

Bureau of Land Management
WIND RIVER/BIGHORN BASIN DISTRICT
Worland Field Office

**Kirby Creek Allotment
#00589**

**Standards for Healthy
Rangelands
and
Guidelines for Livestock Grazing
Management**

for
Public Lands Administered by the Bureau
of Land Management in the State of
Wyoming



MISSION STATEMENT

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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1.0 INTRODUCTION

The Bureau of Land Management (BLM) grazing regulations at 43 Code of Federal Regulations (CFR) 4130.3-1(c) require that grazing permits issued by the BLM contain terms and conditions that ensure conformance with BLM regulations at 43 CFR 4180, which are the regulations under which the Standards for Healthy Rangelands and Guidelines for Livestock Grazing Management for Public Land Administered by the Bureau of Land Management in the State of Wyoming were developed. Recently, the Worland Field Office completed an assessment of the achievement of these standards on the Kirby Creek Allotment. The results of this assessment are presented in this report. This assessment will serve to inform the public of BLM's determination as to whether these standards are being met, and, if they are not met, whether existing grazing management practices contribute to their lack of attainment.

1.1 Standards

The approved standards for rangeland health are as follows:

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 surface runoff.

Standard #2: Riparian and wetland vegetation has structural, age and species diversity characteristic of the stage of channel succession and is resilient and capable of recovering from natural and human disturbance in order to provide forage and cover, capture sediment, dissipate energy, and provide ground water recharge.

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.

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 species, endangered species, species of special concern, or sensitive species will be maintained or enhanced.

Standard #5: Water quality meets State standards.

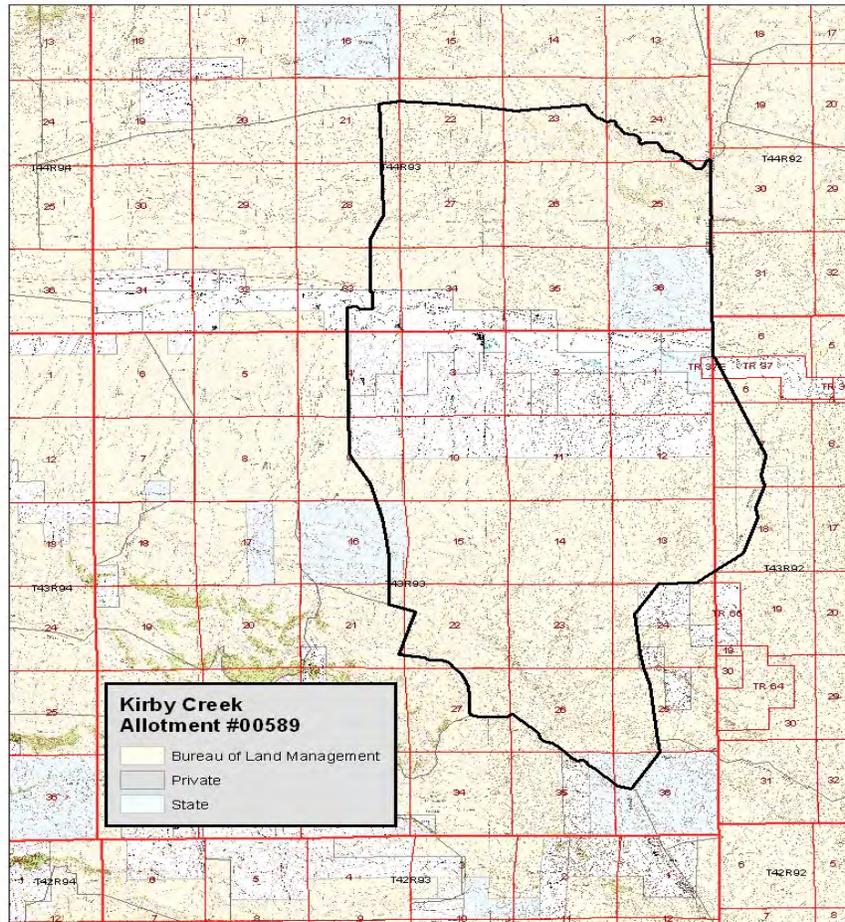
Standard #6: Air quality meets State standards

2.0 AFFECTED ENVIRONMENT-ALLOTMENT DESCRIPTION, RESOURCE VALUES, and USES

2.1 Location and Land Ownership

The Kirby Creek Allotment (Map 1) is located approximately eight miles east of Lucerne, Wyoming. The average elevation ranges from 4,300 feet to 5,300 feet above sea level. The allotment encompasses approximately 14,583 total acres including 10,146 acres public land acres and 4,437 private and State lands (Washakie RMP, 1988).

