetic quality to reduce potential feed costs. Reduced herd sizes may mean reduced labor needs and result in the operators terminating some or all of their employees' positions.
- Causing the operators to sell portions, or all of, their private property. Many of the operators have substantial debt tied to capital improvements on their property. Losing the feed represented by their Carter Lease grazing permits may make their current operations unsustainable.

These adaptive measures would not be restricted to only the permittees and their families. All those who work for the permittees, as well as those people who own or are employed by business patronized by the permittees, would be affected. The loss of annual income represented by the federal range would eventually ripple out through the communities in which the permittees and their employees live and do business.

The permittees could still graze their livestock on private land inside the Carter Lease. However, because the Carter Lease has no internal fences (See Section 4.7, Alternative 4), if unauthorized use cases are proven and settled, the penalties, which may include administrative costs to the BLM, could constitute an additional financial burden to that particular operator (and potentially, the community). To prevent this indirect effect of banning domestic livestock from the federal lands within Carter Lease, the current permittees may feel obliged to fence their private lands apart from publicly owned lands. The cost of constructing these fences would place a tremendous, perhaps unsustainable, financial burden on the permittees. This, in turn, could result in the need for some or all of the permittees to downsize or eliminate their grazing operations.

In addition, the BLM would no longer collect Grazing Fees on Carter Lease. This would directly affect the economies and treasuries of both Lincoln and Uinta Counties because the grazing fees are distributed in the following manner.

- 50% - Range Improvement Fund. This money is used to implement range improvements (i.e. water developments, fence construction, spring developments, etc…) in the area where the grazing fees were generated.
  Because these monies are no longer being collected, the BLM will not have as much to invest in range improvements throughout the KFO. This means fewer jobs will be contracted or constructed, generating less income for area contractors as well as fewer taxes generated for the counties.
- 12.5% - State of Wyoming to be proportionally redistributed to the counties in which the allotment resides. Because no grazing fees will be collected from Carter Lease, the counties will no longer receive these monies, creating a direct impact to Lincoln and Uinta Counties' treasuries.
- 37.5% - U.S. Treasury – While the dollar amount collected from Carter Lease is miniscule compared to the National Budget, it would likely mean reduced expenditures for range improvements in the Kemmerer Field Office.

Chapter 5 - Cumulative Impacts

Current conditions in the Carter Lease result from a multitude of natural events and human actions that have taken place over many decades. Cumulative effects are defined as the "impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions" (40 CFR § 1508.7). According to the 1994 BLM Handbook "Guidelines for Assessing and Documenting Cumulative Impacts," the analysis can be focused on those issues and resource values identified during scoping that are of major importance.

After reviewing the responses to scoping and available information, the following activities or issues within, or adjacent to, the Carter Lease were identified as being most likely to generate

potential cumulative impacts when added to those produced by the Proposed Action. Major issues include Energy Development and transmission, Soils Resources, Water Resources, Upland and Riparian Vegetation, Wildlife, Grazing Management, and Social and-Economic Conditions.

Soils Resources

Cumulative impacts to soils associated with livestock grazing activities accrue over time and are additive on a watershed and landscape scale. The anticipated increases in energy-related development over the coming years will result in increased total acres of disturbance, resulting in a corresponding increase in the acres of soil within the allotment that are vulnerable to erosion. The trigger points included in the Proposed Action to protect both upland and riparian vegetation (which should protect the soil by preventing erosion and trapping sediment) should mitigate the currently-anticipated impacts of additional soil disturbance.

Water Resources

Cumulative impacts to watersheds associated with livestock grazing activities accrue over time and are additive on a watershed and landscape scale. The Carter Lease Watershed 56 Units are influenced by, and contribute to, all water sources and activities within the larger Hamsfork River, Albert Creek, Little Muddy Creek, Muddy Creek and Blacks Fork River Watersheds.

At this time, the only water system within the Carter Lease Allotment that is on the Section 303(d) list the Blacks Fork River (See Section 3.3). Because of the upper end of the contamination sources, and the absence of the other streams from the 303(d) list, it may be presumed that the current livestock management system in Carter Lease is not contributing to bacterial or chemical contamination at levels DEQ considers to be detrimental.

At this time, livestock grazing does not appear to be a causative factor for stream or watershed impairments in Carter Lease (See Section 3.3). The riparian and upland utilization guidelines included in the Proposed Action are expected to help the permittees know when to move their livestock and avoid utilization-caused impacts to the uplands and riparian areas, (See Section 4.3, Alternative 3).

The water quality within the zones surrounding the Carter Lease springs is unknown, (See Appendix 5). The utilization standards of the Proposed Action are expected to help protect the springs by causing the livestock to be removed from the area as either the peripheral riparian vegetation, or the surrounding upland vegetation, reaches the utilization-based trigger points.

Riparian and Upland Vegetation

Given that the allotment met the S&G guidelines for rangeland health, with the notable exception of the condition of the springs, the current grazing practices do not seem to be producing a notable loss in density, vigor or production in the Carter Lease vegetative resources (as a whole).

The Proposed Action for this EA (Alternative 3) includes criteria that provide the permittees, their employees and the BLM clear measures for acceptable vegetation use which will tell them when they should move, or remove, their livestock.

Semi-desert and sagebrush grassland both have a 30-40% use (by weight) for moderate grazing levels (Holochek, 1988). Using the methods described in Section 4.4a, Alternative 3 (page 49), it was determined that this is roughly equivalent to removing, at most, 50% of the vegetative height of the preferred grasses. By incorporating this condition into the permits, the upland sites close to water sources, and most affected by summer cattle grazing, should begin to exhibit improved production.

When combined with the upland use guidelines, along with the proposed rotation plan, the conversion of only one share's worth of preference from sheep would serve to avoid over-use and loss of the grass and forb component in the DJR L&L area. Also, by keeping winter sheep as the primary use in the Carter Lease, the herbaceous vegetation component throughout the allotment uplands will be protected (Bork, et al, 1998), (See 4.4.a, Alternative 3).

The institution of riparian stubble height guidelines will serve to protect the wetland areas around the springs and near the creeks from over-use, (See 4.4.b, Alternative 3).To meet the required minimums, some active herding of the cattle may be required, which will give the riparian species the opportunity to re-grow their stems and leaves, and rebuild their roots, making them more resistant to future grazing impacts.

Wildlife

The allotment consists of a mixture of upland sage, grass-steppe, and mixed juniper. These plant communities provide habitat for a variety of wildlife species including, but not limited to ground squirrels, prairie dogs, shrews, rabbits, migratory birds, big game and raptors. The majority of cumulative effects on wildlife habitat would result from surface disturbing and disruptive activities, such as mineral development and associated wells, roads, pipelines and facilities and geophysical exploration. Effects would be in the form of habitat fragmentation and animal displacement. Habitats are fragmented during the life of oil and gas projects (typically 30-50 years) and animals are displaced during all project phases, with most of the displacement occurring during construction. In addition to the above referenced projects, other projects/activities have the potential to have the same impacts. The projects/activities include, but are not limited to, residential development, recreation (i.e. hunting), wildland fires, timber sales (commercial and firewood), grazing and range improvement projects. Many of these activities, however, would be shorter in duration so impacts would be reduced. For example, hunting season typically occurs in September and October. While there is not any habitat fragmentation that occurs with this activity, animal displacement is observed during the two month time frame, which typically occurs on an annual basis. Conversely, wildland fires could burn large amounts of habitat, creating fragmentation that would persist between 10 and 50 years (depending on burn severity and ability of the plant species to recolonize). When combined with past, present and reasonably foreseeable actions, continued grazing on the allotment is expected to have minimal impacts to wildlife populations using the area regardless of Alternative.

In order to understand the cumulative impacts to pronghorn, the first step is to understand the size of the herd unit. Pronghorn herd unit 419 is a large area which encompasses approximately 1.7 million acres, of which 238,797 acres (14.1%) lie within the project area. Given that the pronghorn herd is 18% above population objective, the effects of adding this grazing permit renewal to the existing (oil and gas wells, pipelines, highways and grazing) and proposed future development (oil and gas wells, pipelines and grazing) are likely to be negligible under

Alternatives 1, 2 or 3. Under Alternative 4, all of the above referenced impacts would still be observed throughout the herd unit and those impacts would also be observed within the project area.

Overall impacts to mule deer are harder to describe due to the fact that the proposed project intersects two herd units (423 and 131). Cumulative impacts for herd unit 423 are hard to define due to the migratory nature of the herd (section 3.4.c). However, the known existing projects and those in the reasonable foreseeable future that influence this herd include; oil and gas facilities, pipelines, compressor stations, renewable energy (wind turbines), highways and an interstate, grazing, a proposed coal mine, wildfire and timber sales (both commercial and firewood). Other factors that are outside of the BLM, permitee/landowner and public control are weather conditions. Given that the herd migrates between Utah and Wyoming, and that only 1.3% of the herd unit is within the project area, the impacts from Alternatives 1, 2 and 3 within this allotment are expected to be negligible. If Alternative 4 were chosen, those impacts would still be observed outside of the project area.

Cumulative impacts to mule deer herd unit 131 are also hard to predict. Existing and future projects that influence this deer herd include oil and gas facilities, pipelines, compressor stations, mining, grazing, prescribed burns, timber sales (both commercial and firewood) and highways. In addition, weather conditions also influence this herd. Currently, the estimated population level for this herd unit is 41.1% below population objective. The WGFD (2009b) states that a contributing factor to this low population level is "drought conditions have persisted on low elevation sagebrush winter ranges from the late 1990s through 2008 thereby reducing current annual growth on important winter browse." Poor forage production, and a high level of human disturbance associated with open roads, and loss of habitat effectiveness due to oil and gas production on the LaBarge winter ranges exacerbates mild winter conditions, and results increased winter mortality in years when losses should have been minimal (WGFD 2009b). In addition, winter conditions in different portions of the herd unit, during different years are adding to the suppressed population numbers (WGFD 2009b). When adding all factors influencing this deer herd, it is unlikely that renewal of the permits under Alternative 1, 2 or 3 would cause impacts greater than what already exist. If Alternative 4 were chosen, the impacts from all other activities (and weather) would still influence this herd.

The population objective for moose herd unit 417 is 57.6% below population objective. Impacts to the moose herd in herd unit 417 under Alternative 1 would be similar to what is currently observed throughout the herd unit when adding all other past, present and future projects. Alternative 2 could potentially increase impacts to the riparian areas, thus increasing impacts to moose. However, implementation of Alternative 3 could improve the riparian habitats for this and other species that depend on the riparian vegetation for some or all life stages. If alternative 4 were chosen, impacts on federally managed lands could potentially positively increase at first, but could contribute to population declines at a later date. Another factor that influences the moose population within this herd unit, regardless of which Alternative is chosen, is parasites and disease. Recently moose in Wyoming have been found with the parasite *Elaeophora schneideri*, commonly called a carotid artery worm (WGFD 2009a). *Elaeophora* are a common parasite in mule deer and do not appear to cause many deaths and population declines (WGFD 2009a). Recent detections of this parasite in moose are strange because it had not been

historically documented in moose and it appears that it is causing severe problems and death in some moose (WGFD 2009a). It is unknown how much of an impact this has on the overall moose population but it is of high concern considering the apparent reductions in moose numbers concurrent with the parasite being detected (WGFD 2009a).

For the purposed of effects analysis for a proposed action, a sage-grouse habitat evaluation shall extend, at a minimum, out to 4 miles from relatively small individual proposed actions and shall extend, at a minimum, out 11 miles from the project boundary for large-scale proposed actions (USDI 2010e). Examples of relatively small actions may include but are not limited to, exploratory wells, individual rights-of-way (including surface level linear projects), vegetation treatments less than 500 acres, and wind energy site testing and monitoring projects (USDI 2010e). Examples of large-scale actions may include, but are not limited to, oil and gas full field developments, wind energy development projects, large power lines, and vegetation treatments larger than 500 acres in size (USDI 2010e). Field managers will be responsible for the determination of whether an individual project is large or small within their field offices (USDI 2010e).

If an analysis were to occur using the 4 mile minimum for relatively small individual proposed actions, then the past, present and future projects that would influence the sage grouse within 4 miles of the project area include; oil and gas facilities, pipelines, powerlines, towns, ranch buildings, grazing, railroad and railroad spurs and roads (highways, county roads and access roads for energy development). Within 4 miles of the Carter Lease allotment there are approximately 15,232 acres of surface disturbance. Some of this acreage is permanently removed due to highways, county roads, railroad lines and ranching operations. The effects from choosing Alternative 1 would be indiscernible when adding all other disturbance in the surrounding area; therefore the impacts would be the same as those currently observed. Choosing Alternative 2 could potentially increase the number of cattle within the allotment (Chapter 2, Alternative 2). The allotment would likely receive more impacts from soil erosion due to repeated hoof action both in the uplands and in the riparian areas (larger animals located in certain areas for longer periods). These soil impacts could reduce the available habitat required for riparian and riverine species. Additional cattle proposed by Alternative 2 could reduce the amount of upland vegetation to the point that it is undesirable for native species to live and survive within the allotment boundaries. These impacts in combination to the activities in the surrounding area could cause negative impacts if Alternative 2 were chosen. Choosing Alternative 3 would authorize fewer cattle than Alternative 2. Impacts to the uplands and riparian areas would be the same as Alternative 2; however, the impacts would be reduced due to fewer cattle. In addition, the utilization of stock tanks to distribute livestock in the uplands would help reduce those impacts. The use of the stock tanks, and moving livestock from one area to another, could potentially reduce the impacts below those expected under Alternative 1. Therefore, the addition of Alternative 3 with all of the other past present and future projects is expected to be minimal. Alternative 4 would not allow the renewal of the grazing permits within the Carter Lease allotment. This could potentially be the best alternative for wildlife/fish and their habitats. However, all other activities would still occur within 4 miles of the project and grazing would likely still occur on the private and state lands within Carter Lease; therefore, impacts would still occur with or without grazing. In addition, Alternative 4 would not be in conformance with the KFO RMP.

If an analysis were to out to 11 miles from the project boundary, the past, present and future projects that influence sage-grouse include all of those listed in the 4 mile analysis as well as one existing and one proposed coal mine. There are approximately 41,660 acres of surface disturbance, currently. The addition of another coal mine would increase the amount of surface disturbance within the 11 mile analysis area. However, the exact amount is unknown at this time. If the mine were to proceed then approximately 2,560 acres of new disturbance (worst case scenario) would be added, making the total surface disturbance approximately 44,220 acres. Impacts to sage-grouse would be the same for all alternatives under this analysis as described in the 4 mile analysis. Disturbance of all kinds would still occur inside and outside of the allotment whether this grazing renewal were to be granted or not.

Alternative 1 impacts to all other species from past, present and future projects in addition to this permit renewal would be similar to what is currently observed. Implementation of Alternative 2 could increase these impacts in a negative way by the addition of 532 cattle to the allotment. The negative impacts would be similar to those previously described. Alternative 3, if implemented could help reduce overall impacts; however, those impacts would not be completely eliminated due to other activities within the area. Implementation of Alternative 4 would be the best for all species, but is not in conformance with the KFO RMP and other laws rules and regulations. In addition, grazing could still occur on private and state lands within the allotment. Therefore, renewal of the permits under Alternatives 1, 2 or 3 would be expected to cause impacts similar to those already existing. If Alternative 4 were chosen, the impacts from all activities, including grazing on private and state lands, would still influence grouse populations.

Past research and surveys indicates that pygmy rabbits are known to occur within the project area; however, actual population data does not exist. The most recent sighting was in April 2011. Historical population data and range is unclear, but research indicates it was much larger than what currently exists. The conversion and degradation of suitable habitat has likely been the primary cause of these declines (Siegel et al. 2004). Most of the remaining sagebrush-steppe has provided or continues to provide livestock owners with valuable lands for grazing (Siegel et al. 2004). The effects of livestock grazing on suitable pygmy rabbit habitat are not well known (Siegel et al. 2004). In theory, cattle grazing may either reduce or enhance habitat for pygmy rabbits depending on its intensity and season (Siegel et al. 2004). Siegel et al. (2004) found that timing and intensity of grazing at Sagebrush Flat has not modified the long-term composition and structure of the sagebrush community. They did find, however, that grazing reduced the biomass of grass available in grazed units and had less protein and more fiber than ungrazed areas. Livestock grazing may influence pygmy rabbits in other ways such as collapsing burrows, attracting predators and facilitating the spread of disease. When combined with past present and future projects, impacts from chosen Alternatives 1 or 3 would be minimal and similar to those observed under the current grazing practices. If Alternative 2 were chosen, impacts would be expected to be slightly higher than under Alternatives 1 of 3. Impacts under Alternative 4 would be expected to be minimal, and results would be similar to those discussed by Siegel et al. (2004). However, under Alternative 4, there would still be impacts from all other activities in the project area, including grazing on private and state lands. Due to the relatively unknown

impacts grazing has on pygmy rabbits and their habitat; impacts are expected to be minimal under all Alternatives.

Livestock Management

Historically, the Carter Lease permits consisted solely of winter sheep use. Though sheep use in the Carter Lease has decreased over time in favor of summer cattle (due to long-term changes in market conditions) cattle use is currently only 9.6% of the total AUM allocation on Carter Lease.

The Proposed Action would require the Carter Lease permittees' livestock management practices to accommodate the new sheep permit terms and conditions as well as the growing season utilization limit guidelines. There is a potential that the utilization trigger points will be met and the permittees would be encouraged to leave the allotment. If that circumstance arises, the permittees' livestock management programs could be profoundly affected.

Existing disturbances, including two-track roads, Moxa development and several gas pipelines have either temporarily or permanently taken thousands of acres out of production in the Carter Lease, (See Section 3.3). In addition, foreseeable activities, including Moxa Arch infill activities, and other energy-related developments (such as the Gateway West Transmission Line) are likely continue to permanently or temporarily remove portions of the allotment from vegetative production. Currently, the Preferred Alternative for the Moxa Arch Infill Project (USDI, BLM, 2007b) offers projections for short- and long-term disturbance for all of the HUC 10 watershed units within the Moxa Arch. After calculating the percentage of each unit that is both within Carter Lease and within the Moxa Arch and multiplying that result by the acres of projected disturbance, the following Carter Lease-Moxa Arch projections were derived:

	HUC 10 Watershed Units			
	Middle Blacks Fork	**Muddy Creek**	**Dry Muddy Creek**	**Lower Hamsfork**
Short-Core	540	0	441	688
Short-Flank	225	0.4	335	333
Long-Core	174	0	141	221
Long-Flank	64	0.1	114	107

Similar figures are available for two additional alternatives for the Moxa Infill EIS. Once the final alternative is chosen it will be possible to make temporary and long-term deductions from the current available AUMs.

One major action in the foreseeable future is the proposed Gateway West Transmission Line. Depending on which route is selected, the line may pass anywhere from the northern edge of the Carter Lease to up to several miles north of the allotment. Depending upon which tower designs are selected, the actual acres impacted by the Gateway project could vary widely. However, an average estimate is 1.7 acres per tower temporary disturbance with 0.7 acre permanent disturbance. At 1235' tower spacing over 23 miles, this would add up to 167.1 acres of

temporary disturbance and 68.6 acres of permanent disturbance to Carter Lease (Gateway West Project Website, 2011, USDI, BLM,2009).