Map 1: Allotment



2.2 Hydrology

2.2.1 Surface Water/Watershed

Within the Kirby Creek allotment there are three different level #6 sub-watersheds that are identified by the United States Geological Survey (USGS) by name and Hydrologic Units Codes or (HUC) (Table 1). In total 70 % of the allotment is located in the Middle Kirby Creek sub-watershed consisting of 41.1% of the total sub-watershed. The remaining 27% of the allotment is located in the Lower Kirby Creek sub-watershed and consists of only a minor portion of 18.4 % of the total sub-watershed. There is also a minor portion (3%) of the allotment that is located in the Bighorn River- Sand Draw (1.2%) of the sub-watershed that drains directly into the Bighorn River (Map2).

Map 2: Watershed Map



Table 1: Hydrologic Unit Codes

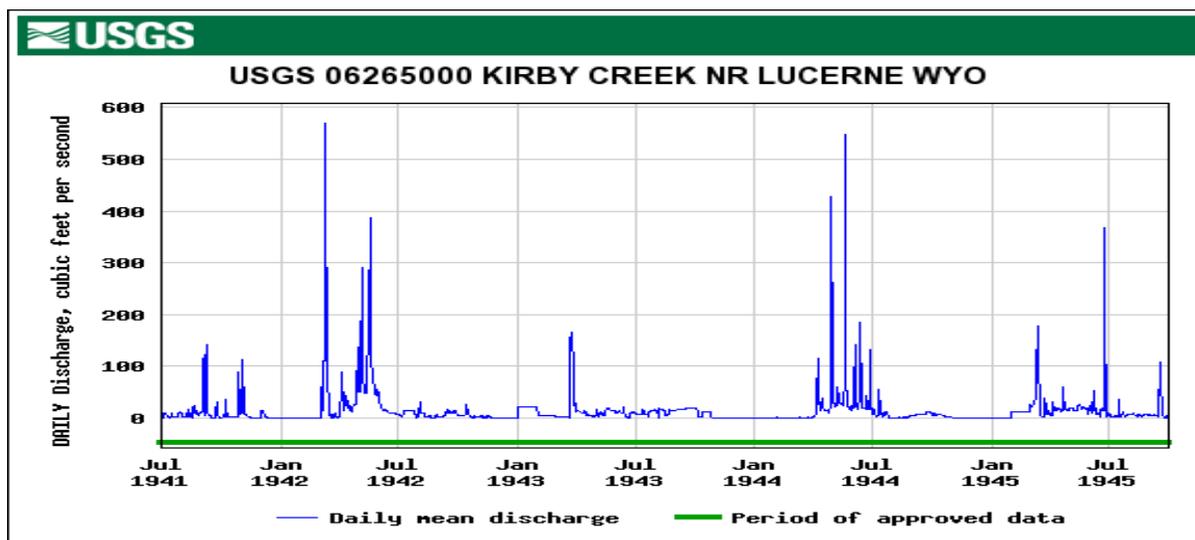
Watershed Name-Level #6 (HUC #)	Total (Mi ²)	(Mi ²)within allotment	(%) Mi ² of watershed in the allotment
Bighorn River-Sand Draw (100800070401)	49.9	0.6	1.2
Middle Kirby Creek (100800070504)	39.9	16.4	41.1
Lower Kirby Creek (100800070505)	34.3	6.3	18.4

The allotment is situated in the middle of the watershed with drainages originating from the north and south geologic divides in the allotment. The surface water flow regime consists of upland drainages that flow toward Kirby Creek that is centrally located in the allotment (Map 2). Kirby Creek is a perennial/intermittent creek that flows across private, state and federal lands in a western direction through the allotment.

These three sub-watersheds in the allotment drain the Cretaceous Cody Shale formation of fine grained shale deposits in lower elevations in the center of the allotment and the Cretaceous Frontier formation a fine grained sandstone along the higher slopes on the southern end of the allotment. The Cody and Frontier formations have a moderate to low sensitivity to groundwater contamination due to relatively low water transmission rates (Hamerlinck and Arnerson, 1998).

A United States Geological Survey gauging station 0626500 (**Table 2**) located six miles downstream to the west near the mouth of Kirby Creek recorded flows from 1941-1945. The flow record during this time recorded peak flows ranging from 300- 570 cubic feet per second occurring mostly during the month of May and following storm events in the summer months. The hydrograph is typical for flashy systems with peak summer flows usually occurring in May and June and little to no base flow occurring in the late fall and winter months. The station was discontinued in the fall of 1945 due to lack of funding; however the station does provide a hydrograph for historic flow from the Kirby Creek watershed into the Bighorn River. Since 1945 there have not been any continuous stream measurements, but there has been two level I watershed studies completed by the state of Wyoming in 2004 completed by Sunrise Engineering and in 2010 by PBS&J. The volume and timing of the flow through the public land segment on Kirby Creek in the allotment is related to gauging station because there are no major tributaries into Kirby Creek between the segment and the gauging station.