Within the KFO, wildland fires and other natural events capable of changing landscape conditions are expected to continue at irregular and uncontrollable intervals in the future. In the event of reduced vegetation production, the use criteria included in Alternative 3 would provide the permittees an objective measure for determining if, or when, livestock need to be removed from the allotment. If necessary, grazing permits would be adjusted to maintain rangeland health standards when fire, drought, and other uncontrollable natural events occur. Future grazing authorizations, with the revised terms and conditions included in Alternative 3 would help to assure that vegetative habitats maintain their range of phenological stages, composition, and vigor.

Given the level of impacts from Oil & Gas drilling, and other energy-related developments, it is unlikely that the new Terms and Conditions or management guidelines included in alternative 3 would produce detrimental impacts to the permittees' livestock management operations.

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Chapter 7: Contributors

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Erik Norelius	Wildlife Biologist
Ed Jess	Archaeologist
Wally Mierzejewski	Outdoor Recreation Planner

APPENDIX 1

MAPS

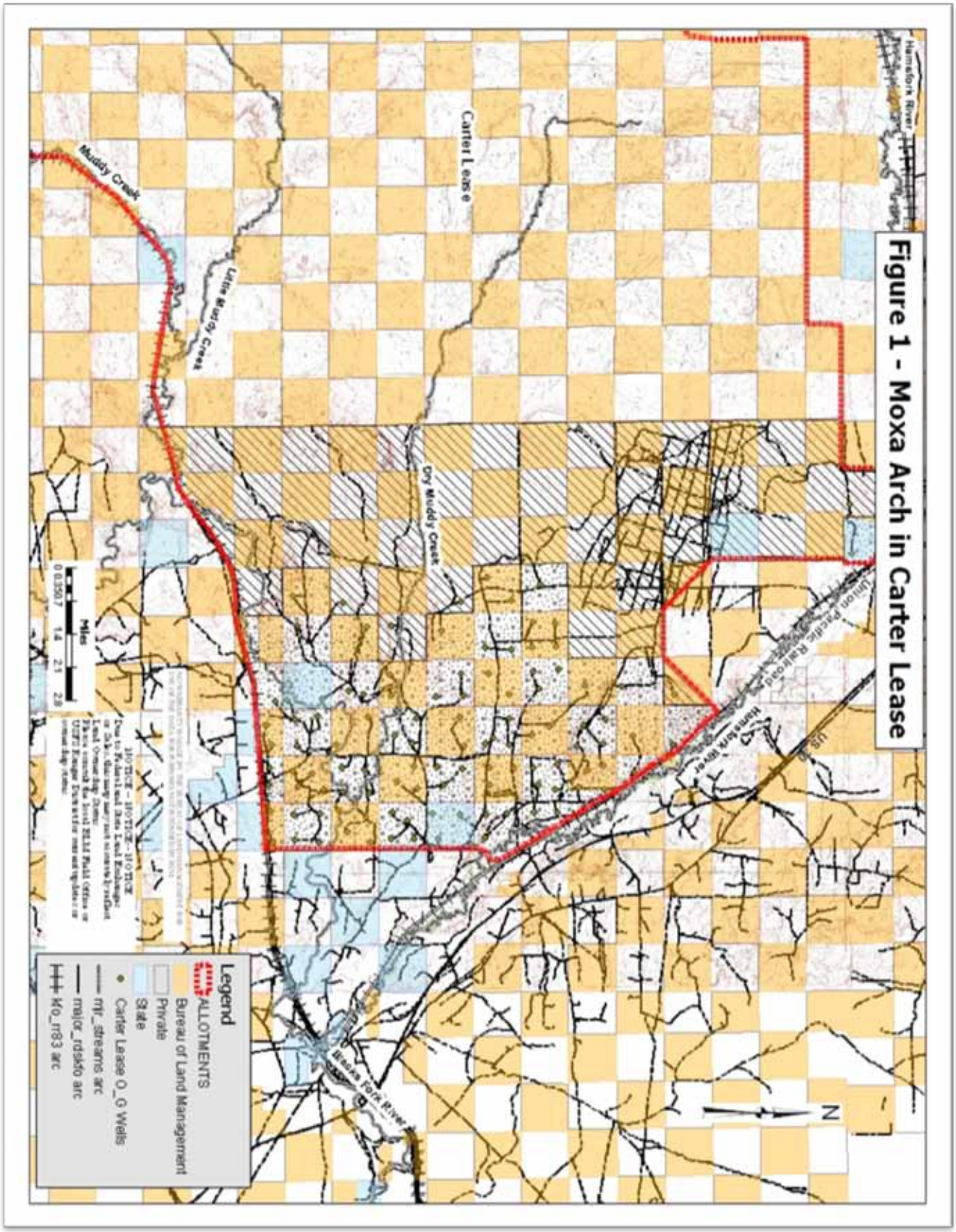
Figure 1 - Moxa Arch in Carter Lease
Carter Lease
Muddy Creek
Little Muddy Creek
Dry Muddy Creek
Hams Fork River
Union Pacific Railroad
Legend
ALLOTMENTS
Bureau of Land Management
Private
State
Carter Lease O_G Wells
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major_rdsklo arc
klo_rr93 arc
Miles
N

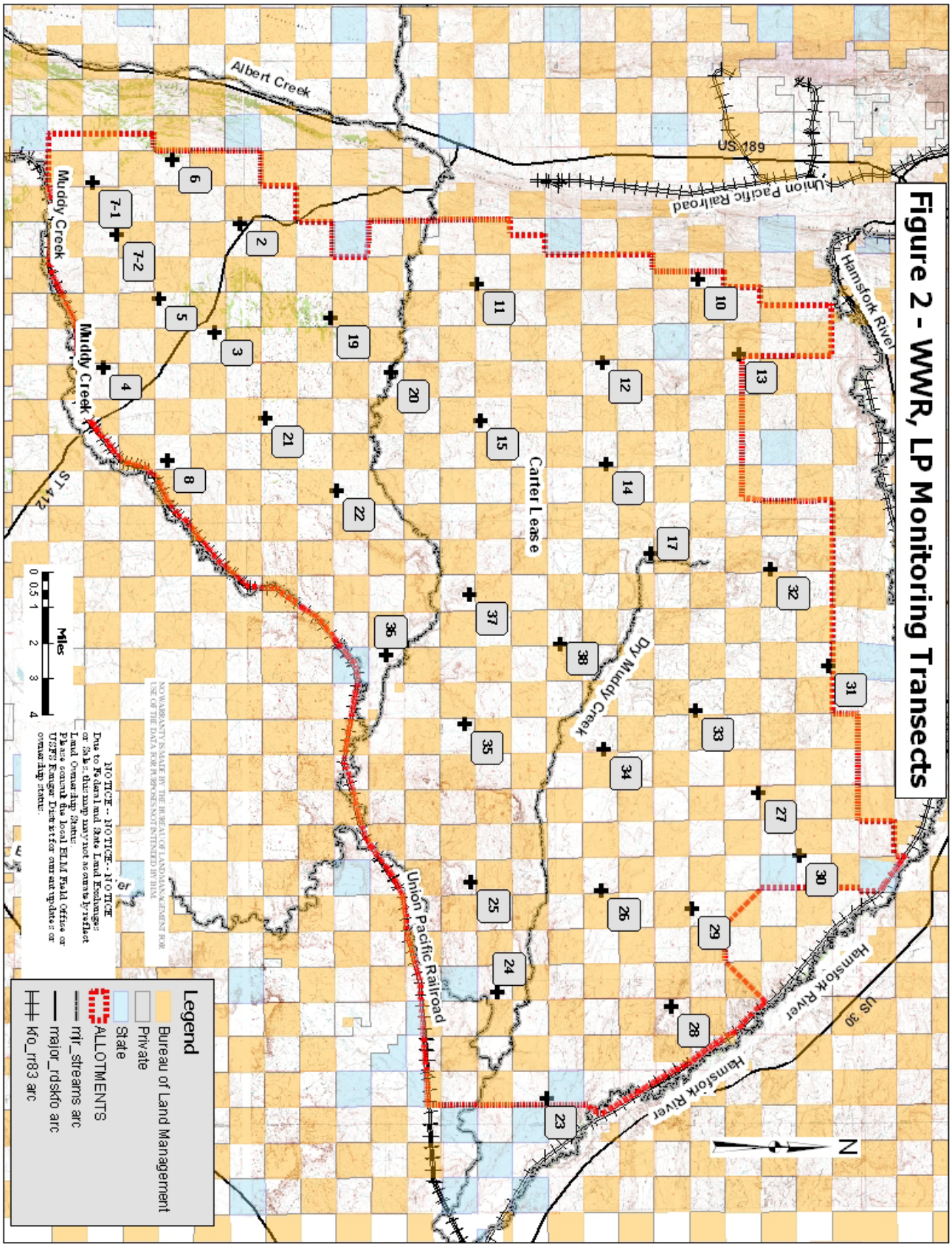
Figure 2 - WWR, LP Monitoring Transects
Albert Creek
Muddy Creek
Muddy Creek
ST 412
US 189
Union Pacific Railroad
Hamsfork River
Carter Lease
Dry Muddy Creek
Union Pacific Railroad
Hamsfork River
US 30
Hamsfork River
N
Miles
0 0.5 1 2 3 4
Legend
Bureau of Land Management
Private
State
ALLOTMENTS
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major_rdskfo arc
kfo_rlr83 arc

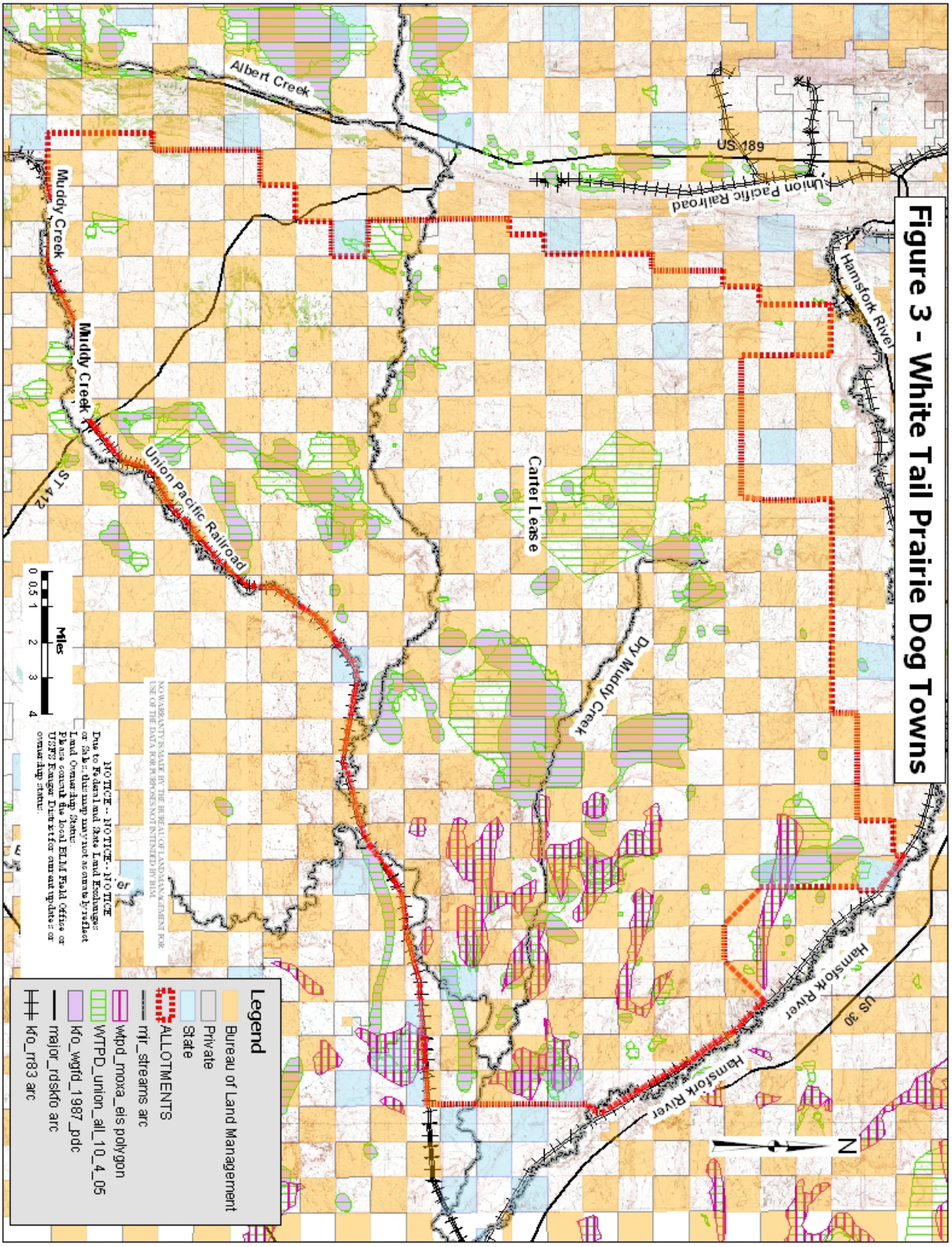
Figure 3 - White Tail Prairie Dog Towns
Albert Creek
US 189
Union Pacific Railroad
Hamsfork River
Muddy Creek
Muddy Creek
ST 412
Union Pacific Railroad
Carter Lease
Dry Muddy Creek
Hamsfork River
Hamsfork River
US 30
N
Miles
0 0.5 1 2 3 4
Legend
Bureau of Land Management
Private
State
ALLOTMENTS
mjr_streams arc
wfpd_moxa_eis polygon
WTPD_union_all_10_4_05
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major_rdskfo arc
kfo_rr83 arc

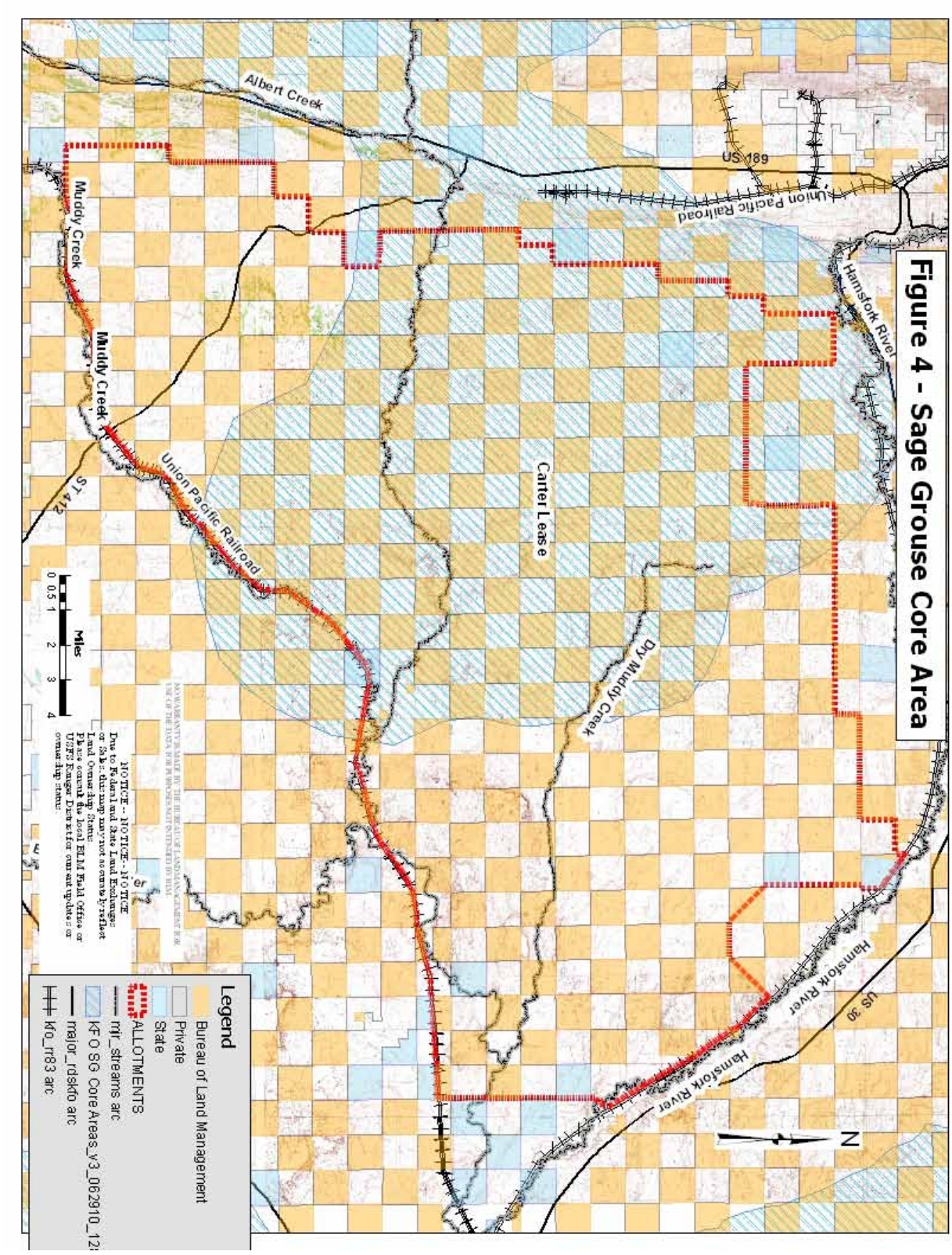
Figure 4 - Sage Grouse Core Area
Albert Creek
Muddy Creek
Muddy Creek
Union Pacific Railroad
US 189
Union Pacific Railroad
Hamsfork River
Carter Lease
Dry Muddy Creek
ST 412
Hamsfork River
Hamsfork River
US 30
N
Miles
0 0.5 1 2 3 4
Legend
Bureau of Land Management
Private
State
ALLOTMENTS
rnjr_streams arc
KFO SG Core Areas_v3_062910_12
major_rdskfo arc
kfo_rr83 arc