Table 2: USGS Daily Discharge



Lower elevations of Kirby Creek have an intermittent flow in the channel 10-80 percent of the year. The smaller upland drainages have an ephemeral flow regime using the definition provided by (Hedman, 1982) with surface flow in response to storm events and seasonal snow melt in the spring months for average of < 10 percent of the year.

Water availability in the Kirby Creek watershed was estimated as part of the recently completed Draft Wind-Bighorn Basin Plan Update (MWH 2010). Water availability for surface water resources is defined as the amount of water that is physically and legally available for new water uses. Water availability was estimated for dry years, average years, and wet years using measured stream flows where data were available and linear regression techniques using regional equations when streamflow gages had incomplete records (MWH 2010). In the 2010 Wind-Bighorn Basin Plan Update, Reach 410 is attributed 7,840 acre feet of available surface water during dry years, 17,982 acre feet during average years, and 31,988 acre feet during wet years (MWH 2010).

2.2.2 Ground Water

There is a portion of the western end of the Lower Kirby Creek sub-watershed that also provides some minimal groundwater recharge. However, overall, there is very little groundwater recharge occurring in the Kirby Creek watershed (WYGISC,1998).

2.2.3 Water Quality

Kirby Creek is classified as a 2C water, which indicates it supports all use designations except drinking water and game fish and is designated as a warm water fishery (Table 9).

2.2.4 Riparian

Site hydrology is the overriding characteristic that distinguishes riparian/wetland areas from adjacent uplands. The hydrology of any site or region is ultimately linked to precipitation, but the development of riparian/a wetland area is dependent on the longer term presence of available water. In much of the western U.S. annual precipitation is less than 20 inches and annual evapotranspiration is over 30 inches per year (WRCC 2009), indicating a water deficit and that precipitation alone is insufficient to support the establishment or persistence of wetland/riparian areas. These conditions hold true for the Kirby Creek watershed. Because of this water deficit the hydrology of riparian/wetland areas in the project area originates primarily from surface water, groundwater, or both (PBS&J,2010).

There is a 0.2 mile segment (1056 feet) of Kirby Creek on public land within the allotment that has an intermittent flow regime (**Map 2**). The floodplain width varies between 20 -30 feet. These areas have wetland type soils, vegetative wetland or facultative species, and sufficient water available to support varying riparian plant communities. It is classified as a Rosgen Gc and E type stream; a low gradient and is slightly entrenched (E) and moderately entrenched (Gc) with limited access to the floodplain needed for riparian development (PBS&J, 2010 p.3.28). The water table has been effectively lowered from the entrenchment process that has occurred along Kirby Creek. Long term geomorphic processes both natural and human induced have resulted in channel degradation and incision throughout the much of the watershed (PBS&J, 2010 ES.3). These historic changes have impacted the segment of the creek in the allotment and will require a slow rebuilding natural process to re-develop stable channel geometry.

According to the BLM Washakie Resource Management Plan (RMP) (p.24) the Kirby Creek Watershed is listed as a sensitive watershed with an emphasis placed on reductions of soil erosion and sediment yields to be achieved by increasing vegetative cover and to stabilize watersheds with grazing management along with site specific sediment control and other modifications. The local stake holders, BLM, NRCS, Wyoming Water Development Office, and others have formed the Kirby Creek coordinated resource management group (CRM). The CRM has outlined an action plan with prescriptions for water development opportunities, grazing management, riparian restoration and other potential projects to assist in the improvement of the overall watershed health of Kirby Creek.

2.3 Climatic Features

Annual precipitation for the Kirby Creek Allotment ranges from 10- 14 inches per year. The normal precipitation pattern shows the least amount of precipitation occurs in December, January, and February, increasing to a peak during the latter part of May. Amounts decrease through June, July, and August and then increase some in September. Much of the moisture that falls in the latter part of the summer is lost by evaporation and much of the moisture that falls during the winter is lost by sublimation. Average snowfall exceeds about 20 inches annually. Wide fluctuations may occur in yearly precipitation and result in more dry years than those with more than normal precipitation.

Temperatures show a wide range between summer and winter and between daily maximums and minimums, due to the high elevation and dry air, which permits rapid incoming and outgoing radiation.

Cold air outbreaks from Canada in winter move rapidly from northwest to southeast and account for extreme minimum temperatures. Chinook winds may occur in winter and bring rapid rises in temperature. Extreme storms may occur during the winter, but most severely affect ranch operations during late winter and spring.