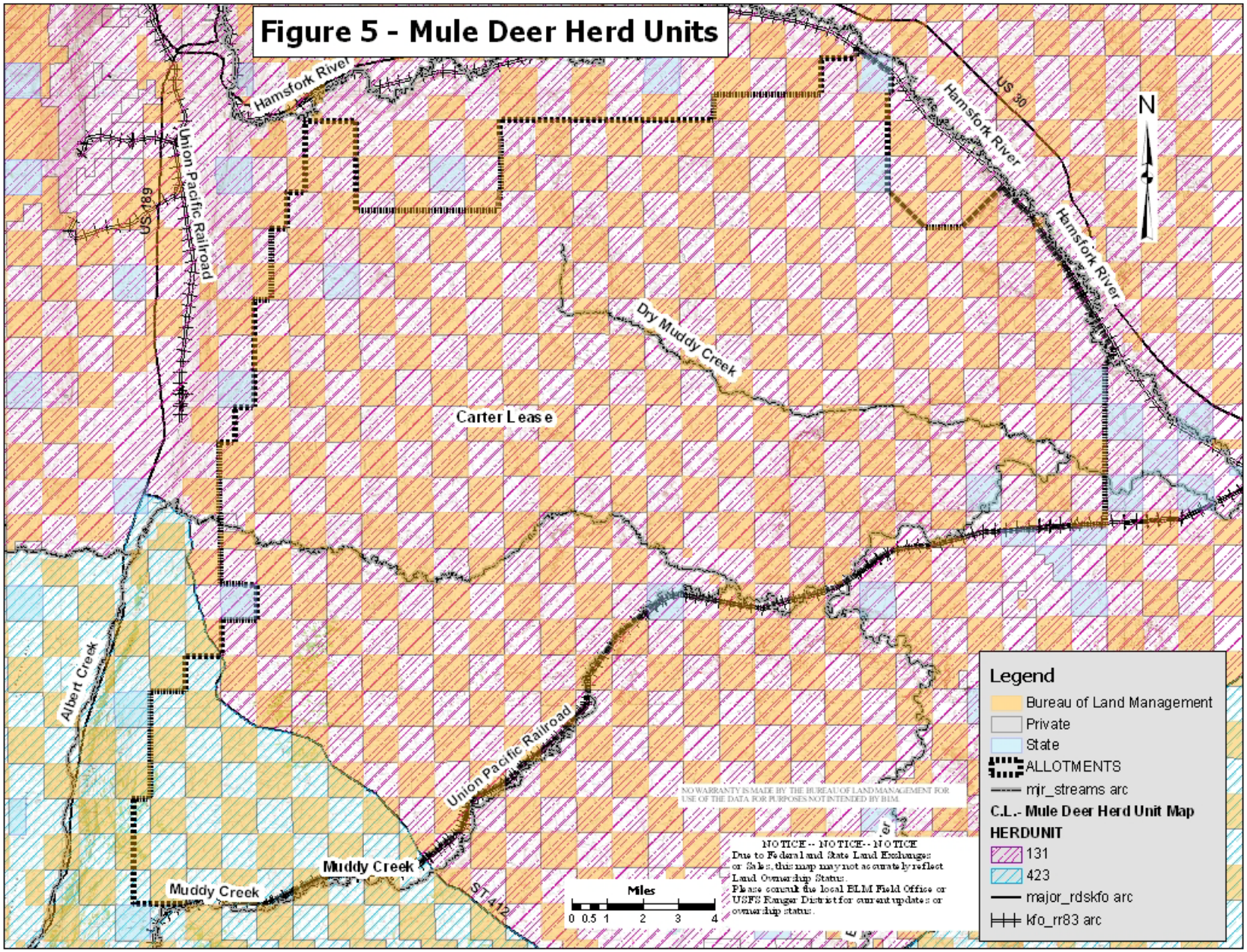
Figure 5 - Mule Deer Herd Units
Hamsfork River
US 30
Hamsfork River
Hamsfork River
N
US 189
Union Pacific Railroad
Dry Muddy Creek
Carter Lease
Albert Creek
Union Pacific Railroad
Muddy Creek
Muddy Creek
ST 412
Miles
0 0.5 1 2 3 4
NO WARRANTY IS MADE BY THE BUREAU OF LAND MANAGEMENT FOR USE OF THE DATA FOR PURPOSES NOT INTENDED BY BLM.
NOTICE -- NOTICE -- NOTICE
Due to Federal and State Land Exchanges or Sales, this map may not accurately reflect Land Ownership Status.
Please consult the local BLM Field Office or USFS Ranger District for current updates of ownership status.
Legend
Bureau of Land Management
Private
State
ALLOTMENTS
mjr_streams arc
C.L.- Mule Deer Herd Unit Map
HERDUNIT
131
423
major_rdskfo arc
kfo_rr83 arc

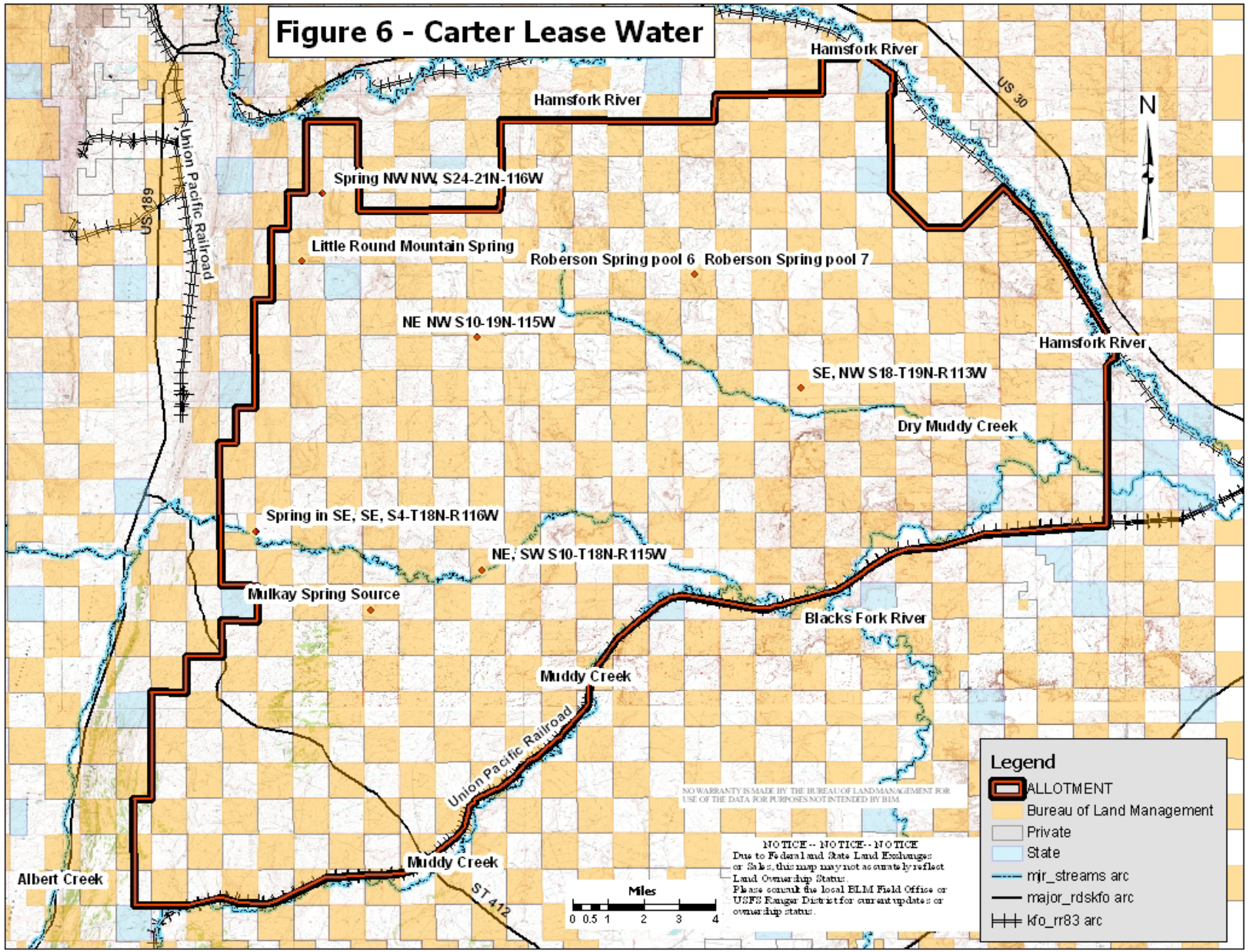
Figure 6 - Carter Lease Water
Hamsfork River
Hamsfork River
US 30
N
Spring NW NW, S24-21N-116W
US 189
Union Pacific Railroad
Little Round Mountain Spring
Roberson Spring pool 6
Roberson Spring pool 7
NE NW S10-19N-115W
Hamsfork River
SE, NW S18-T19N-R113W
Dry Muddy Creek
Spring in SE, SE, S4-T18N-R116W
NE, SW S10-T18N-R115W
Mulkay Spring Source
Blacks Fork River
Muddy Creek
Union Pacific Railroad
Muddy Creek
Albert Creek
ST 412
NO WARRANTY IS MADE BY THE BUREAU OF LAND MANAGEMENT FOR USE OF THE DATA FOR PURPOSES NOT INTENDED BY BLM.
NOTICE -- NOTICE -- NOTICE
Due to Federal and State Land Exchanges or Sales, this map may not accurately reflect Land Ownership Status.
Please consult the local BLM Field Office or USFS Ranger District for current updates or ownership status.
Miles
0 0.5 1 2 3 4
Legend
ALLOTMENT
Bureau of Land Management
Private
State
mjr_streams arc
major_rdskfo arc
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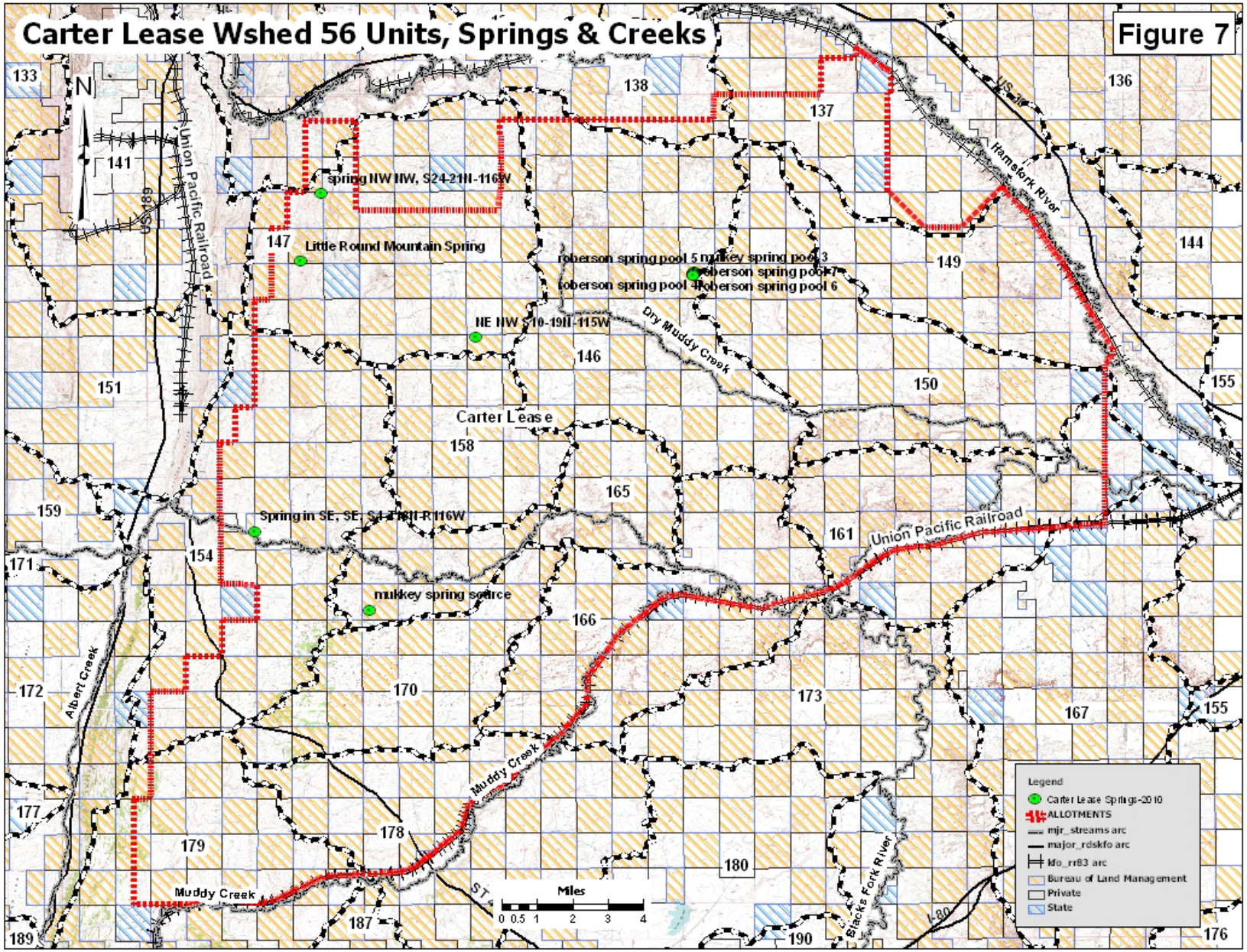
Carter Lease Wshed 56 Units, Springs & Creeks
Figure 7
N
Union Pacific Railroad
US 189
Spring NW NW, S24-21N-116W
Little Round Mountain Spring
roberson spring pool 5
mulkey spring pool 3
roberson spring pool 7
roberson spring pool 4
roberson spring pool 6
NE NW, S10-19N-115W
Dry Muddy Creek
Carter Lease
Spring in SE, SE, S1-17N-R116W
mulkey spring source
Albert Creek
Muddy Creek
Muddy Creek
Hams Fork River
US 30
Union Pacific Railroad
Blacks Fork River
I-80
Miles
0 0.5 1 2 3 4
Legend
Carter Lease Springs-2010
ALLOTMENTS
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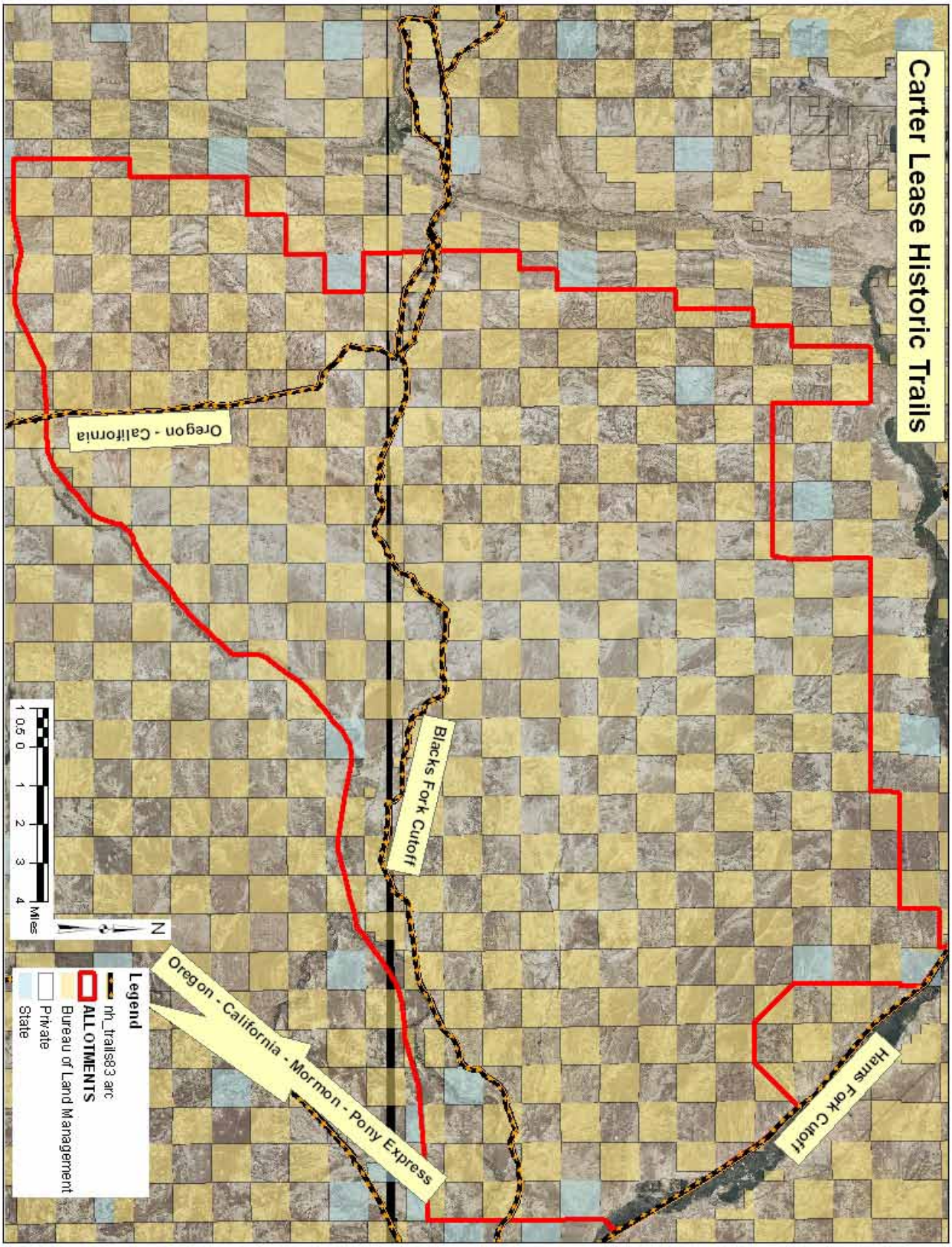
major_rdskfo.arc
kfo_rr83.arc
Bureau of Land Management
Private
State


Carter Lease Historic Trails
Oregon - California
Blacks Fork Cutoff
Hams Fork Cutoff
Oregon - California - Mormon - Pony Express
Legend
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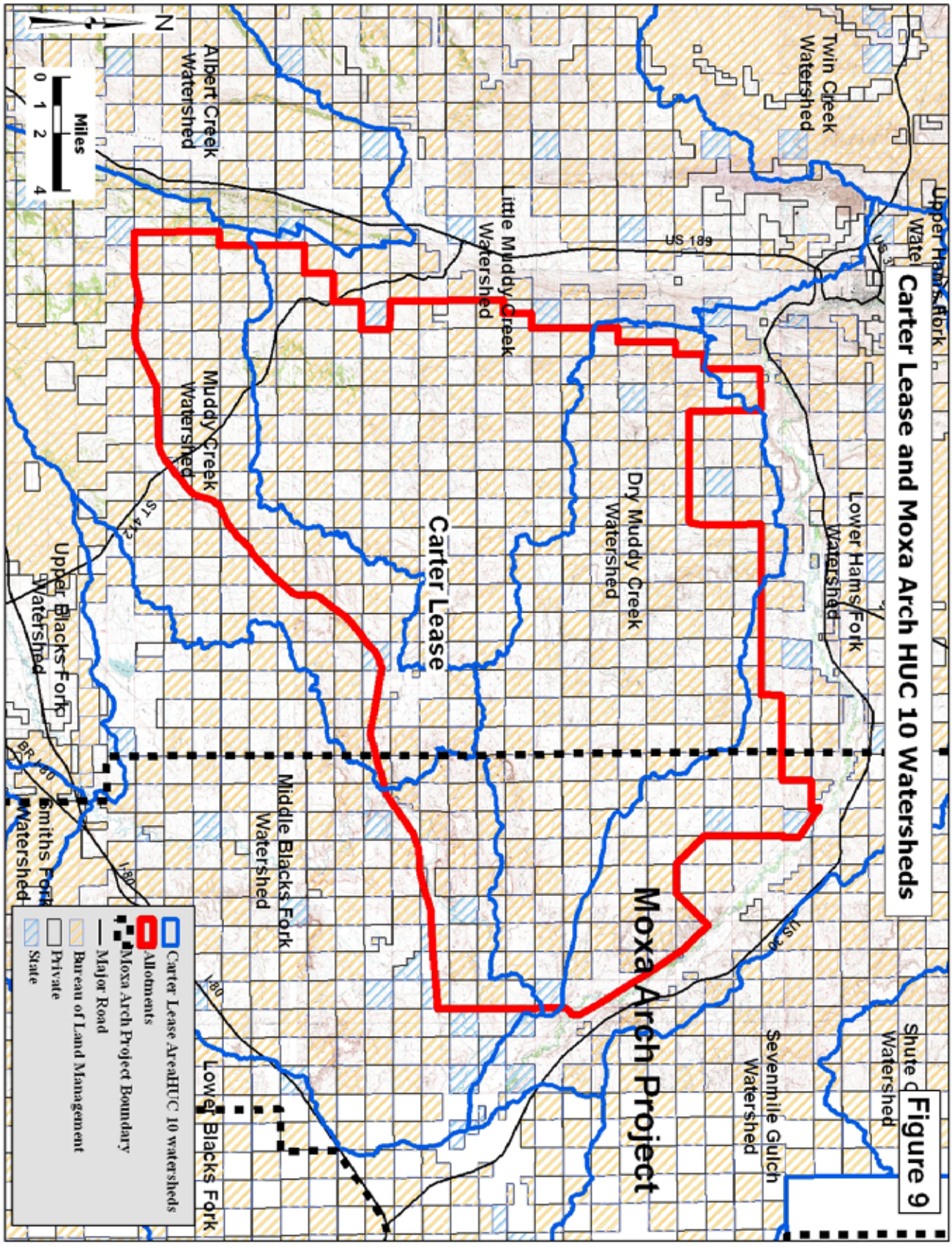
ALLOTMENTS
Bureau of Land Management
Private
State
1 0.5 0 1 2 3 4 Miles
N