Winds are generally not strong as compared to the rest of the state. Daytime winds are generally stronger than nighttime and occasional strong storms may bring brief periods of high winds with gusts to more than 75 mph.

Growth of native cool-season plants begins about April 15 and continues to about July 15. Cool weather and moisture in September may produce some green up of cool season plants that will continue to late October.

The following information is from the “Thermopolis 2” climate station:

	Minimum	Maximum	5 yrs. out of 10 between
Frost-free period (days):	74	149	May 23 – September 16
Freeze-free period (days):	112	180	May 8 – October 1
Mean Annual Precipitation (inches):	7.6	21.9	

Mean annual precipitation: 12.35 inches

Mean annual air temperature: 46.2°F (30.1°F Avg. Min. to 62.3°F Avg. Max.)

For detailed information visit the Natural Resources Conservation Service (NRCS) National Water and Climate Center at <http://www.wcc.nrcs.usda.gov/> website. Other climate station(s) representative of this precipitation zone include “Basin”, “Deaver”, “Lovell” and “Worland”, (Information taken from the United States Department of Agriculture (USDA) NRCS Technical Guide Section IIE Rev. 11/01/05).

2.4 Soils

The soils of the Kirby Creek allotment reflect the desert environment in which they formed. They are highly variable, reflecting differences in parent material (shale, sandstone and/or mixed alluvium), position on the landscape, slope and aspect. Soil depth ranges from 10 inches to over 60 inches with soft shale bedrock common below the substratum. Most of the allotment consists of soils with a light brown surface layer and fine to moderately course textured (clay, clay loam, loam, fine sandy loam). The subsoil often reflects an increase in clay and sodium being expressed as an argillic and natric horizons. Slopes range from 0 to 60 percent, but are generally less than 45 percent.

The Natural Resources Conservation Service spacial data depicts the break between 5-9 and 10-14 inch precipitation zones as roughly dissecting the allotment along Kirby Creek. Soil survey data places the entire allotment in the 10-14 inch precipitation zone.

Based on the soil survey data for Hot Springs the dominant ecological sites found in the in the allotment are listed below:

Loamy 10-14 inch precipitation zone	R032XY322WY
Shallow Loamy 10-14 inch precipitation zone	R032XY362WY
Saline Upland 10-14 inch precipitation zone	R032XY344WY
Clayey 10-14 inch precipitation zone	R032XY304WY
Shallow Clayey 10-14 inch precipitation zone	R032XY358WY
Sandy 10-14 inch precipitation zone	R032XY350WY

Five rangeland health assessments utilizing the methodology described in *Interpreting Indicators of Rangeland Health, Technical Reference 1734-6* were relied upon in the analysis of the Kirby Creek Allotment. Two were conducted in 2011 at representative locations within the allotment. Three assessments conducted in 2005, were part of a broad watershed assessment effort and are also incorporated into this analysis.

The first 2011 assessment was conducted in the south pasture (43.68412 – 107.98654) and was located in Map Unit 703 Fort Collins-Cushman Complex. The soils at this location support a Loamy 10-14 inch precipitation zone ecological site; however they were not a good fit for either the Fort Collins or the Cushman soil series in that they lacked an argillic horizon. They were similar to the both the Kim and Thedalund soil series. The second 2011 assessment (43.74919 – 107.98829) was conducted in the north pasture and was located in Map Unit 490 Cadoma-Thedalund Complex. The soil at this location was similar to the Thedalund soil series and supported a Loamy 10-14 inch precipitation zone ecological site.

In 2005 the soil investigations were conducted only to the extent necessary to verify the ecological site; they were not identified to the soils series level. An overview of the 2005 assessment locations follows:

More specifically, the native plant species identified during the first 2011 assessment (43.68412 – 107.98654) in the south pasture of Kirby Creek included Bluebunch wheatgrass (*Pseudoroegneria spicata*), Sandberg bluegrass (*Poa secunda*), Needle and thread (*Hesperostipa comata*), Western wheatgrass (*Pascopyrum smithii*), Prairie junegrass (*Koeleria macrantha*), Scarlet globemallow (*Sphaeralcea coccinea*), Shaggy daisy (*Erigeron pumilus*), Penstemon (*Penstemon spp.*), Phlox (*Phlox spp.*), Textile Onion (*Allium textile*), False dandelion (*Agoseris glauca*), Oxytropis (*Oxytropis spp.*), Segó lily (*Calochortus nuttallii*), Indian paintbrush *Castilleja spp.*), Plains pricklypear cactus (*Opuntia polyacantha*), American vetch (*Vicia americana*), Biscuit-root (*Lomatium cous*), Wyoming big sagebrush (*Artemisia tridentata* spp. *Wyomingensis*), biological crusts and lichens.