Carter Lease and Moxa Arch HUC 10 Watersheds
Figure 9
Carter Lease
Moxa Arch Project
Albert Creek Watershed
Muddy Creek Watershed
Upper Blacks Fork Watershed
Smiths Fork Watershed
Little Muddy Creek Watershed
Dry Muddy Creek Watershed
Middle Blacks Fork Watershed
Lower Blacks Fork
Twin Creek Watershed
Lower Hams Fork Watershed
Sevenmile Gulch Watershed
Shute Creek Watershed
US 189
I-80
ST 412
N
0 1 2 4
Miles
Carter Lease AreaHUC 10 watersheds
Allotments
Moxa Arch Project Boundary
Major Road
Bureau of Land Management
Private
State

APPENDIX 2---

HISTORICAL BILLED USE TABLE

	ACTIVE	EXCHANGE - OF-USE	NONUSE	REP WILLFUL UNAUTH	SUR-CHARGE	TRAILING	UNAUTH	WILLFUL UNAUTH	Grand Total	PUBLIC AUM USE (Active + Trailing + Unauth)
1988	9769		80			172			10021	9941
CATTLE	257								257	257
SHEEP	9512		80			172			9764	9684
1989	12292	109	1451			92		4	13948	12388
CATTLE	1207	109						4	1320	1211
SHEEP	11085		1451			92			12628	11177
1990	11409	55	1852			278			13594	11687
CATTLE	1137	55	70						1262	1137
SHEEP	10272		1782			278			12332	10550
1991	12082	91	1047			174	2		13396	12258
CATTLE	1141	91							1232	1141
SHEEP	10941		1047			174	2		12164	11117
1992	7913	109	2216			61			10299	7974
CATTLE	1207	109							1316	1207
SHEEP	6706		2216			61			8983	6767
1993	10067	109	3673			64			13913	10131
CATTLE	1207	109							1316	1207
SHEEP	8860		3673			64			12597	8924
1994	10467	109	2198			41			12815	10508
CATTLE	1207	109							1316	1207
SHEEP	9260		2198			41			11499	9301
1995	10157	109	2396			39			12701	10196
CATTLE	1207	109							1316	1207
SHEEP	8950		2396			39			11385	8989
1996	11032	109	1231			43			12415	11075
CATTLE	1211	109							1320	1211
SHEEP	9821		1231			43			11095	9864

	ACTIVE	EXCHANGE-OF-USE	NONUSE	REP WILLFUL UNAUTH	SUR-CHARGE	TRAILING	UNAUTH	WILLFUL UNAUTH	Grand Total	PUBLIC AUM USE (Active + Trailing + Unauth)
1997	10813	109	1162			27			12111	10840
CATTLE	1213	109							1322	1213
SHEEP	9600		1162			27			10789	9627
1998	12258	109	1920			114			14401	12372
CATTLE	1210	109							1319	1210
SHEEP	11048		1920			114			13082	9643
1999	13899	109	1806			106			15920	14005
CATTLE	1211	109	501						1821	1211
SHEEP	12688		1305			106			14099	12794
2000	7231	109	633	3		101			8077	7335
CATTLE	1211	109		3		20			1343	1234
SHEEP	6020		633			81			6734	6101
2001	10751	109	2020		234	54			13168	10805
CATTLE	1210	109			234				1553	1444
SHEEP	9541		2020			54			11615	9595
2002	6897	53	3729		234	129			11042	7026
CATTLE	957	53			234				1244	1191
SHEEP	5940		3729			129			9798	6069
2003	6358	9098	4993				4		20453	6362
CATTLE	370	182	862				4		1418	374
SHEEP	5988	8916	4131						19035	5988
2004	10126	83	1922			193			12324	10319
CATTLE	878	83	92						1053	878
SHEEP	9248		1830			193			11271	9441
2005	11199	84	1923			107			13313	11306
CATTLE	782	84	191						1057	782
SHEEP	10417		1732			107			12256	10524

1

	ACTIVE	EXCHANGE-OF-USE	NONUSE	REP WILLFUL UNAUTH	SUR-CHARGE	TRAILING	UNAUTH	WILLFUL UNAUTH	Grand Total	PUBLIC AUM USE (Active + Trailing + Unauth)
2006	7240	693	2306			218			10457	7458
CATTLE	780	693	191						1664	780
SHEEP	6460		2115			218			8793	6567
2007	7838	84	608			196			8726	8034
CATTLE	975	84	234						1293	975
SHEEP	6863		374			196			7433	7059
2008	9377	967	1918			152			12414	9529
CATTLE	975	967							1942	975
SHEEP	8402		1918			152			10472	8554
2009	12201	84	1761			9			14055	12210
CATTLE	626	84							710	626
SHEEP	11575		1761			9			13345	11584
2010	8040	84	852			20			8996	8060
CATTLE	971	84							1055	971
SHEEP	7069		852			20			7941	7089

APPENDIX 3 –

STANDARDS AND GUIDES ASSESSMENT

WYOMING RANGELAND STANDARDS CONFORMANCE REVIEW SUMMARY

Field Office: Kemmerer

Allotment: Carter Lease, #11306

Allotment	Public Acres	Percent Public	Private Acres	Percent Private	State Acres	Percent State	Total Acres
Carter Lease	118114	42.1	131745	53.8	7454	4.1	257,313

Permitted Use on Carter Lease:

Authorization Number	Livestock type and no.	Federal AUMs (Active)	Federal AUMs (Suspended)	Season of Use Start	Season of Use End	% Federal AUMS
4900005	S 1200	432	108	12/01	4/30	36
4900132	C 2	9	0	6/01	10/15	100
4900132	C 45	226	46	5/16	10/15	100
4900235	S 2839	1212	0	12/01	4/30	43
4904064	C 51	255	45	5/16	10/15	100
4904105	S 1173	288	72	12/01	4/30	33
4904119	S 2923	900	225	12/01	4/30	31
4904121	S 1200	432	108	12/01	4/30	36
4904166	C 30	181	45	5/01	10/31	100
4904197	S 1349	576	144	12/01	4/30	43
4904204	S 6069	2592	648	12/01	4/30	43
4904207	S 4050	1728	458	12/01	4/30	43
4904207	S 910	147	0	5/01	5/31	79
4912976	C 38	190	50	5/16	10/15	100
4912983	S 1340	576	144	12/01	4/30	43
4913076	C 80	345	0	5/01	10/15	78
4913903	S 4020	1716	494	12/01	4/30	43
4914306	S 1148 S 1212	224 160	 93	12/01 3/01	2/28 4/30	33 33

4914307	S 1148 S 1212	224 160	93	12/01 3/01	2/28 4/30	33 33

PART 1 – CONFORMANCE REVIEW

Standard #1

Within the potential of the ecological site (soil type, landform, climate and geology), soils are stable and allow for water infiltration to provide for optimal plant growth and minimal runoff.

DO RESOURCE CONDITIONS IN THE ALLOTMENT MEET THE STANDARD? **YES**

Rationale:

Soils in the Carter Lease Allotment vary from shallow silt- or clay-loams in the valley bottoms to fine-textured silts and clays on the slopes and areas of exposed rock in the uplands, particularly in the western portions of the allotment. The Carter Lease vegetative communities vary from Big Sagebrush-bunchgrass communities to sparsely-vegetated alkaline sites to unvegetated badlands with high bluffs. In most sites within the allotment, the vegetation appears to be robust and healthy, given the climate and ecotype of the community the plants are growing in. There is sufficient standing plant matter and litter present in the uplands, within the constraints of the ecological community, to disperse the energy from wind, rain or overland flow and reduce erosion. The flowing riparian areas show evidence of substantial incision/down-cutting in the past. This has resulted in some high cutbanks that still show active under-cutting and sloughing as the streams rebuild a meandering flow pattern. There are numerous gulleys feeding the Dry Muddy, Little Muddy and Muddy Creeks, as well as the Blacks Fork and Hams Fork Rivers. However, with very few exceptions, the gulleys presented rounded features and some vegetation at the bottom, indicating that the erosion is occurring slowly.

Standard #2

Riparian and wetland vegetation has structural, age, and species diversity characteristic of the stage of channel succession, is resilient and capable of recovering from natural and human disturbance in order to provide forage and cover, capture sediment, dissipate energy, and provide for groundwater recharge.

DO LOTIC (FLOWING) RESOURCE CONDITIONS IN THE ALLOTMENT MEET THE STANDARD? **YES**

Rationale:

The Carter Lease Allotment contains approximately 40 miles (on public, private and state lands) of perennial and seasonal flowing riparian systems in the Muddy Creek, Little Muddy Creek and Blacks Fork River. The majority of the flowing systems are in private lands as access to water was a high priority in the homestead era. The 2010 PFC Assessment conducted on the public lands resulted in a Functioning-At-Risk (FAR) assessment of all the systems. The lotic systems are all in incised channels. The incised nature of the channels restricts the ability of the system to dissipate the water's energy because the water cannot access the floodplain.

Little Muddy Creek was judged to have an Upward trend. The team observed some stable undercut banks, vegetated point bars, and healthy stands of sedges and rushes, as well as several stands of Coyote Willow in the segments where the channel bends offered protection to the seedlings, trapped snow or the steep banks protect the saplings from browsing. There were very limited signs of erosion in the channel, even though sediment deposits indicated recent high flow levels. Livestock impacts seemed to be restricted to areas where the banks had lower angles, allowing livestock to access the water or cross the channel. Though the localized impacts were significant in those particular areas, they constituted a very minor percentage of the total stream length and were not causing a systemic degradation of Little Muddy Creek, despite the recent high flow levels.

Muddy Creek showed obvious signs of prolonged high flow levels due to near-record release volumes from upstream reservoirs. With the notable exception of the outside curves, especially in areas with high cutbanks, the Muddy Creek steambanks showed relatively little erosion and high levels of sediment capture, both on the floodplain and inside the channel. Riparian vegetation was dominated by Baltic and Spike Rush, though some pockets of Nebraska Sedge and Coyote Willow were seen. Most of the Tamarisk seen along Muddy Creek below the Little Muddy Confluence had been sprayed and were dead. However, there were a few that had live branches. Above the confluence, there were multiple stands of live Tamarisk.

Livestock impacts were localized to areas that offered the cattle easy access to Muddy Creek and constituted a very small percentage of the total length of the stream. Despite the recent high flows, no significant degradation had occurred as result of livestock use. Use levels of the riparian vegetation were low and most of the cattle seen during the tour were on the uplands. Due to the inconsistent signs of heavy erosion (primarily in outside curves and cutbanks) and deposition (atop the floodplain and point bars inside the channels) levels, contrasting with the vegetated banks holding together and vigorous growth of herbaceous riparian vegetation and appearance of some Coyote Willows, the assessment team opted to rate Muddy Creek, both below and above the confluence with Little Muddy, as Functioning At Risk, Trend Not Apparent.

The Blacks Fork River below the Muddy Creek confluence seemed to be far less stable than Muddy Creek. The team observed a high sediment load in the water, though it did seem to be settling out in some of the point bar areas where the water velocity was lower. There were significant signs of erosion. Though a few clumps of rushes or willows still clung to the channel sides, most of the lower floodplain had been eroded away in the areas subjected to high-velocity water; leaving a wide, high-walled channel with the next available bench two to three feet above the current water level. Many of the high cutbanks on the outside edges of the meanders showed significant levels of erosion and/or sloughing. On the positive side, the low-velocity areas exhibited large areas of bare sediment deposits on the point and channel bars, as well as on the high terrace. The team did not find vegetation under these sediments, though it is possible that the sediments were deeper than the team allowed for. The significant levels of erosion and amount of bare sediment caused the team to judge these reaches to be FAR-Downward. However, the team did not find significant signs of livestock impacts. The degradation in this segment seemed to be caused by the extreme water volumes that had been released in May of 2010.

The riparian systems in the Carter Lease, with the exception of the Blacks Fork River, weathered the extreme flows of 2010 with no significant signs of degradation. In addition, the vegetation in the low-velocity segments of all riparian systems did trap and retain significant amounts of sediment.

DO LENTIC (SPRING OR POND) RESOURCE CONDITIONS IN THE ALLOTMENT MEET THE STANDARD? **NO**

Rationale:

One of the springs (in or next to the Dry Muddy Creek) appears to have dried up. Though the team was equipped with a GPS unit and a map that indicated they were on the correct site, there was no sign of water or riparian vegetation. Immediately uphill of the site where the spring was supposed to be, there were multiple gas wells and two separate pipelines. It is surmised that the water has been diverted by one or more of the wells or pipeline trenches.

Of the remaining seven springs, Roberson Spring was judged to be FAR with trend Not Apparent. Mulkay Springs, Little Round Mountain Spring and two unnamed springs (one in the extreme northwest corner of S24-T20N-R115W, and the other next to Little Muddy Creek in NE, SW S10-T18N-R115W) were determined to be FAR-Down due to livestock impacts. Soil compaction and deformation such as post-holing, hummocking and (re)channelization were observed on each site, as well as apparent invasion by upland species into historically wetland communities.

A spring near the Little Muddy at the section line between Sections 3 and 4 in T18N-R116 W had a complete lack of typical riparian vegetation and almost no discernable animal impacts. This spring was also rated as FAR-NA.

The two remaining springs (unnamed) in NE, NW S10-T19N-R115W and NE, SW S6-T19N-R113W were rated as non-functional. These springs had extreme levels of hoof impacts to the point that no vegetation remained near the spring source. No water was visible in these springs beyond the hooprint-caused pools in the mud in the middle. The spring in Section 6 apparently once fed a small, excavated pond. It appeared that the spring has since degraded to the point that someone dug the spring out at least a food in depth at the source and cut a channel to the pond. At the time the spring was observed, there was no free water at the spring source and the pond was dry.

The 2004 Carter Lease S&G document called for the construction of exclosures around the springs to protect them from further degradation. This need is now urgent. Those springs that can be developed (Mulkay, Little Round Mountain, and the unnamed spring north of Little Round Mountain, should be developed with springboxes and pipes to take the water to a trough or tank sited sufficiently downhill to provide positive flow.

Standard #3
Upland vegetation on each ecological site consists of plant communities appropriate to the site which are resilient, diverse, and able to recover from natural and human disturbance.

DO RESOURCE CONDITIONS IN THE ALLOTMENT MEET THE STANDARD? **YES**

Rationale:

The old flow channels that now form some portions of the first bench above Little Muddy Creek, Muddy Creek and the Blacks Fork River are often dominated by Big Sage and Silver Sage with an understory of mixed upland and mesic grasses and forbs. On the whole, the forage plants in these areas appear healthy, though the more accessible sites do have some repression in plant growth impacts from trailing.

The upland vegetation on the wide terraces above the channels of Little Muddy Creek and much of Muddy Creek is primarily composed of the saline lowland (drained) community. This means that the herbaceous plant community is consistent with what is expected in saline lowlands, due to the low surface soil moisture, texture and tendency towards salinity. Western Wheatgrass is the dominant grass in these sites. Where Western Wheatgrass is absent, there are varying amounts of Sandberg Bluegrass, Bottlebrush Squirreltail and Indian Ricegrass. These variations seem to indicate variations in soil salinity levels. The presence of Gardner Saltbush is another indicator of surface soil salinity. The Greasewood in these

sites is of lower stature than expected in saline lowland sites, suggesting that the water table is deeper than what is normally expected in typical saline lowlands.

Though there is significant variation in species composition and production levels due to changes in soil and salinity levels, the plateaus and hills within the allotment show vigorous growth in the shrub component, as well as the understory grasses and forbs. This is to be expected in areas that typically see only winter sheep use. As a whole, the shrubs in these areas do not show significant alterations in their growth pattern, indicating that they typically receive low levels of use.

There are areas where the shrubs do exhibit moderate to severe hedging. These areas tend to be near water (springs or swales where snow accumulates early and remains longest), or near traditional sheep camp sites. There are also heavily impacted areas near gates and sites traditionally used for temporary sorting corrals. However, the corral sites are invariably on private land where the BLM has no authority.

Undesirable species in the uplands such as Cheatgrass and halogeton seem to be confined to high-impact areas such as sheep camps and pipelines. So far, neither species seems to be spreading beyond the disturbed areas. The checkerboard ownership pattern within this allotment can make coordinated control problematic because some commercially available chemicals have not been approved for use on federal land.

STANDARD #4:
Rangelands are capable of sustaining viable populations and a diversity of native plant and animal species appropriate to the habitat. Habitats that support, or could support, threatened or endangered species, species of special concern or sensitive species will be maintained or enhanced.

RESOURCE CONDITIONS IN THE ALLOTMENT MEET THE STANDARD? **YES**

Rationale:

The following species were among those present, in varying amounts, on several upland sites depending on soil texture and salinity: Indian Ricegrass, Needle-and-Thread, Thickspike Wheatgrass, Western Wheatgrass, Gardner Saltbush, Fourwing Saltbush, winterfat, Big Sagrbrush, Rabbitbrush, Spiny Hopsage and Silver Sagebrush. Appropriate species were present for the soil types at all undisturbed sites. Individual plants appeared robust for the climatic conditions at the time, with no indications of die-off or thinning of the stand. Some of the brush clumps had die-off of individual branches or bushes while the remainder of the stand appeared vigorous.

Highly-disturbed sites such as pipelines scars, well pads and other oil/gas developments were often dominated by Halogeton and other opportunistic INNS. At this time, however, the percentage of acres impacted by oil and gas activity is still very minor compared to the overall acreage of the Carter Lease within the Moxa Arch.

Field observations suggest that Carter Lease is capable of sustaining viable populations and diversity of native plant and animal species appropriate to the area. A BLM Wildlife Clearance dated 7/27/2010, indicates that the Carter Lease may or does contain potential habitat for sage obligate birds including the Sage Thrasher, Sage Sparrow, Brewer's Sparrow, and Loggerhead Shrike, Mountain Plover and Pygmy Rabbit. The ID Teams that conducted the PFC ratings of the Muddy/Blacks Fork systems reported flushing numerous Sage Grouse as they walked along the streams.

Wyoming Game and Fish is responsible for the management of all big game species in Wyoming, including setting population goals for each herd unit of each species. The Carter Lease allotment lies entirely within pronghorn antelope herd unit 401 crucial winter and yearlong range. According to the most recent WGFD job completion report (2008), herd unit 401 contains 59,200 individuals and is therefore, 23% above the population objective of 48,000.

Mule Deer unit 413 occupies all of the allotment north of State Highway 412 (the Carter Highway), with Mule Deer unit 423 south of the highway. The mule deer population is currently at the population objective for unit MD423 and the 10 year trend is at or slightly below the population objective (WGFD 2007). The allotment lies entirely within the boundaries of the West Green River Elk Herd Unit E428. The elk population is currently 12% above the population objective for this unit and the 10 year trend has been above the population objective (WGFD 2007). The portion of Carter Lease north of Highway 412 lies within Moose Herd Unit number M134, and the portion south of the highway is in unit M168. The Hams Fork, Muddy Creek and Blacks Fork drainages, as well as the valley west of the allotment where Highway 189 is found, are all considered critical winter range for Pronghorn Antelope. The Highway 189 valley, the juniper-topped ridges to the south and west of the Carter Lease Allotment, and Muddy Creek drainage south of the allotment are all mapped as critical winter habitat for Mule Deer.

The Carter Lease contains (potential) habitat for the following Special Status Species: Black-Footed Ferret, Pygmy Rabbit, Sage Sparrow, Burrowing Owl, Ferruginous Hawk, Greater Sage-Grouse, Mountain Plover, Loggerhead Shrike, Long-Billed Curlew, Sage Thrasher, Brewer's Sparrow and Ute Ladies'-Tresses. The Carter Lease has multiple sage grouse leks and a sizable Core Area (approx. 115,778 acres) dominates the western three-fifths of the allotment

Other mammals with actual or potential habitat in the Carter Lease include: Badger, Red Fox, Coyote, Desert Cottontails, White-Tailed Jackrabbit, Ground Squirrels, Chipmunks, Mice, Voles, Shrews and Pocket Gophers.

STANDARD #5:
Water Quality Meets State Standards.

RESOURCE CONDITIONS IN THE ALLOMENT MEET THE STANDARD? **YES**

Rationale:

The amounts of chemical and/or biological contamination present in the waters within the Carter Lease are unknown at this time. However, none of the waters Carter Lease Allotment are currently listed on the Wyoming Department of Environmental Quality impaired waterbody list or monitoring list. Also, none of the streams in these allotments are listed on the 2008 State of Wyoming Approved Clean Water Act Section 303(d) list of waterbodies with credible impairment data.

STANDARD #6:
Air Quality Meets State Standards.

RESOURCE CONDITIONS IN THE ALLOTMENT MEET THE STANDARD? **YES**

Rationale:

A November 3rd email from Carrie Chitty, Data Manager/Natural Resources Program Principal, State of Wyoming DEQ - Air Quality Division - Monitoring Section, informed this office that available air quality data indicated that the Carter Lease area located in Lincoln and Uinta counties is in attainment for State and National Air Quality Standards at this time.

Reviewed by

Steven Calkum, Range Management Specialist — July 21, 2011 Date

Erik Norelius, Wildlife Biologist — 7/21/2011 Date

Michele Easley, Assistant Field Manager, Resources — 7-21-2011 Date

CONCURRANCE:

John R. Christensen, Field Manager — 7/21/2011 Date

APPENDIX 4

PROPER FUNCTIONING CONDITION (PFC) ASSESSMENT

2010 PFC Assessments of Carter Lease Lotic (flowing) Riparian Systems

Team Members (Lotic Assessments) Marion Mahaffey (Natural Resources Specialist), Bill Laycock (Range Consultant), Robert Epp (Range Management Specialist), Joshua Freeman (Wildlife Biologist), Steven Calkum (Range Management Specialist), Kelly Owens (Hydrologist), Jennifer Fleuret (Hydrologist)

Four separate systems were identified within the Carter Lease: Muddy Creek between the town of Carter and the confluence with the Little Muddy, Little Muddy Creek from the wst edge of the allotment and the confluence with Muddy Creek, Muddy Creek from the Little Muddy Confluence to the confluence with the Blacks Fork River, and the Blacks Fork River from the Muddy Confluence to the eastern border of the allotment.

PFC assessments of Little Muddy and Muddy Creeks, as well of the portions of the Blacks Fork River within the Carter Lease were conducted from July 6-9 of 2010. Little Muddy Creek is deeply incised and somewhat protected from livestock impacts by that incision. The team observed that the stream had recently been flowing at a level much higher than its current level and attributed areas of fresh erosion or sediment deposition to the recent high flows. Meadow Foxtail comprised the vast majority of the waterline vegetation, with Baltic Rush in the gaps. Numerous small stands of Coyote Willow were observed in sediment deposition areas and seemed to be both armoring the banks and trappoing sediment that may eventually become a new flood plain. The great majority of Little Muddy's streambanks held together against the recent high flow event, though some outside bends, particularly in those areas affected by trampling from cattle crossing the drainage or simply accessing the water. The team members agreed that there were no alternatives short of armoring the crossings with concrete or rocks that these impacts could be avoided. Little Muddy Creek was found to be Functioning at Risk, with an upward trend. A major resource for this decision was Dr. Laycock who contributed his memories of what the stream had looked like in 1998.

Muddy Creek from Carter to the confluence with the Little Muddy is a smaller incised channel inside a much wider, older riparian area. The current channel showed a fairly high level of impact from the recent high flows. Where the creek had accessed the floodplain, there were deposits of sand and silt up to 4" thick. However, this showed that the stream and the floodplain had done exactly what they were supposed to. There was some Tamarisk (Salt Cedar) observed in many areas, but most of the stands were dead. Kill zones around the Salt Cedar indicated chemical control. Frequent stands of young (under 5 years old) willows were observed, mostly in deposition zones, providing hopeful signs for vegetative improvement. The willows showed no to fairly light levels of use at the time of the assessment. Baltic Rush dominated the greenlines, though some Nebraska Sedge stands were seen. Many of the outside banks of the incised channel showed significant levels of scouring and sloughing, causing concerns about increased risks for future erosion. No identifiable livestock impacts were observed until the team was within a mile or so of Hampton. Though it was still early in the season, some isolated patches of the riparian area showed significant trample. However, the percentage of streambank between the point where livestock impacts were first identified and the Muddy/Little Muddy confluence occurred was estimated to be less than 10-15%. Muddy Creek between the Town of Carter and the Little Muddy Confluence was found to be exhibiting a positive vegetative trend, but still the hydrology was

thought to still be of questionable stability. The team rated this segment as Functioning at Risk with Trend Not Apparent due to the mixed indicators.

Muddy Creek between the Little Muddy Confluence and the Blacks Fork Confluence appeared much the same as Muddy Creek from Cater to the Little Muddy Confluence. The major difference was the presence of Meadow Foxtail. Meadow Foxtail did not seem to crowd out existing sedges or rushes, however it seemed to aggressively colonize bare areas of streambank or moist areas further away from the water and prevent the native aquatics from entering. Baltic Rush still seemed to be the primary colonizer of fresh point bars or sediment islands. This segment also showed significant levels of fresh sediment on the instream bars and floodplains. There were some willow stands observed, but smaller and less frequent than in either the Little Muddy or Muddy Creeks below their confluence. Small herds of cattle were observed, though livestock impacts appeared to occupy a fairly small percentage of the greenline. Livestock were observed in This segment was also rated as Functioning at Risk with Trend Not Apparent due to the mixed indicators.

The Blacks Fork River showed evidence of very high flows earlier in the season. The water level at the time of the assessment was, judging by sediment deposits and scour lines, 3-4 feet down from the crest flow. The water appeared to still be quite dark, though it was difficult to tell if the color was from suspended sediments or the bottom of the channel. The eastern-most section of the river was incised at least two feet above the current water level. Even so, the terrace above the channel frequently had sediment drifts caught by tamarisk or other woody plants over a foot deep. The channel wall in the more incised sections showed significant scouring and only isolated patches of what may have been the former floodplain clung to the channel walls near the current waterline. Several fairly large stands of Tamarisk were observed on both the terrace and on the floodplains where the channel was not so incised. The portions of the river that were not so heavily incised (and thus had more access to their floodplains) showed far less scouring, though nearly all of the outside cutbanks showed recent sloughing. The floodplains and point bars in those segments showed sediment deposits from a few inches to over 1 foot thick. Riparian vegetation was comprised mostly of Baltic Rush stands which were sparse to sporadic in spots. The thickness of the sediment deposits made it difficult to know whether the riparian vegetation was absent or buried. There were very isolated stands of willows observed sheltered areas along the entire stream reach. The willows were absent to very sparse from the east edge of the allotment until the team was about halfway between the east edge of the allotment and the confluence with Muddy Creek. At that point, the willows gradually became thicker as the team got closer to the Muddy Creek/Blacks Fork Confluence. The team felt that the vegetation and hydrologic indicators of the Blacks Fork River in the Carter Lease were both questionable. It was determined that this segment was Functioning at Risk with Downward Trend

One spring at NE, SW S10-T18N-R115W was rated by this team. There was abundant herbaceous riparian vegetation surrounding the spring and tracing its overland flow. However, there was also abundant trampling, which had pushed the saturated soil around the spring source down over a foot. Trampling and soil hummocking downhill of the spring appeared to have diverted the water from its former flow into a different channel. This diversion appears to have been recent, as the new flow path did not have any riparian vegetation along its length. This spring was rated as Functioning At Risk with Trend Not Apparent. However, the team felt strongly that an exclosure

was needed to prevent further degradation. To preserve access to the water would require a pit of some type as there is not enough elevation difference between the spring and the lip of Little Muddy's embankment to make a gravity-fed springbox and tank feasible.

2010 PFC Assessments of Carter Lease Lentic (non-flowing) Riparian systems

Team Members (Lentic Assessments): Steven Calkum (Range Management Specialist), Erik Norelius (Wildlife Biologist), Jennifer Fleuret (Hydrologist), Kelly Owens (Hydrologist)

PFC assessments of the springs within the Carter Lease conducted in August of 2010 found that all of the springs were Functioning at Risk or Non Functional. All except Roberson Spring and a small spring in Section 4-T18N-R116W were found to be in a downward trend due to livestock-caused physical impacts and/or apparent drying.

Roberson Spring seemed to be a series of small pools surrounded by Baltic Rush within a deep, steep-sided channel. The area showed very low levels of use by cattle while antelope use appeared to be more prevalent and showed and displayed no apparent trend.

The unnamed spring in SE, NE S4-T18N-R116W appears to be almost unused by either cattle or wildlife, yet there are no rushes or other classic riparian vegetation. The Little Muddy is within fifty yards of the spring and shows significant levels of cattle and wildlife use. It is possible that the water has an unpalatable chemical content. This spring was not rated by the team as they felt there were significant unanswered questions.

Mulkay Spring has hummocking and high levels of livestock trampling. There are signs that upland vegetation is invading formerly riparian areas and that the spring flow is starting to channelize. There is evidence that attempts to develop the spring and pipe the water offsite, as well as impound the water onsite, were made in the past. The team rated this spring as Functioning at Risk, with a Downward Trend and some discussion was made about building an exclosure to protect the spring and installing a springbox and pipe to take the water to a tank equipped with a float valve.

The spring at SE, NE S26-T20N-R116 W (Little Round Mountain Spring) was found to show evidence that water sources further uphill of the current flow points may have dried up. Upland vegetation is moving into sites dominated by riparian species where old, eroded hummocks still rise above now-dry soil. Active hummocks and deep, water-filled cattle tracks were observed near active seeps. One seep has a hand-built rock dam that is holding some water. Trampling by cattle seems to be the primary cause of degradation of this spring. Like Mulkay Spring, an exclosure, in combination with a springbox, pipeline and one or more tanks may be the most effective means to preserve or restore this spring.

The unnamed spring at NW, NW S24-T20N-R116W is degrading in a manner similar to Little Round Mountain and Mulkay Springs. The wetland appears to be shrinking, with evidence of upland species moving into formerly saturated areas. There is evident hummocking and trampling, as well as some evidence of channelization. The team thought that an exclosure,

coupled with a springbox, pipeline and tank would be best means of preserving or restoring the spring to a healthier state.

The unnamed spring at NE, NW S10-T19N-R115W is heavily degraded. The site consisted of a bare dirt circle about 30+ feet in diameter, with a muddy ring about 5 feet across in the center. Some water was visible in the mud. The mud was very unstable, indicating that the water was welling up from below. The center of the ring was about 2 – 3 feet below the surrounding ground, indicating that either animals or men had altered the site in an effort to dig down to water. This site was rated as Non-Functional.

The team made an effort to look at a spring that was mapped at NW, SE S24-T19N-R112W. However, they were unable to locate any riparian indicators at all. Two pipeline scars were observed just uphill of the site, as well as many oil/gas wells, causing the team to question whether the trenching or drilling had diverted or drained the water flow.

Erik Norelius and Steven Calkum visited another spring in SE, NW S18-T19N-R113W prior to the hydrologists coming out for the assessments. This spring consisted of an unvegetated mud-splotch quite similar to, but smaller than, the spring at NE, NW S10-T19N-R115W. There is a small pit just downhill of the spring. The spring may have fed this pit at one time, but due to either drying or trampling, the spring has degraded to the point that a person or persons unknown have dug the the spring area at least a foot below the surrounding hillside. Though a channel was cut out to preserve flow potential from the spring to the pit, the pit showed no signs of being wet for any length of time. The spring and pit both were both completely lacking in riparian vegetation. Due to time constraints in August, this spring was not visited by the entire ID team.

APPENDIX 5

Carter Lease Watershed Evaluation

Introduction: This document is intended to combine the findings of the Proper Functioning Condition (PFC) assessments of the riparian and wetland areas within the Carter Lease Allotment with the Standards and Guidelines (S&G) Evaluations (Both of which were conducted in 2010) to produce a comprehensive evaluation of the various components and systems that make up the watersheds contained within the allotment.

Allotment Description:
This is an abbreviated allotment description that presents the elements critical to this evaluation.
The Carter Lease has the rough, broken topography of the Overthrust Belt along its western side. The remainder of the allotment is primarily composed of steep-sided plateaus with relatively flat to rolling topography on top. The plateaus are separated by steep-sided drainages containing or feeding Muddy Creek, Little Muddy Creek, Dry Muddy Creek, Blacks Fork River and the Hamsfork River. These water systems currently flow in steep-sided incised channels. Old, abandoned stream channels and floodplains suggest that Little Muddy and Muddy Creek, as well as the Blacks Fork and Hamsfork Rivers, once flowed at a level as much as ten vertical feet above their current level. However, these abandoned drainages are well-vegetated with upland species, including sagebrush plants at least 50+ years old, indicating that the down-cutting by the streams occurred several decades ago and not as a result of current management strategies.

Wyoming Big sagebrush and Desert Shrub vegetative communities dominate the Carter Lease. Juniper Woodlands are found on some of rocky ridges in the southwest corner of the allotment where the Overthrust features are dominant. Pockets of shrub-dominated riparian communities are found along the channels of Muddy Creek and the Blacks Fork River where perennial water is reliably available.

Annual precipitation in the Carter Lease Allotment ranges from 6-10 inches annually. Typically, the majority of the precipitation comes in the form of snow in the winter. However, the winters in 2008/09 and 2009/10 were unusually dry, followed by a wet spring. It is unknown if this signals a change in the dominant weather pattern. Most of the allotment is in the 8-10 inch range, with a wedge of 6-8 inches starting at the southwest corner and gradually widening until the eastern six miles of the allotment is within the 6-8” zone.

Carter Lease Watersheds: All of the runoff from this allotment contributes to the flow in the Green River. The extreme northern and northeast edges of the allotment drain directly into the Hamsfork River. The remainder drains into the Muddy Creek system or directly into the Blacks Fork River (which the Muddy System empties into). The Blacks Fork River absorbs the Hamsfork approximately four miles outside the eastern edge of the Carter Lease Allotment before flowing east and south to the Green River. The Carter Lease Allotment contains all or part of fifteen different watershed (wshed) 56 units. On the north and northeast edges of the allotment, units 138, 137 and 149 mark the areas which drain directly into the Hamsfork River from both the southern and northern banks.

- Units 147 and 146 drain into the Dry Muddy Creek. Dry Muddy is an ephemeral stream, flowing only with snow melt or in the event of a high-runoff rain event.
- Unit 154 extends beyond the western edge of the allotment and includes the portion of Albert Creek Allotment which drains into Little Muddy Creek.
- Units 158, 165 and 170 all drain into Little Muddy Creek.

- Unit 158 defines a small, ephemeral watershed separated from the Little Muddy by the bluffs on the north side of the creek. It drains into Little Muddy in Section 1 of T18N-R115W.
- Unit 165 is the Little Muddy Creek valley and those portions of the surrounding territory that drain directly into the creek. It extends from the ridge in Section 1-T18N-R116W to the east edge of Section 9-T18N-R114W where an old, abandoned meander of Little Muddy joined with Muddy Creek.
- Unit 170 defines a long, narrow watershed separated from 165 to the north and from the Muddy Creek watersheds to the east by various ridges. Like 158, it is likely that this watershed is ephemeral.

· Units 179, 178 and 166 all drain directly into Muddy Creek west of the Blacks Fork Confluence. These units include the western 3/4 of allotment's southern edge and cross over into the portions of the allotments south of Carter Lease (Bridger Airport, Muddy Creek and Austin Triangle) that also drain directly into Muddy Creek.

· Unit 150 Drains a large portion of the northeastern portion of Carter lease and empties into the Blacks Fork River about one mile west of the eastern edge of the allotment.

· Unit 161 is defined by the portions of Carter Lease and Granger Lease (to the south of Carter Lease) that drain directly into the Black's Fork River.

· Unit 167 just crosses into the extreme south-eastern corner of the allotment. The water draining from this small piece of the Carter Lease will flow south into the Granger Lease Church Buttes Pasture. Unit 167 empties into the Blacks Fork River about 1.5 miles east of the Carter Lease.

Wshed 56 Unit Conditions:

The primary method to determine the health of a watershed, regardless of its size, is to assess the condition of its components. In the case of the watersheds listed above, the components are the soil underlying the vegetation, the vegetation (both riparian and upland), the functionality of the existing hydrologic systems that collect and carry off the water that leaves the watersheds, the health of the native wildlife populations, and the cleanliness or quality of the water and air leaving the watersheds.

Factors Affecting Wshed 56 Unit Conditions:

· **Bridges, Culverts and other Instream Structures** - Where railroads, highways or other transportation corridors cross any of the creeks or rivers that cannot be forded due to perennial water flow or other physical barriers, culverts or bridges have been installed. Bridge supports and abutments perturb and confine the water's natural flow, causing increased water velocities and turbulence within and/or downstream of the structure, resulting in scour and erosion of the streambed and banks within and downstream of the structure (Merrill, 2005). Conventional pipe culverts can magnify this effect because the turbulence is confined within the tube and released suddenly at the downstream end. When railroads or highways are adjacent to a river, or if a river flows through a town, it is common to protect the manmade structures with rock or concrete to protect against erosion. The rock protects the structure against erosion, but does so at the cost of deflecting the water's force back into the stream, increasing the erosive force impacting the streambed and banks downstream. The erosive force carried by the structure-produced water velocity and turbulence often produces increased streambed and streambank

erosion, including stream widening and down-cutting (which result in channelization and/ or incision) and the formation of 'drop pools' (Merrill, 2005). Scoured-out holes inevitably work their way upstream and may be part of why nearly all of the many rivers and creeks in and around the Carter Lease are deeply incised.

- **Union Pacific Railroad (UPRR) –** The high berm the railroad is built on stops and redirects the widely dispersed overland flow from rain or snowmelt (see Unpaved Roads). The berm is often protected from the erosive force of the channeled water by rock or planted vegetation which often serves to direct the cutting force of the water outward. The runoff is diverted to into culverts or trestles increasing the volume and erosive energy of the water flowing through that particular gulley or low point (See Bridges, Culverts and other Instream Structures).