The native plant species identified during the second 2011 assessment (43.74919 – 107.98829) in the north pasture of Kirby Creek included Bluebunch wheatgrass (*Pseudoroegneria spicata*), Sandberg bluegrass (*Poa secunda*), Needle and thread (*Hesperostipa comata*), Western wheatgrass (*Pascopyrum smithii*), Indian ricegrass (*Achnatherum hymenoides*), Scarlet globemallow (*Sphaeralcea coccinea*), Shaggy daisy (*Erigeron pumilus*), Bluebells (*Mertensia longiflora*), Phlox (*Phlox spp.*), Textile Onion (*Allium textile*), False dandelion (*Agoseris glauca*), Oxytropis (*Oxytropis spp.*), Yellow prairie violet (*Viola nuttallii*), Segó lily (*Calochortus nuttallii*), Indian paintbrush *Castilleja spp.*), Plains pricklypear cactus (*Opuntia polyacantha*), Smooth woody aster (*Xylorhiza glabruiscula*), American vetch (*Vicia americana*), Fourwing saltbush (*Atriplex canescens*), Wyoming big sagebrush (*Artemisia tridentata* spp. *Wyomingensis*), Winterfat (*Eurotia lanata*), and biological crusts.

The native plants identified during the first 2005 assessment (43.73870 – 107.98645) in the north pasture of Kirby Creek included Bluebunch wheatgrass (*Pseudoroegneria spicata*), Needle and thread (*Hesperostipa comata*), Western wheatgrass (*Pascopyrum smithii*), Sandberg bluegrass (*Poa secunda*), Aster (*Symphotrichum spp.*), Textile Onion (*Allium textile*), Plains pricklypear cactus (*Opuntia polyacantha*), Prairie violet (*Viola nuttallii*), Greasewood (*Sarcobatus vermiculatus*), Saltbush (*Atriplex spp.*), Wyoming big sagebrush (*Artemisia tridentata* spp. *Wyomingensis*), and biological crusts.

Native plants identified during the second 2005 assessment (43.69439 – 107.97898) in the south pasture included Bluebunch wheatgrass (*Pseudoroegneria spicata*), Green needlegrass (*Nassella viridula*), Western wheatgrass (*Pascopyrum smithii*), Plains pricklypear cactus (*Opuntia polyacantha*), Scarlet globemallow (*Sphaeralcea coccinea*), Vetch (*Astragalus spp.*), Phlox (*Phlox spp.*), and Wyoming big sagebrush (*Artemisia tridentata* spp. *Wyomingensis*).

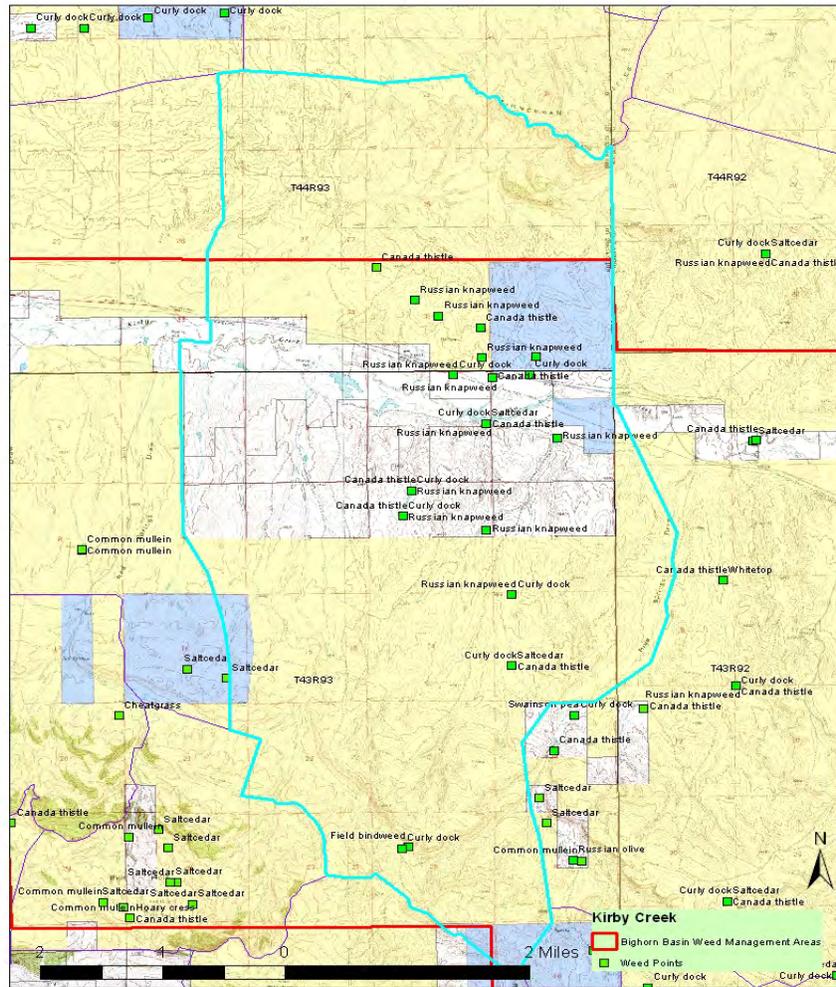
The native plant species identified during the third 2005 assessment (43.70155 – 107.95105) in the south pasture included Needle and thread (*Hesperostipa comata*), Bluebunch wheatgrass (*Pseudoroegneria spicata*), Sandberg bluegrass (*Poa secunda*), Western wheatgrass (*Pascopyrum smithii*), Blue grama (*Bouteloua gracilis*), Scarlet globemallow (*Sphaeralcea coccinea*), phlox (*Phlox spp.*), Vetch (*Astragalus spp.*), Plains pricklypear cactus (*Opuntia polyacantha*), and Wyoming big sagebrush (*Artemisia tridentata* spp. *Wyomingensis*).