- **Highways –** Highway surfaces are impervious to rainwater and are relatively smooth compared to the natural landscape. Therefore, the paved surface produces greater runoff volumes, and higher peak flows, contribute to runoff with a greater erosive potential. In addition, the cuts, berms and ditches associated with any improved road permanently alter the topography and with it, the pre-existing hydrologic flow patterns of the site. Road cuts and ditches can also trap snow, potentially altering winter precipitation and snowmelt runoff patterns and volumes The raised roadbed and uphill borrow ditches of any highway capture and redirect overland flow to the next culvert or bridge downhill, producing a high-energy, concentrated flow with elevated erosive potential. Finally, wherever highways cross the rivers, the supports (if any) and abutments affect the water's flow patterns and energy (See Bridges, Culverts and other Instream Structures).

- **Unpaved Roads -** Both improved and two-track roads often serve to capture (with ditches or ruts) overland sheet flow and divert it from its 'normal' paths that usually have either the vegetation or rock capable of dispersing the water's energy. The captured water becomes a focused stream with enough volume and erosive energy to create gullies and transport the resulting sediments offsite.

- **Moxa Arch Gas Wells –** Part of the Moxa Arch gas field lies under the eastern nine (9) miles of the Carter Lease. The well pads, improved roads, tanks and buried gas lines affect the surface runoff volumes and patterns. The roads and pads redirect and bar overland drainage patterns (see Unpaved Roads). The pipeline trenches can alter the subsurface flow by breaking through impermeable soil or rock layers, allowing the water to drain to deeper layers, or capture overland flow due to improper backfill methods.

- **Municipalities/Gas Processing Facilities –** The towns of Frontier, Kemmerer, Diamondville and Opal affect the Wshed 56 units they are in by increasing runoff from the sites they occupy and producing concentrated flow from stormwater sewer systems (if present). Gas facilities also produce high levels of runoff from inside the facility. In addition, the containment berms surrounding the facilities can redirect or rechannel runoff flowing towards the facilities (see Unpaved Roads).

- **Climate –** The climate shared by the Wshd56 Units in and around Carter Lease is high (6,600+ feet above sea level), semi-arid (6-10 inches of precipitation per year) and cold (average of 239

days per year below 32F) (Weatherbase.com). This is one Factor that operates in complete independence of management practices, therefore, it is assumed that all units discussed in this document are equally impacted by the limitations imposed by the short growing season and limited moisture.

- **Soils** - The soils vary in salinity/alkalinity depending upon the parent material, current slope and soil water availability. The highly deformed areas with upthrust rock ridges typically have very thin, rocky soils with very low production, while the flat-lying areas that collect runoff from the higher slopes typically have deeper soils with increased vegetative production. Salt or alkali crusts are present to some degree in many low-lying areas where water collects but does not drain. The soils are often composed of fine-grained materials (silt and clay) which have slow infiltration rates. As a result, a relatively high percentage of any moisture from precipitation events either runs off, or is held in the top few inches of soil. All the soils in the Carter Lease are classified as fragile (meaning they are easily eroded if disturbed)

- **Native Vegetation** - The altitude, cold temperatures and dry climate, in combination with saline/sodic soils have produced an environment that supports only those plants tolerant of short growing seasons, very limited water to produce growth and high salt contents. This has resulted in a community of drought-tolerant plants with a relatively large percentage of bare ground. Both the upland and riparian communities were examined during the PFC and S&G ratings performed in 2010.
  a. Upland vegetative communities in the Carter Lease are dominated by Desert Shrub and Wyoming Big Sagebrush. There are some juniper-dominated rocky uplands in the west-central and southwest corners of the allotment. Sagebrush steppe communities extend outward from the edge of the natural riparian and/or human-altered areas such as towns or hayfields. The upland communities that do not receive additional moisture are variable in production and type, depending on slope steepness and soil type.
  b. Riparian vegetation (Sedges, Rushes) are present around most of the springs and along Muddy and Little Muddy Creeks as well as the Hamsfork and Blacksfork Rivers. Some Coyote Willow saplings were observed along the Muddy and Little Muddy drainages as well. Presence of riparian vegetation is considered an indicator of healthy wetland systems. Presence of upland species in areas of wetland vegetation is often a sign of decline, as upland plants cannot tolerate saturated conditions wetland plants prefer. The 2010 PFC monitoring indicated that Little Muddy Creek is in improving condition, Muddy Creek has no apparent trend, while the Blacks Fork River is declining. In addition, the August 2010 PFC monitoring efforts found all of the Carter Lease springs with palatable water to be in declining or non-functional condition.

- **Hayfields –** Much of the Hamsfork and Blacksfork river floodplains between Kemmerer and Granger have been converted into hayfields. These fields are irrigated with river water diverted at various points upstream of the fields and applied by flood or sprinkler irrigation methods. The diversion of river water causes immediate depletions in the Hams Fork River flow volume, decreasing opportunities for the river to deposit sediments on the former floodplain, potentially increasing sediment deposits within the old river channel. Return flow from flood irrigation tailwater runoff from the fields can potentially cause increased nutrient or sediment loading in the river. The dense root systems and stems within the fields facilitate

water infiltration and retention within the hayfield soils. The increased capture and retention of water (whether from irrigation or runoff) by the hayfields can produce lateral flow through the floodplain soil profile from the fields and back into the river, potentially prolonging river flow levels through the summer and fall.

a. Interior-During the growing season, the interior areas of the hayfields provide high-value forage for all herbivorous species of wildlife. The wide, relatively flat fields offer very little visual cover for carnivores to approach unseen, particularly during first green-up and immediately after cutting or bale removal. Fields with mixed alfalfa/grass or clover/grass provide good vegetative food sources to adult Sage-grouse and sustenance for the insects that may be needed by the chicks.
b. Margins-The areas that border the cropped portions of the hayfields (both inside and outside the fences) are characterized by very tall, vigorous growth by mixed communities consisting of both native and introduced plant species. Because these sites receive intermittent peripheral irrigation, the soil profile is not constantly saturated. This allows both upland species adapted to drier soils and mesic (water-loving) native and introduced species to thrive. The dense growth provides both visual and thermal cover for wildlife, particularly smaller-bodied species, as well as young offspring of larger species.

- **Invasive/Non-Native Species (INNS) --** are exotic plant species that possess the ability to out-compete native species and contribute to the decline of native plant populations and the wildlife that depend on them. The primary INNS of concern in the Carter Lease Area are Tamarisk, Halogeton and Downy Brome (Cheatgrass).
  a. Tamarisk plants were observed along much of Muddy Creek and the Blacksfork River during the 2010 PFC and S&G assessments. Tamarisk is considered a noxious weed in Wyoming, in part because it aggressively invades wetland areas, displacing native plants. It consumes large quantities of water causing reduced stream flows. Tamarisk can tolerate saline sites and exudes absorbed salts out through its leaves. These deposited salts can raise the alkalinity of the soils under the tree, eventually killing any competing vegetation. Uinta County Weed and Pest has a Tamarisk control program and seemed to have killed most of the plants upstream of the Little Muddy Creek/Muddy Creek confluence. There did not appear to have been any control efforts below the confluence.
  b. Halogeton is primarily found in heavily disturbed areas (drilling pads, pipelines and gas field roads). Halogeton does not seem to compete well with established stands of native vegetation. However, in the absence of competition, is does become established more quickly than seeded native species and can prevent successful reclamation of disturbed sites. There are some areas (downhill of existing infestations, along two-track roads, and in badland sites that do not support other vegetation) where Halogeton is becoming established.
  c. Downy Brome (Cheatgrass) is an aggressive annual species that is among the first plants to green up in the spring and is well-adapted to take advantage of any seasonal moisture. It has very little root development and will produce seed viable for many years, even in drought conditions. It can crowd out native perennial species, especially in fire-prone areas, and contributes to the likelihood of fire because of the amount of fine fuel it can produce in a single year. In the Carter Lease, Cheatgrass has been observed in and near disturbed sites such as: sheep camps that are used year after year, oil/gas developments, both improved and two-track roads and rocky areas with thin soil.

d. Thistles (Canadian & Musk) Both species are aggressive invaders designated as noxious weeds. They favor sites that are moist, but not saturated year-round. Both are typically dark green in color, wavy, spine-edged leaves and have multiple purple flowers.
   i. Musk Thistle is a biennial (lives for only two years) that reproduces only by dandelion-like seeds carried by the wind. Each plant can grow from 18" to 6+' high, and typically have 4+ large (1"+ in diameter) flowers, depending upon water supply and soil fertility.
   ii. Canadian Thistle is a perennial (lives for many years) that spreads both by seed and rhizomes. Canadian thistle stems are thin, (¼ - ½ in. dia.) and typically 12 - 30" tall. The flowers are small, ½ - ¾ in. dia. at the base. Due to Canadian Thistle's aggressive colonizing abilities and extensive root/rhizome system, it can provide vital bank stabilization abilities in otherwise bare cutbanks.

e. Black Henbane is an escaped ornamental/medicinal plant. It can grow either as an annual or biennial. It has a rich-to-dark green thick stalk up to 3' tall with thick (up to 6" wide), long (up to 8") leaves growing directly from the stalk. The entire plant is covered with greasy hairs. Wide, trumpet-like, white-to-yellow flowers grow from the leaf axils. It is often seen growing in clumps, from the seeds dropped by previous year's plants. This plant is of concern not only because it displaces native vegetation, but also because it contains alkaloids that can be lethal to humans. Animals tend to avoid it unless there is no other forage available.

· **Domestic Livestock –** The presence of domestic livestock in the Carter Lease area has been a consistent factor affecting the surface density of soils, plant composition and health in both upland and riparian areas and numerous other factors since the mid-to-late 19th century. Between the passage of the 1934 Taylor Grazing Act and the late 1960s, Carter Lease was almost exclusively allocated for winter sheep use. The 1971 adjudication document allocated only 955 (9.1%) of the 10,497 Carter Lease Federal AUMs to summer cattle. In the 2010 grazing year, 971 (7.3%) of the 13,241 Federal AUMs on Carter Lease were allocated to cattle use.

a. Winter Sheep- The predominance of winter sheep use is possible because sheep are adapted to utilize browse from woody species such as sagebrush far more readily than cattle. This has protected many of the Carter Lease herbaceous species (grasses and forbs) from use during the growing season by timing the primary harvest when those plants are dormant and less vulnerable to the negative impacts normally associated with grazing. In addition, sheep are normally herded and can use snow as a water source. This can protect riparian areas from compaction and forage removal, except when there is insufficient snow.
b. Summer Cattle- In the Carter lease, cattle are typically an unherded species. As a species, cattle tend to stay within 1-3 miles of reliable water sources, and are far more likely to use grasses and forbs than woody species. This combination of factors creates a tendency for them to concentrate their grazing and physical impacts in the riparian areas around the springs, creeks or rivers. This situation becomes more pronounced in mid-summer when the weather becomes hot and the upland grasses mature, making the upland sites much less appealing.

With the exception of land inside railroad or highway rights-of-way, the public lands within all Wshed56 Units discussed in this document are grazed by cattle, sheep, or both at some time during each year. Detailed discussions of this factor will be restricted to those units or portions of units that show noteworthy alterations due to livestock grazing.

Wshed 56 Unit Descriptions

- **Unit 138:** The far west end of this unit is bounded on the west where Highway 30 passes north of the Elkol Mine. The north side of the unit follows that ridge eastward and crosses the Hamsfork River approximately where Highway 189 diverges from the river, then follows Oyster Ridge south about three miles before angling southeast to a point approximately five miles west of Opal. The north edge of the unit then follows the north side of the Hamsfork valley to a point about two miles east of Opal. The eastern side of Unit 138 crosses the Hamsfork Valley to a point about three miles south of the river. From that point, the south side of the unit heads in a west-northwest direction, taking in all but the southwest corner of Roberson Creek Allotment. From there, it follows the south ridge of the Hamsfork Valley until it reaches the east face of Oyster Ridge, at point even with the south rail spur to the Elkol Open Pit Mine. From there, it follows the crest of the hill between the Hamsfork River and Highway 189 then between Diamondville/Kemmerer and the bypass loop before finally crossing Highway 30 as it crosses the railroad near the northeast corner of the mine. The far northern side of the unit runs straight north along the ridge from the north side of the mine.

  Unit 138 includes portions of the North and South Moyer, Airport, Slate Creek and Cow Hollow Allotments to the north. The unit also includes the Elkol, Cumberland, Carter Lease, Coyote Springs, Roberson Creek and Opal Allotments to the south of the Hamsfork River. The unit is centered along the Hamsfork River and extends up to three miles into the uplands on either side of the river beyond the steep, often sparsely-vegetated, slopes on either side of the valley. Due to past down-cutting by the river, the old floodplain is now several feet above the river. In the vicinity of Kemmerer, the river dynamics are rock-dominated. In many places, the flow channel is relatively wide and shallow, has abundant growth of riparian shrubs and appears to be rebuilding a floodplain at its new level.

  Once downstream of the narrow passage through Oyster Ridge, the Hamsfork Valley changes to a more fine-grained sedimentary system that is much wider than the portions within Unit 138 above the ridge. Below the ridge, the valley is largely dominated by irrigated hayfields. In addition to providing sources for livestock winter feed, the fields also provide forage sources to area Pronghorn Antelope and Mule Deer herds. North of Kemmerer and south of Opal, the Hamsfork is mapped as crucial winter range for both species.

  The main river channel, and some of the primary irrigation ditches that feed the hayfields, are well-populated by willows. As these areas are all on private land, the BLM has no data on species composition or coverage within the channels. It is considered likely that the willow-sheltered areas are also capable of providing thermal or visual cover for wildlife

  The functionality of this Unit is affected by factors 1-12.

  1: Both Highway 30 and 189 cross the Hamsfork at least once in this unit. The UPRR crosses the river more than once and the river banks have been hardened in several places to protect structures. There are also multiple small bridges or box culverts that cross the river in this unit. All of these structures perturb the natural flow of the water, resulting in energy being added to the water and increasing its erosive force downstream.

2-4: The main UP line, plus the spurs associated with the Elkol coal mine and a currently inactive sulphur loading facility, Highways 30 and 189, have significantly changed the historic flow patterns both before and after the water enters the Hamsfork River. In addition, numerous private improved and two-track roads affect water flow patterns.

5: There are no gas wells inside this Unit. However the gas plants exist because of the presence of the Moxa Arch gas field. This unit is also being impacted recently, or is currently being impacted, by the construction of the Ruby pipeline. In this unit, the Ruby runs south-southwest from Opal, crossing into Unit 146 about 0.75 miles east of Roberson Creek Allotment's western border. The trenching and boring done to construct the pipeline will affect the physical composition and permeability of the surface soils, the reseeding will change the plant community and exclusion of the reseeded sites from grazing will affect the plant health both inside and outside of the protected areas.

6: The towns of Kemmerer, Diamondville, Frontier and Opal, plus the gas plants near Opal and the power plant near Kemmerer have diverted water from or into the Hamsfork River. Kemmerer, Diamondville and Frontier have altered the river by armoring the banks where the channel could threaten portions of the towns. Opal and the gas plants nearby are isolated from the river, but the roads and berms associated with them serve to accelerate, redirect or hinder runoff. The municipal water use and sewage production associated with the towns alter the water flow in this unit.

8: The soils in the valley floor are significantly more productive than the upland soils due to higher soil organic matter built up over historic river deposits and plant growth around the water. The upland soils are thin to skeletal in the rough, rocky terrain near Oyster Ridge and the steep slopes on either side of the Hamsfork Valley. This reduces opportunities for infiltration of snowmelt or rainfall to occur, causing the runoff to reach the valley floor quickly.

9: Vegetation is primarily native grasses and shrubs in the uplands. Some wetland or thicker upland vegetation is found where water is either slowed or held by topography.

10: Hayfields and field margin communities dominate the valley floor. Native riparian vegetation is typically contained inside the Hamsfork River channel and some deeper irrigation canals.

11: INNS; no known Tamarisk stands exist in this Unit. Halogeton and Cheatgrass are found along disturbed sites as described in the Factors section. There are no stands of thistles known to the BLM in this Unit.

- **Unit 137:** This is the next unit down downstream of the unit 138. It includes portions of the Cow Hollow, Nutria, Carter Lease, Granger Lease, Opal, Nutria Section and Hasset Allotments. The southern edge of the Hasset Allotment coincides with the downstream edge of Unit 137. This unit extends up to 3.5 miles north of the Hamsfork River, encompassing nearly all of the Cow Hollow Allotment south of the Opal Bench. The eastern edge of the unit

follows a ridgeline that roughly parallels Highway 30 and takes in a small portion (about a one-mile-wide) of Granger Lease until the allotment boundary merges with Highway 30. From that point, the highway very closely follows the break between Unit 137 and the next unit to the east. The northwest corner of Unit 137 is about one mile east and ¼ mile south of the northwestern corner of Cow Hollow Allotment. The western edge of the unit runs south in a curving path that passes just east of the west edge of Cow Hollow, across the Hamsfork valley, then through the Roberson Creek/Opal Allotment boundary before turning southeast about two miles south of the Opal Allotment. The south side of the unit runs a curving path east-southeast to meet the southern edge of the Hasset Allotment.

The first five miles of the old Hamsfork floodplain from the western edge of this unit are much narrower than in Unit 138. After that point, approximately at the west edge of the Hasset Allotment, the floodplain widens considerably. The parts wide enough to use as hayfields have been converted to perennial forage irrigated either by flood or pivot systems. In addition to providing sources for livestock winter feed, the fields also provide forage sources to area Pronghorn Antelope and Mule Deer herds. The Hamsfork throughout this Unit is mapped as crucial winter range for both species. The main river channel, and some of the primary irrigation ditches that feed the hayfields, are well-populated by willows. As these areas are all on private land, BLM has no data on either species composition or coverage within the channels. It is considered likely that the willow-sheltered areas are also capable of providing thermal or visual cover for wildlife.

Except for a very small portion of this area, west of where the highway is atop the bluff, the watershed drains to the southeast. The channel passes under the highway approximately one mile west of Nutria Allotment. The portion of Unit 137 that lies between the river and the highway is primarily characterized by the steep slopes between the valley floor and the relatively flat plateau above. The Nutria Allotment is located in this area directly across from the northwest corner of Hasset Allotment.

The functionality of this watershed is impacted by Factors 1-5 and 7-12.

1-4: The UPRR is always on the west bank of the Hamsfork River in this Unit and Highway 30 is either near the east bank or atop the ridge east of the river valley. However, there are small, private bridges crossing the river to allow access to the Nelson Section and Hasset Allotments as well as the hay fields between the river and the railroad.

5: This Unit includes portions of the western flank and core area of the Moxa Arch. The bluffs above the Hamsfork Valley on both sides have many wells and their associated roads, tanks and pipelines. Many sites have been developed on the valley floor as well. The proliferation of improved roads to the well sites has altered the historic overland flow patterns in many locations, resulting in concentrated flow patterns through culverts in low points or gullies.

8: The soils in the valley floor are significantly more productive than the upland soils due to higher soil organic matter built up over historic river deposits and plant growth around the water. The upland soils are thin to skeletal on the steep slopes on either side of the Hamsfork Valley. This reduces opportunities for infiltration of snowmelt or rainfall to occur, causing the runoff to reach the valley floor quickly. The soils in the bench areas both north and south of the

river valley are poorly developed and highly variable with bare, badland slopes along the Opal Bench.

9: Vegetation is primarily native grasses and shrubs in the uplands. Some wetland or thicker upland vegetation is often found where water is either slowed or held by topography. The slopes and benches are often mosaics of Desert Shrub (in drier areas) and Big Sagebrush steppe communities in areas where snow or water are held. The south aspect of the Opal Bench north of Highway 30 is mixed desert shrub and badlands communities.

10: Hayfields and field margin communities dominate the valley floor. Native riparian vegetation such as willows, sedges and rushes is typically confined to inside the Hamsfork River channel and some of the deeper irrigation canals.

11: INNS; no known Tamarisk stands exist in this Unit. Halogeton and Cheatgrass are found along disturbed sites as described in the Factors Chapter. There are no stands of thistles known to the BLM in this Unit.

- **Unit 149:** This Unit underlies the south border of Unit 137 and is largely defined by an unnamed drainage that begins about two miles south of Nelson Section and runs east-southeast before it enters the Hamsfork River just at the eastern boundary of the Carter Lease Allotment. Unit 149 extends one to three miles east of the Hamsfork River and includes Highway 30 until the highway veers away from the river about three miles before it crosses the UP railroad and the Blacksfork River near the town of Granger. The south tip of the unit is defined as the junction of the Hamsfork and Blacksfork Rivers. The ridge between the two rivers forms the south and west boundary until it re-enters the allotment. At that point, the south edge of the allotment is defined by the break between the waters that flow east into the Hamsfork and the lands drained by the Dry Muddy Creek.

  The functionality of this watershed is impacted by Factors 1-5 and 7-12.

  1-4: The UPRR crosses the Hamsfork River several times in this unit as the channel meanders back and forth across the valley floor. Highway 30 is typically at least a mile away from the river channel, but is within the Unit throughout much of its length. In addition, there are small, private bridges crossing the river to allow access to the valley bottom hay fields and the gas field.

  5: This Unit includes portions of the western flank and core area of the Moxa Arch. The bluffs above the Hamsfork Valley on both sides have many wells and their associated roads, tanks and pipelines. Many sites have been developed on the valley floor as well. The proliferation of improved roads to the well sites has altered the historic overland flow patterns in many locations, resulting in concentrated flow patterns through culverts in low points or gullies.

  8: The soils in the valley floor are significantly more productive than the upland soils due to higher soil organic matter built up over historic river deposits and plant growth around the water. The upland soils are thin to skeletal on the steep slopes on either side of the Hamsfork Valley. This reduces opportunities for infiltration of snowmelt or rainfall to occur, causing the runoff to reach the valley floor quickly. The soils in the upland drainage west of the Hamsfork

Valley are poorly developed and support only desert shrub or Wyoming Big Sagebrush communities.

9: Vegetation is primarily native grasses and shrubs in the uplands. Some wetland or thicker upland vegetation is often found where water is either slowed or held by topography. The slopes and benches are often mosaics of Desert Shrub (in drier areas) and Big Sagebrush steppe communities in areas where snow or water are held.

10: Hayfields and field margin communities dominate the valley floor. Native riparian vegetation such as willows, sedges and rushes is typically confined to inside the Hamsfork River channel and some of the deeper irrigation canals.

11: INNS; no known Tamarisk stands exist in this Unit. Halogeton and Cheatgrass are found along disturbed sites as described in the Factors Chapter. There are no stands of thistles known to the BLM in this Unit.

- **Unit 161** (& 167)**:** Unit 161 is roughly centered along the Blacks Fork River between the confluence with Muddy Creek and the confluence with the Hamsfork River. The north edge of the unit is defined by the ridge separating the Blacksfork and dry muddy drainages up to the confluence of the two drainages, after which the ridge between the Hamsfork and Blacksfork is the eastern boundary until the rivers converge near the west edge of Granger. The eastern edge of Unit 161 then drops almost directly south until it reaches a low ridge formation that lies just north of Interstate 80 about four miles east of the I-80-Hwy 30 intersection. The ridge defines the south edge of Unit 161 westward for about 4 miles before turning north along a meandering path northward until it meets the south bank of the Blacksfork about three miles west of Granger. The south edge of Unit 161 wraps around the north and east sides of Unit 167. Unit 167 drains a portion of the Church Buttes Pasture into the Blacksfork about two miles east of the Carter Lease Allotment. It also crosses very slightly into the extreme southeast corner of Carter Lease.

  Units 167 and 161 are both impacted by Factors 1- 9, 11 and 12.

  1-5: Interstate 80 crosses Unit 167 and the old frontage road from Granger crosses both units. The UP railroad follows the Blacksfork River closely as it proceeds east from Granger. Numerous bridges and armored banks have altered the river's flow patterns and may be one of the causes for the incised nature of the Blacksfork and its tributaries. Both Unit 161 and 167 are crossed by the UPRR line that runs west from Granger until it meets Muddy Creek. At that point, the railroad follows the Muddy Creek channel toward the southwest very closely. The railroad crosses both the Blacksfork River just below the Blacksfork/Muddy Creek confluence. Both units are in portions of the Moxa Arch Core or West Flank. Numerous two-track and improved gas field roads exist in both units, disrupting the historic low-volume overland flow and either producing patterns of concentrated flow or making shallow ponds that quickly evaporate. Much of unit 167 has been drilled. However, only the eastern third of 161 has been developed.

6: The town of Granger sits just east of the eastern edge of Unit 161. The buildings, lawns and streets associated with the town have altered the drainage patterns of the now-remote floodplain.

8: The river valley soils are relatively flat and often bear the remains of historic channels. Though these areas are no longer dominated by riparian vegetation, they do have higher production potential than the neighboring slopes or flatter plains or mesas do. Outside of the Blacksfork valley, the soils have only very limited development and may consist only of the areas inhabited by surface roots over parent material.

9: The Blacksfork valley west of the Granger vicinity is uncultivated. The incised channel has some signs of floodplain-building and fringes of sedges or willows along the water's edge. Some portions of the previous channel remain next to the currently incised channel. These areas usually produce denser and more vigorous upland plants, including species that have higher water needs water than are seen outside the old channels.

11: Both 161 and 167 have areas, primarily in and near oil-related developments that are heavily infested by Halogeton and Cheatgrass. These infestations do not currently show much tendency to spread beyond the currently-occupied areas. The Blacksfork River banks have several groves of Tamarisk which did not show any signs of control efforts as of July, 2010. Much of the historic floodplain above the current channel level, as well as the unvegetated steep channel banks, was infested with both species of thistles.

12: The Blacksfork riverbanks showed some signs of caving, displacement and compaction that were apparently caused by livestock accessing the water.

· **Units 179, 178:** These units more-or-less follow the UPRR and the Muddy Creek. The north side of Unit 178 is two miles south of the point where Muddy Creek passes under the UPRR to enter Muddy Creek. The south side of Unit 178 is the north side of Unit 179 and lies two miles south of Hwy 412. Unit 179 is the next unit upstream of Unit 178 and extends about two miles upstream of the southwest corner of Carter Lease.

Unit 179 resembles a bent rectangle with a south-pointing spine in the southwest corner of the unit. The ridge of the west-most hogback ridge in the Coal Mine Draw and Albert Creek Allotments along Highway 189 forms the west edge of Unit 179. The south edge of the unit defined by the drainage breaks in the ridges west of Muddy Creek as it runs in an irregular line eastward from the hogback ridges through the Coal Mine Draw and Bigelow Bench allotments about 3-4 south of Carter Lease's southwest corner. Unit 179's southeast corner lies 4 miles south, and 3 miles east of Carter Lease's southwest corner. From the southeast corner of Unit 179, the east side of the unit runs roughly north for 1 mile, then turns slightly northeast for one mile. It crosses the Bigelow Bench/Bridger Airport line at a point about 2.5 miles east of Muddy Creek and follows the fist ridge south of Muddy Creek and meets the southern edge of Unit 179 on the bank of Muddy Creek about two miles upstream of the Highway 412 bridge across Muddy Creek. The north side of Unit 179 runs roughly northwest, with some jogs to follow ridgelines, to the northwest ¼, Section 5-T17N-R116W where it meet the southwest corner of Unit 170. The border of unit 179 arches southwest for 1 mile before cutting a west-

southwest line for roughly 2.5 miles and meets the hogback that makes up the west side of Unit 179.

Unit 178 is roughly in the shape of a right triangle with the base south of Hwy 412 and the square corner in the southeast corner. The south border of Unit 178 is close to right angles to Muddy Creek and extends about six miles northwest of the creek and four miles southeast. The border is about 1.5 to 2 miles south of Hwy 412 and parallel to the highway. The west edge of Unit 178 runs roughly parallel to Muddy Creek about 3 to 4 miles east of the creek. About 5 miles north of Highway 412, the border arches to the west and runs roughly straight west to intercept the base's east edge. This unit includes all of Muddy Creek Allotment, portions of Bridger Airport and Austin Triangle Allotments, as well as Carter Lease.

Units 179 & 178 are both affected by factors 1, 2, 4, 7-9, 11 & 12. Unit 178 is also affected by factors 3 and 6.

1 & 2: The UPRR follows Muddy Creek very closely throughout these three units. However, the creek's meandering path forced the much straighter path of the railroad to cross the creek in several places. In addition, the railbed has been armored with erosion-resistant materials, such as large rocks and old ties, to protect it whenever the stream channel is close enough to potentially threaten the railroad.

3 & 6: Unit 178 is crossed by State Highway 412 (The Carter Cutoff/Highway) as it descends the hills on either side of Muddy Creek. The UPRR is on the west side of Muddy Creek, and the tiny municipality of Carter is just west of the rails. The impacts of the increased runoff from the roofs, highway and other hardened areas within Carter are contained and slowed by the raised railbed. Unless the runoff event is exceptionally large, it is unlikely that Carter's runoff travels far enough to reach a culvert or trestle which would allow it to enter Muddy Creek. Just north of Carter, there are small ephemeral wetlands created by water trapped between the main line and a siding. Cattails, along with rushes and sedges indicate that a sufficient volume of runoff is captured and held long enough to create wetland soils.
The highway 412 right-of way alternately channels and disperses runoff as the grade is the low point at the top of the slopes leading down to Muddy Creek and the high point once the road reaches the toes of the slopes. The bridge across Muddy Creek has multiple concrete support pillars and abutments on both banks. The cutting and sedimentation patterns in the creek channel illustrate the disruption caused by these structures.

4: All of the allotments within these two units have unimproved two-track or bladed roads. Almost invariably, these roads become the default drainage paths as they capture overland flow. Where the roads cross natural gullies, they become eroded as the water captured by the ruts is concentrated by the natural topography.

8 & 9: The current Muddy Creek channel shows some indications of building a floodplain within the current incised channel. Riparian species such as Baltic Rush, Nebraska, Beaked and Aquatic Sedges are becoming established, as well as occasional coyote Willow saplings. The old Muddy Creek floodplain soils are relatively flat and often bear the remains of historic channels. Though these areas are no longer dominated by riparian vegetation, they do seem to

have higher production potential than the neighboring areas. The gentle slopes at the toes of the bluffs on either side of Muddy Creek typically have higher plant production and less bare soil than the steeper slopes above them. The steep slopes are typified by very limited development and may consist only of the areas inhabited by surface roots over undeveloped parent material. Unit 178 extends up to four miles into Carter Lease and Austin Triangle. The upland Carter Lease areas in the southwest portion of Unit 178 include some of the deformed, upthrust regions. Some of the rocky ridges have open stands of juniper. The private sections inside Carter Lease bordering Highway 412 are used to feed sheep during withers with heavy snow. This concentrated use can result in soil compaction and extreme use levels on woody species. The southeast corner of Unit 178 includes one square mile of private land inside Austin Triangle that was tilled and planted to exotic forage species. The area experienced accelerated soil erosion by both wind and water before the seeded species became established. This has resulted in some sedimentation of the drainages downhill of the tilled section as well as accelerated drainage off the tilled area due to the presence of more micro-channels.

11: INNS in Units 178 &179 consist primarily of Halogeton, Cheatgrass, Black Henbane, Canadian Thistle, Musk Thistle and Tamarisk. The first three are typically found along two-track roads, perennial (used year after year) sheep camp sites and other disturbed upland sites. Black Henbane in the Carter Lease is more prevalent along the two tracks in the southwest corner, though it has been seen in the Moxa area. Tamarisk is found only near the current Muddy Creek channel or the multiple abandoned channels inside Austin Triangle. Some of the Tamarisk specimens that have been seen in these units have been sprayed and partially or totally killed. However, there are still several specimens in the bends of the abandoned channels. Musk and Canadian thistles are both plentiful along the sides and tops of current incised channel, as well at the abandoned areas. Canadian Thistle stands are most dominant on the steep channel sides, where there are few plants competing with it. Musk Thistle plants are more prevalent on the higher bank sides and tops where the soil is drier. There are also areas downhill of the seeded section in Austin Triangle where some of the exotic forage species have become established.

12: The Muddy Creek channel sides exhibit some signs of caving, displacement and compaction that were apparently caused by livestock accessing the water. All of the allotments within each of the two units have livestock in them at some time every year. The portions of the Carter Lease Allotment within these units are primarily used for winter sheep by virtue of the fact that the Muddy Creek is outside of the allotment, and no other water sources have been developed in this part of the Carter Lease. Muddy Creek Allotment is used for an early spring holding/lambing pasture. Austin Triangle is used for summer cattle as well as fall and spring sheep. The portions of Bridger Airport and Bigelow Bench within these units are primarily used by summer cattle and some spring/fall sheep trailing.

- **Units 147, 146 & 150:** These Units define the portions of Carter Lease Drained by the Dry Muddy Creek.
  Unit 147 is the extreme west end of the Allotment, and crosses into the Cumberland Flats allotment at the highest hogback ridge. Almost all of the Coyote Springs Allotment and the southwest corner of Roberson Creek Allotment are inside this unit. The southwestern corner of Unit 147 is approximately five miles north, and three miles east of the Highway 412/189

intersection. The south edge of the unit angles slightly southeast for about four miles, then almost straight east for another three miles. The eastern edge is roughly north-south from the southeast corner and meets the crest of the Hamsfork Valley ½ mile east of the west edge of the Coyote Spring Allotment The flow from this region is ephemeral, lasting only as long as the snowmelt or runoff. The western half of Unit 147 is semi-rugged, the upthrust ridges of resistant rock slope steeply down to the valley bottoms carved through softer rock. The east half of 147 much flatter, with broad flat tables notched by steep-sided drainages. The entire unit appears to drain either directly north or south towards a central drainage channel that runs from the west ridges to the Dry Muddy Channel about ½ mile east of the Unit 147/146 border. Unit 147 has three springs that appear to offer permanent water. Little Round Mountain Spring and another spring approximately two miles north of it are situated on the eastern slope of high ridges, very near the tops. Both springs show signs of degradation due to livestock impacts. Another spring that appears to be some type of upwelling is located in the NW ¼ of Section 10-T19N-R115W. This area is a broad, flat to rolling, desert shrub community. This spring is heavily impacted to the point it was little more that saturated mud in a circle of bare earth.

Unit 146 is the next unit downstream from 147. The line between the two units is roughly one mile east of the eastern edge of Coyote Spring allotment and extends from about ½ mile north of the south edge of Roberson Creek to about 9 miles south of Roberson Creek Allotment. The Unit is shaped roughly like a boot. The line between Units 147 and 146 forms the back of the boot. The south edge of Unit 146 is the sole and follows the arching breaks between Little Muddy and Dry muddy drainages. The line proceeds in a east-southeast direction for seven miles east and two miles south. The north edge of Unit 146 is the top of the shank and runs east-southeast from the northwest corner of the allotment for 6 miles until it is roughly ¾ mile southeast of the southeast corner of Roberson Creek. The border then follows an south-southwest arc to a point about 1 mile south of Roberson Spring (the ankle of the boot) -before angling southeast to SW1/4 of 19—T19S-R113W before angling southwest for two miles where it meets the south edge of the allotment. The east edge of the unit crosses the Dry Muddy Channel about ½ of a mile northwest of the turning point in section 19. The Dry Muddy Channel originates in S25-T15N-R120W and runs almost straight south for two miles where the flow from Unit 147 meets it and the channel turns east-southeast. The slopes south of the Dry Muddy drain north into the channel, either directly or via simple branched drainages. The portions directly north of the Dry Muddy headwaters drain directly south into the creek. The northeastern two-thirds of the 'shank' area drains toward the channel that contains Roberson Spring, which then flows southwest toward the Dry Muddy channel.

Unit 150 lies directly downstream of Unit 146, and is shaped roughly like a boomerang with the western and southern sides forming the outside. The south edge of the unit runs more or less straight east for about eight miles. It then arches north and east about one mile east and two miles north to meet the south edge of Unit 149. The border turns back north and west to start the top edge of the boomerang. The border runs west and north as the south border of Unit 149 until it meets Units 137 and 146. Dry Muddy Creek enters the west edge of the unit about 1.5 miles north of the south edge and flows slightly south of east to exit the unit on the southern edge at the point where the southern border first arches northward. The northern arm of the unit drains from the east and west edges towards the middle and into Dry muddy Creek about one mile east of the west edge of the unit. The lands within Unit 150's east arm drain

directly into the Dry Muddy Creek. Unit 150 has a single active spring near the center of Section 18-T19N-R113W. This spring is heavily degraded due to physical impacts and is little more than a muddy circle of bare earth. It is not clear whether the impacts were caused by domestic livestock or wildlife. There is a small pit immediately downhill from the spring, which was probably built to catch and retain water from the spring. Someone has dug a hole, roughly 5 feet in diameter and at least a foot in depth, around the spring source and connected the excavation to the pit with a furrow-like trench. The USGS maps indicate that there is also a spring in the Dry Muddy Creek Channel near the center of Section 24-T19N-R113W. There was no trace of the spring visible in August of 2010. There are numerous gas wells on both sides of the Dry Muddy Creek channel near the site. There were also two pipeline scars cutting across the slope on the south side of the channel. It is possible that one of the pipeline trenches or wells has intercepted or drained the water source that fed the spring.

Wshed Units 147, 146 and 150 are all affected by Factors 1, 4, 5, 7-9, 11 & 12. Unit 146 also is affected by Factor 6.

1& 4: The Moxa Gas Field developments within Unit 150 have produced a large number of improved roads to access the wells and other developments. Dry Muddy Creek is crossed by at least three bridges, and the numerous roads also have culverts where the roads cross minor drainages or gullies. Two-track or bladed roads in Units 147 and 146 also cross many small gullies and Dry Muddy Creek. Not all of these crossings are bridged or have culverts. Some are simply fording points where the channels are shallow enough or the sides sloped enough to allow the passage of a pickup. Even though there are no structures in these crossings, the ruts in the creek beds and banks can produce turbulence in the water, just as artificial structures can, until they are either filled in or worn away.

5: The eastern 2/3 of Unit 150's south arm has 3+ gas wells per section. The well pads, pipelines and other structures have altered the local drainage patterns.

6: A gas pumping facility is situated in the SW ¼ of S23-T20N-R115W in Unit146. This facility receives gas from the plants near Opal. Older pipelines leave the plant heading northwest and southeast. One new pipeline also heads southeast toward Granger and the Ruby Pipeline heads southwest.

8 & 9: The soils in these three units have some variation, depending upon slope, parent material and water availability. The fine textures and salinity/alkalinity of the soils in these three units contribute to slow percolation rates and high runoff potential. The primary native plant communities throughout these three units are Wyoming Big Sagebrush and Desert Shrub. The eastern 1/3 of Unit 146, the majority of Unit 147, and the southern edge of Unit 150 are dominated by Desert Shrub communities. The remainder is primarily Wyoming Big Sagebrush Steppe. The only areas within these three units that show notable soil development and high forage production potential are adjacent to, and downhill of, the springs in Unit 147 and in the extreme southeast corner of Unit 150 where Dry Muddy Creek empties into the Hamsfork River. The relatively plentiful water has allowed these areas to develop riparian plant communities dominated by rushes and sedges. The area along the Blacksfork also has the potential for willows and other riparian shrubs.