This list is not all inclusive however the vegetation noted are those that are quite evident and readily available.

2.6 Invasive Species

The majority of the noxious weeds in the Kirby Creek Allotment occur along the roads, drainages and near reservoirs (Map 4). Scattered populations exist of Canada thistle, field bindweed, saltcedar and Russian knapweed. Other invasive species in the area include curly dock, Swainsonpea, and cheatgrass/common brome. This allotment lies within the Kirby Creek Weed Management Area and is intensively managed and monitored for noxious and invasive weed species using a cooperative, integrated pest management strategy. Hot Springs County Weed and Pest District personnel treated noxious weeds within the allotment in the summer of 2011. Cheatgrass occurs across the allotment in varying abundances. It ranges from that expected for the site, to scattered throughout the allotment.

Map 4: Invasive Species



2.7 Livestock Grazing Use

The Kirby Creek Allotment is authorized for use by sheep, cattle, and horses. The water sources for livestock are Kirby Creek, reservoirs, and a windmill. The allotment is categorized as an “I1” (Improve) in the Washakie RMP.

Livestock are authorized on the allotment as follows:

Kirby Creek #00589			
900 Sheep	03/01 to 05/31	70% Public Land	381 AUMs
100 Cattle	03/01 to 04/30	70% Public Land	140 AUMs
100 Cattle	10/01 to 02/28	70% Public Land	348 AUMs
8 Horses	12/01 to 02/28	70% Public Land	17 AUMs
900 Sheep	01/23 to 02/28	70% Public Land	153 AUMs

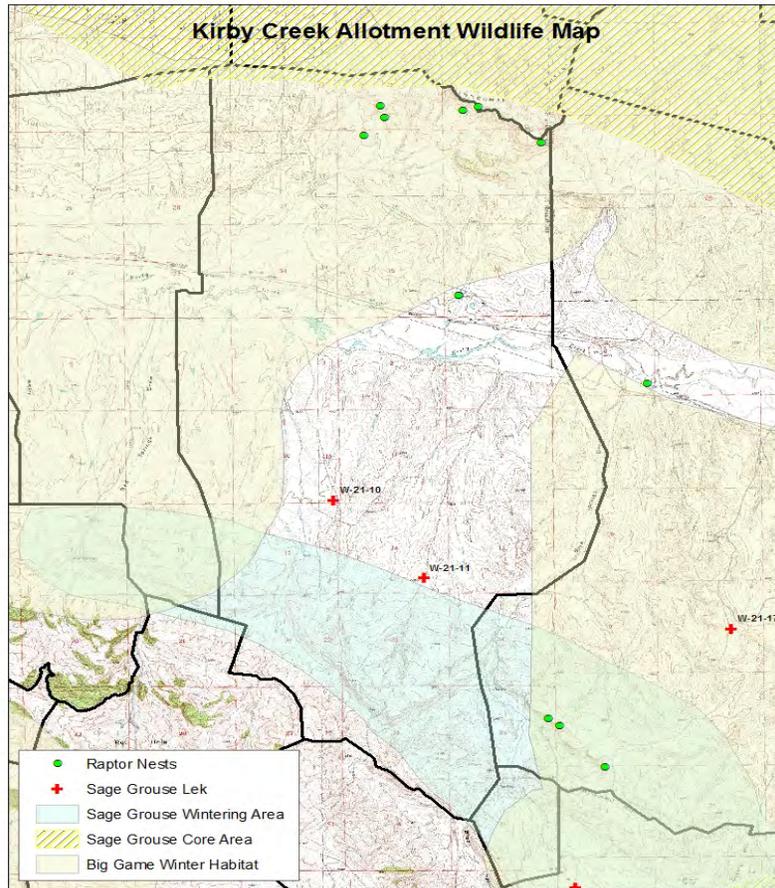
Permitted Use (AUMs): 1044 Active 598 Suspended 1642 Total