11: INNS in these three Units consist primarily of Halogeton, Cheatgrass, and Black Henbane, Musk and Canadian Thistles and Tamarisk. The first three are typically found as fringes or clumps along two-track roads, perennial (used year after year) sheep camp sites and other disturbed upland sites. The thistles and Tamarisk are primarily found only near the Hamsfork River.

12: The only livestock use that Units 147 and 146 are likely to see is from winter sheep use. The sheep camp sites are typically on hilltops (where snow is less likely to accumulate) and easily accessible from either improved or two-track roads. Both of these units are far enough from easily accessible water that cattle are unlikely to visit them. Unit 150 is adjacent to the Blacksfork River and is likely to see some use from free-roaming summer cattle. The highly-impacted springs in Units 147 and 150 are both fairly close to two-track roads and Big Sagebrush communities. It is possible that sheep herds have impacted the springs during dry winters when snow was unavailable.

- **Units 154, 158 & 170:** These units define the watersheds that feed directly into Little Muddy Creek without being defined by the creek's path.
  Unit 154 is shaped somewhat like a steak knife with the tip pointed south and the cutting edge facing east. The unit's topography is dominated by the steep ridges on the west side of Carter Lease and the eastern sides of the Albert Creek and Cumberland Flats Allotments. The northwest corner of Unit 154 is the southwest corner of 147. The north side of Unit 154 extends east for four miles along Unit 147's southern edge. The west side of Unit 154 follows the crest of the ridge closest to Highway 189. The exception to this is an upside-down triangle jutting west from the west-most ridge into Cumberland Flats where Highway 412 meets Highway 189. The top of the triangle runs slightly north of straight west for two miles. The southwest edge of the triangle roughly southeast and meets the ridgeline again about two miles south of Little Muddy Creek. The southern tip of Unit 154 is the northwest corner of unit 179 (four miles north of the southwest corner of Carter Lease. The east side of Unit 154 arches south and east for two miles. About 2 miles north, and 5 miles east of where Little Muddy Creek crosses the west boundary of Carter Lease, Unit 154's eastern border start to follow a ridgeline's zigzag path south and slightly west. The ridgeline passes about one mile west of Mulkay Spring and immediately jogs southeast one mile. From there it runs south and increasingly west until it meets the northeast-most arch of Unit 179. Unit 154's boundary follows the northern edge of Unit179 southwest. This unit contains a small spring in the SE ¼ of the NE ¼ of Section 4-T19N-R115W. This spring is exceptional because there were no signs of animal anywhere around the spring and no 'normal' riparian vegetation exists around the water. Also, at one time a small berm was constructed to prevent the water from entering Little Muddy Creek.

  Unit 158 is an irregular shape defined by the boundaries of other units. The unit's west side is the east side of Unit 154 north of the Little Muddy Breaks. The northern side is the southern side of Unit 147 west of Unit 154. The north half of the east side is L-shaped and is the southern 2 miles and western 1.5 miles of the southwest corner of Unit 146. The southern half of Unit 158's east side runs 2 miles south and ½ miles west to meet Little Muddy Creek. This unit essentially functions as a modified bowl, with the main body all draining to a point about

two miles northwest of the point where the unit connects to Little Muddy Creek. From there, the collected runoff flows to the creek. Runoff from the remainder of the unit drains directly to the runoff channel or into Little Muddy Creek.

Unit 170 is essentially a long, narrow valley between two rides that give it an elongated shape running generally along a SW – NE axis. The SW and NE ends are each about one mile in length. The extreme southwestern corner of the unit is the point where Units 154, 179 and 170 meet. The SW end of the unit follows the edge of Unit 179 southeast for about 1 mile. At that point, the south side of Unit 170 follows the north edge of Unit 178 and runs almost directly east for approximately 6 miles. At that point, the boundary turns sharply northward. The east side of unit 170 follows the west Muddy Creek ridge north-northeast for 6 miles. At that point, it meets the southern ridge of Little Muddy Creek. The NE end of Unit 170 runs almost straight west for approximately one mile. The northwest corner of the unit connects with the Little Muddy Creek about 4 miles east of Unit 154. The west side of the unit runs south and west along the southern ridge of Little Muddy Creek until it meets Unit 154 about 1 mile southwest of Mulkay Spring. From that point on, the northwestern side of Unit 170 is the southeastern edge of Unit 154 and ends at Unit 179. Runoff from this unit flows through minor ephemeral channels to the valley bottom and then north to the Little Muddy.

Units 154, 170 & 158 are all affected by factors 4, 7-9, 11 & 12. Factors 1 & 3 affect Units 154 and 170. Factor 1 affects only Unit 154.

1: Little Muddy Creek runs through a culvert under Highway 412 shortly before it meets Highway 189. The creek channel is deeply incised upstream of the culvert and more so below. The creek is on private land in this area and the bed is lined with chunks of concrete and asphalt for a considerable distance downstream of the highway. In both units, several culverts under Highway 412 channel the flow from the ephemeral drainages north and west of the highway.

3: Highway 412 crosses Unit 170 very close to the top of the watershed. The small extent of the acreage uphill of the highway limits the impact the highway has on the watershed. Highway 412 affects only a small percentage of the acreage in Unit 154. However the slopes above the highway's path are fairly steep, giving the water more force. There is evidence of sedimentation on the uphill sides of the highway and the channels downhill of the culverts are incised.

4: The private land just north of Little Muddy Creek and west of Carter Lease Allotment has a sandstone quarry, and its associated improvements. A crown-and-ditch road leads from Highway 412 to the stone-cutting building and the loaded pallet storage site. Near the stone-cutting facility there are a few old sheds and stables with adjoining corrals. Unraised, bladed roads lead from these facilities to the quarry, the private pastures just outside the Carter Lease and the cattle guard at the edge of Carter Lease. Recent earthwork to close old coal mine portals has occurred along the ridges that form the western edge of Unit 154. Temporary roads were constructed, or existing roads improved, to access the openings. The roads and closures may cause minor changes in runoff flow patterns, but not enough to affect the functionality of the unit.

The two-track roads throughout these three units have highly variable affects on the watersheds. The roads in Unit 154 north of Little Muddy Creek, particularly those close to the creek seem to get a lot of use. Where the trails cross tributary channels or run up the slopes, there is a considerable amount of erosion where the ruts capture and channel the runoff. The resulting sediment load winds up in alluvial fans at the toes of the slopes or in the ephemeral gullies. Usually, unless the road is close to Little Muddy Creek, the sediment drops out before the water reaches the channel. The two-tracks that follow the ridgeline between Units 170 and 154 follow the rock much of the time. However, when the road crosses low points in a ridge or swales between ridges, the ruts capture and hold the runoff, creating small ponds at the low points. When the soil is soft, additional traffic deepens the existing ruts or adds new ones, increasing the amount of water that can be held. Some of the rut-created ponds hold water long enough that they have markedly increased plant production and some wetland plant species that can also tolerate drought.

8 & 9: The soils and plant communities in all but the southern half of Unit 154, all of Unit 158, and the northwestern half of Unit 170, are essentially the same as those seen in Units 147 and 148. The majority of Units 154 and 160, and the western third of Unit 158 are Wyoming Big Sagebrush communities. The remainder of Unit 158, the first mile of 154 east of the east-most ridges, and the first two miles west of the east side of unit 170 are Desert Shrub. The excepted portions of Unit 154 and 170 have Juniper Woodlands along the rocky ridges that define the border between 154 and 170, and along the western edge of Unit 154 more than two miles south of Little Muddy Creek. The private sections inside Carter Lease along Highway 412 are used as feeding grounds during winters with heavy snowfall. This concentrated use can result in soil compaction and heavy to extreme use of woody and browse species in those areas.

The Muddy Creek channel inside Unit 154 has a healthy community of native rushes, sedges and sapling Coyote Willow stands along the edges of the water. The creek is starting to re-build a floodplain system inside the incised channel.

11: INNS in Units 154, 170 & 158 primarily consists of Halogeton and Cheatgrass along the roads and disturbed or marginal sites such as sheep camps, edges of badland sites and rocky areas with very thin soil. Little Muddy Creek does have Meadow Foxtail, a non-native hay species, along much of its length. However, this species is not considered a weed and does serve to help protect the streambanks. It is uncertain whether the native sedges will be able to crowd out the Meadow Foxtail as time goes on. Unit 154 also has Musk and Canadian Thistle colonies inside, or adjacent to, the Little Muddy Creek channel.

12: Units 154, 170 & 158 are all likely to see use by summer cattle, winter sheep or both. However, only the portions of each unit close to Little Muddy Creek, Albert Creek or Mulkay Spring are likely to see cattle use during the summer. The portions of Unit 154 inside Carter Lease, as well as all of Units 158 and 170 are all likely to see winter sheep use. The parts of Unit 154 outside of Carter Lease may see spring and fall sheep use, as well as summer cattle use. Current impacts to the watersheds from livestock grazing include: Development or deepening of livestock trails to Little Muddy Creek and alterations to the floodplain at watering or crossing points, Alterations to plant density and species composition on the private sections

along Highway 412, Alterations to the physical structure and plant species composition in the wetlands around Mulkay Spring, as well as degradation of the water source(s). The impacts to Little Muddy Creek are minor and the creek shows an upward trend in its functioning condition. The feeding impacts to the private sections along Highway 412 can be heavy. However they are sporadic in nature and occur only on private land where the BLM has no authority. The impacts to Mulkay Spring are creating channels in the wetland created by the reliable water flow. The reduced water storage capacity is reducing the quantity and quality of vegetation in the area fed by the spring as well as the ability of that area to absorb and hold water.

- **Units 165 & 166:** Unit 165 is defined by the ridges on either side of Little Muddy Creek in the area between Units 154 and 166. Unit 166 is the area between the ridges on either side of Muddy Creek immediately downstream of Unit 178 and upstream of Unit 161. Unit 166 includes the confluence of Little Muddy Creek and Muddy Creek.

  Unit165 extends from the eastern edge of Unit 154 to the western edge of Unit 166 (About 2 miles upstream of the Little Muddy/Muddy confluence). The width of the unit depends on the distance between the ridges north and south of the creek. At the western edge of Unit 165, the unit is about three miles wide. The unit gradually narrows until it is about one mile wide where Unit 158 empties into the creek. Unit 166 wraps around the southern half of Unit 158's east side, then follows an arching path north and east for 1.5 miles before arching back down and connecting with Unit 166's western edge about two miles north of Little Muddy Creek. The southeast corner of Unit 165 lies at the point where Little Muddy Creek meets the edge of Unit 166. From the southeast corner, the southern edge of Unit 165 is also the northern edge of Unit 166. It runs almost straight west for two miles then makes a small arch to the north and west over for two miles, at which point Unit 166 meets Unit 176. Unit 165's southern edge runs roughly west for another mile before it turns and runs almost straight southwest for two miles. The line turns to just slightly south of directly west and passes about ¼ mile south of Mulkay Spring where it meets the eastern edge of Unit 154.

  Unit 166's northwest corner sits about 2.5 miles north of Little Muddy Creek and two miles west of the Little Muddy/Muddy Creek confluence. The northern edge suns roughly straight east for three miles until it meets the west side of Unit 161. The border turns south for about 1.5 miles before in makes a southeasterly arch to the confluence of the Blacksfork River and Muddy Creek, which marks the southern corner of the east side of the unit. The southern side of unit 166 runs west-southwest for about six miles through the Austin Triangle until it is one mile west and just over one mile north of Unit 176's northeast corner. At that point, the southern edge of unit 166 turns straight south until it meets Unit 176. The south side of Unit 166 follows Unit 176 until it is roughly three miles west of Muddy Creek. The west side of the unit follows the east edge of Unit 170 to the northeast until it meets Unit 165. At that point the border follows the edge of Unit 166 east and then north to close the border.

  Units 165 and 166 are both affected by the following Factors: 1, 4, 7-9, 11 & 12. Unit 166 is also affected by Factor 2.

1, 2 & 4: In both units, two-track roads on the historic floodplain follow the entire length of Little Muddy Creek on the north side and sporadically along the south side. An old wooden bridge crosses the Little Muddy channel at the southwest corner of Section 9-T18N-R115W, about two miles west, and one mile north of Mulkay Spring. The UPRR follows the Muddy Creek channel very closely throughout Unit 166. Beginning at the south end of the unit, the creek is on the east side of the tracks for two miles. It then crosses under the railroad and remains there as the tracks run northeast and eventually turn almost due east. About two miles east of the Blacksfork River, the creek crosses to the south side of the tracks for one mile, then it crosses back to the north side. The supports and abutments for the bridge and railroad trestles all affect the energy and flow patterns of the water in the creeks. The banks of Muddy Creek next to the railroad are armored with rock, old ties and other hard materials to prevent the creek from reaching the railbed. The armoring also disrupts the flow patterns in the creek.

8 & 9: Both units have fine sediments in the old, flat floodplains and the often steep sides of the current channels. The slopes on either side of the old floodplains up to the ridges that mark the borders of Unit 165 are rolling with moderate vegetation to very steep with very little vegetation. The majority of the south and west-facing slopes in Unit 165, as well as much of the valley floor outside of the old channels are Desert Shrub Communities as is the portion of Unit 166 that lies north of Little Muddy Creek. Some of the Desert Shrub areas with very little slope have salt accumulations on the soil surface. The slopes on either side of Unit 166 are mostly more gentle in grade and have moderate vegetation. The vegetation in Unit 166 is predominantly Big Sagebrush. The area south and east of the railroad in Austin Triangle is dominated by old floodplain and historic channels. Enough water is captured by the old channels, especially where they run up against the railroad berm, to support small pockets of riparian vegetation.

Mulkay Spring is situated very near the crest of the slope south of Little Muddy Creek in the SW ¼ of Section 18-T18N-R115W. The riparian community around the spring is thinning and upland and dryland species are becoming established inside remnant rush and sedge stands. Another spring is located just north of Little Muddy Creek, in the center of Section 10- T18N-R115W. The riparian community fed by the section 10 spring shows signs of heavy forage use and hoof impacts. The flow patterns have been altered to the point that the water was observed flowing into a Desert Shrub community and the soil surface in established sedge and rush stands was drying.

11: INNS in Units 165 and 166 include Halogeton, Cheatgrass and Tamarisk. Non-native Meadow Foxtail is present in the Little Muddy Creek channel in the western half of Unit 165. However, it is not considered a weed. Cheatgrass stands are primarily present along the two-track roads and marginal sites with thin soil. Some Halogeton is present along the two-track roads and edges of badland slopes. However, both species are beginning to spread downhill from their current sites. Infestations of Musk Thistle and Canadian Thistle are present in both the Muddy Creek and Little Muddy Creek channels. They are primarily present on the steeper cutbanks where there is little competition from other species. However, Canadian Thistle does dominate some parts of the Little Muddy's narrow floodplain inside the incised channel. Tamarisk plants are present along Muddy Creek along its entire length in both Austin Triangle and Carter Lease. Control efforts have killed most of the plants in Carter Lease upstream of

the confluence. No control efforts have been made downstream of the Muddy Creek confluence as yet. The Tamarisk inside Austin Triangle did not show signs of control efforts, however, they are scattered in both the active and abandoned channels and are more difficult to find than those inside Carter Lease.

12: Inside Carter Lease, both units are utilized by both summer cattle and winter sheep. The cattle typically stay within 1-2 miles of the creek channels and utilize the grasses and grass-like plants in the old floodplains and active channels. Winter sheep primarily utilize the Big and Silver Sagebrush during the winter. Because the grasses are used during the growing season, they are put at a competitive disadvantage. By utilizing the browse species when the grasses and other herbaceous species are not available, those species are also forced to draw upon root reserves to generate new buds which reduces their competitive advantage. Thus, something of a balance is maintained between the herbaceous and woody components in the areas where cattle use is highest.

Synthesis and Conclusions:

- What is Working:
  In a very broad sense, the current guidelines governing livestock and mineral development practices on the Carter Lease are not impairing the healthy function of the Wshed56 Units. The impacts of some major historic disruptions, (Such as construction of the UPRR line and its effects on stream courses and functions and overgrazing by domestic livestock) are still evident (the incised nature of the creeks and rivers in and around the Carter Lease and the resulting loss of wetland environment). The watersheds examined in this document (even those where one or more of the 12 Factors examined in this document has/have altered the overall watershed function to a noteworthy degree) appear to be stable in their current state.

- What is Not Working:
  <u>Presence of INNS</u>-
  - Thistles: All 7 wshed 56 Units that contain the entire length of the Muddy Creek System inside the Carter Lease are infested with Canadian and/or Musk Thistle to some degree. Some control of biennial Musk Thistle is occurring due to the release of an insect whose larvae eat the seeds out of the flowers. Canadian Thistle is perennial and spreads through rhizomes as well as by seed. Because the thistles are so close to open water, any sort of chemical control is very difficult. In addition, the presence of thistles on private land upstream of the Carter Lease makes elimination of the thistles very unlikely as the water itself becomes a perpetual seed source.
  - Tamarisk: Tamarisk (Salt Cedar) is present on almost every creek in the southern portion of the KFO. Uinta County Weed and Pest has an aggressive control program to eliminate the weed.
  - Halogeton: This invasive plant is prevalent in and around nearly every oil or gas well site in the Carter Lease. It is also present in rocky areas and along many of the improved or two-track roads and the fringes of badland sites throughout the allotment.
  - Cheatgrass: This annual grass is very aggressive and its winter wheat-like ability to sprout in the fall and green up and grow in the very early spring allow it to use the water in the soil surface before the native perennials emerge from dormancy. Stands of various sizes

are found in many of the same sites where Halogeton is found, as well as disturbed sites, such as sheep camp and winter feeding sites.

Degraded Springs- Every identified spring (with the exception of the one at the line between Sections 3 and 4 in T18N-R116 W) on the Carter Lease has been seriously degraded. Both livestock and wildlife impacts to the vegetative and soil characteristics of the springs have resulted in soil compaction and channelization which has led to drying of the soil around the springs. This has led to the reduction in flow from the springs, loss of high-quality riparian forage and encroachment by upland species into what used to be wetland. In two cases, there has been a total loss of forage as well as function by the spring. In 2004, the S&G assessment of the allotment declared that the springs were not meeting the S&G standards and called for the construction of exclosures around all of the Carter Lease springs. The 2010 assessment repeats the assessment and recommendation.

Recommendations:

- Protect the Springs. All of the palatable springs need to have permanent livestock exclosures built around them at the earliest opportunity to prevent further degradation. With protection, the riparian plant community can become re-established or expand and gradually rebuild the soil/root sponge around the spring and eventually restore the former riparian areas. For some sites, this sponge restoration will improve the long-term water flow to the areas downhill or downstream of the springs.
- Alternative Water Sources. Three of the springs in Carter Lease can be feasibly developed with springboxes and pipelines to serve offsite water troughs. This will prevent the grazing pressure attached to the spring use from being refocused on the creeks. These springs may be high enough that more than one tank could be supplied. The engineering and NEPA process will mean that the spring developments will not happen until a year or more after the exclosures are built. Therefore, the cattle permitees may need to initiate summer riparian monitoring to watch for signs of over-utilization and either move or remove the cattle to protect the creekside riparian areas.