2.8 Wildlife

Wildlife habitat on the Kirby Creek Allotment is suitable for a wide range of big game, non-game, and sensitive wildlife species. The allotment is characterized by gently sloped sage brush plains with small, deep draws and ridges. The allotment is roughly bisected by the Black Mountain Road with all drainages flowing generally into Kirby Creek. The vegetation is characterized by a mix of Wyoming Big sage brush, perennial grasses, and

cheatgrass. Mule deer and antelope use the allotment year round with higher concentrations of mule deer utilizing it during late fall and winter. Antelope may be observed throughout the allotment. Approximately the northern half of the allotment is designated as crucial big game winter habitat for mule deer and antelope. The allotment also provides habitat for a wide range of wildlife species such as small mammals and predators, numerous grassland passerines, sage grouse, and numerous raptor species. Numerous raptor nests have been located within the allotment boundary, most of them near the higher elevations of Zimmerman Butte at the north end.

Map 5: Wildlife Habitat



2.9 Threatened or Endangered Species

2.9.1 Threatened, Endangered, Candidate, and BLM Sensitive -- Plant Species

There are no known threatened, Endangered, Candidate, or BLM Sensitive plant species known to occur in the Kirby Creek Allotment.

Ute ladies'-tresses is the only USFWS endangered plant species known to potentially exist in the Big Horn Basin. However, the species has not been found in the basin. There is potential habitat along Kirby Creek.

2.9.2 Threatened, Endangered, Candidate, and BLM Sensitive - Wildlife Species

No known threatened or endangered wildlife species have been observed or recorded utilizing habitat within the allotment. Sage grouse, a BLM sensitive species is known to utilize habitat within the allotment during the breeding, nesting, and early brood-rearing seasons. There are two active sage grouse leks within the south pasture of the allotment, and a significant portion of the allotment lies within the two-mile buffer zone of four active leks.

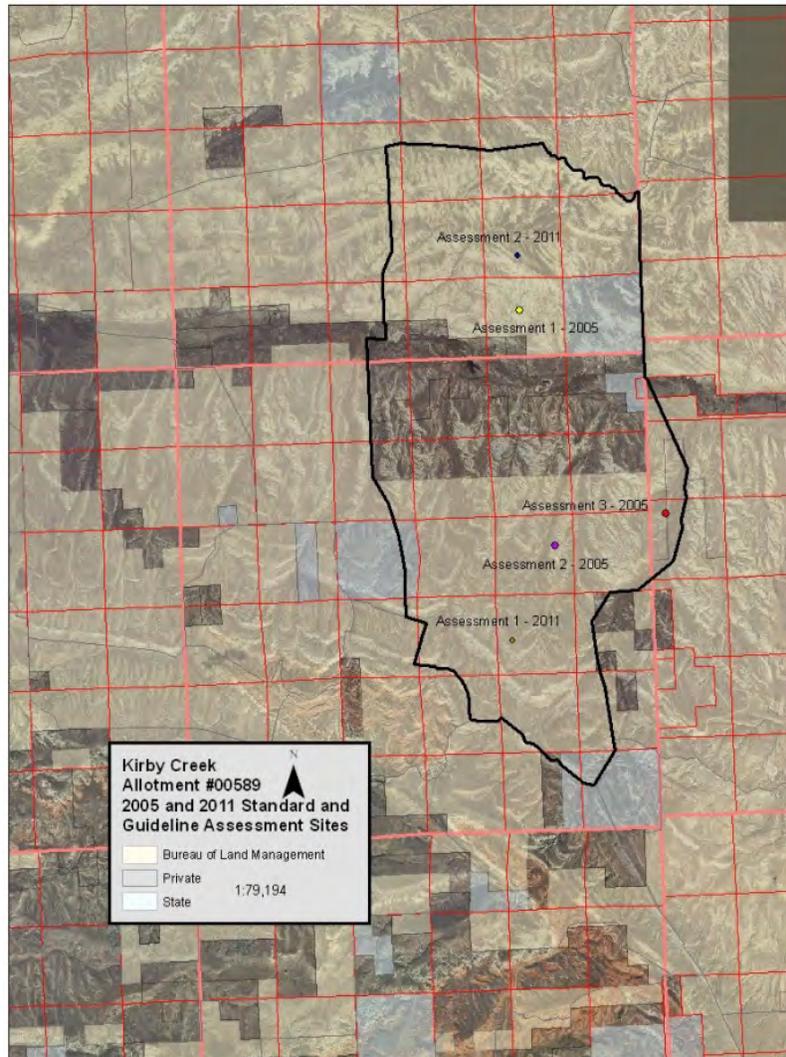
Although the allotment is not within a sage grouse core breeding area, it does provide sage grouse wintering area near the southern boundary. The quality of the sage brush and the existence of active leks, as well as the proximity of the allotment to wintering habitat makes it valuable habitat for seasonal use by sage grouse.

3.0 SUMMARY OF MONITORING DATA

3.1 Rangeland Health Summary

An interdisciplinary team of BLM resource specialists evaluated the Kirby Creek Allotment through five assessments using the “*Interpreting Indicators of Rangeland Health*”, Technical Reference 1734-6 and other monitoring data. Two assessments were conducted in 2011 and three rangeland health assessments were conducted in 2005 at random points. These three assessments were generated as part of a broad watershed assessment effort in 2005. **Map 6** shows the location of the assessment sites.

Map 6: Assessment Sites



The 17 indicators of rangeland health were observed and recorded within the transect area. The 17 indicators are broken into 3 categories - soil stability, hydrologic function, biotic integrity. The measurement of these indicators is based upon a departure from that which would be expected for the specific range site. The “measuring stick” to judge against is provided by the United States Department of Agriculture, Natural Resources Conservation Service (NRCS) in the form of an Ecological Site Description (ESD) and Reference Sheet for each specific range site and precipitation zone. The indicators and the assessed departure for Assessment One are found in Table 3 below.

The first assessment in 2011 (43.68412 – 107.98654) was conducted in the south pasture. It was located in a Loamy 10-14 inch precipitation zone ecological site. The attribute rating justification for soil and site stability, hydrologic function, and biotic integrity was determined to be slight to moderate.

Table 3: Assessment 1 - Soil /Hydrologic/Biotic Integrity Ratings

Indicator	Departure from Reference
1. Rills	None to Slight
2. Water Flow Patterns	Slight to Moderate
3. Pedestals and/or Terracettes	Slight to Moderate
4. Bare Ground – 22 percent	None to Slight (10 – 30 percent expected)
5. Gullies	Slight to Moderate
6. Wind-Scoured, Blowouts, and/or deposition areas	None to Slight
7. Litter Movement	Slight to Moderate
8. Soil Surface Resistance to Erosion - 4.9	Slight to Moderate (should be 3.0 or greater)
9. Soil Surface Resistance to Degradation	Slight to Moderate
10. Plant Community Composition and Distribution Relative to Infiltration	None to Slight
11. Compaction Layer	None to Slight
12. Functional/Structural Groups	None to Slight
13. Plant Mortality/Decadence	None to Slight
14. Litter Amount – 21 percent	None to Slight (5 - 30 percent expected)
15. Annual Production	None to Slight
16. Invasive Plants	Slight to Moderate
17. Reproductive Capability of Perennial Plants	None to Slight

Attribute Rating Justification Summary

Soil and Site Stability Rating – Slight to Moderate
 Hydrologic Function Rating – Slight to Moderate
 Biotic Integrity Rating – Slight to Moderate

Photo of Assessment 1 - 2011



The second assessment (43.44969 – 107.59268) in 2011 was conducted in the north pasture. It was also a Loamy 10-14 inch precipitation zone ecological site. The attribute rating justification for soil and site stability, hydrologic function, and biotic integrity was determined to be slight to moderate.

Table 4: Assessment 2 – Soil/Hydrologic/Biotic Integrity Ratings

Indicator	Departure from Reference
1. Rills	None to Slight
2. Water Flow Patterns	Slight to Moderate
3. Pedestals and/or Terracettes	Slight to Moderate
4. Bare Ground 25 percent	None to Slight (10 - 30 percent expected)
5. Gullies	None to Slight
6. Wind-Scoured, Blowouts, and/or deposition areas	None to Slight
7. Litter Movement	None to Slight
8. Soil Surface Resistance to Erosion - 5.5	None to Slight (should be 3.0 or greater)
9. Soil Surface Resistance to Degradation	None to Slight
10. Plant Community Composition and Distribution Relative to Infiltration	None to Slight
11. Compaction Layer	None to Slight
12. Functional/Structural Groups	None to Slight
13. Plant Mortality/Decadence	None to Slight
14. Litter Amount - 20 percent	None to Slight (5 - 30 percent expected)
15. Annual Production	None to Slight
16. Invasive Plants	Slight to Moderate
17. Reproductive Capability of Perennial Plants	None to Slight

Attribute Rating Justification Summary

Soil and Site Stability Rating – Slight to Moderate

Hydrologic Function Rating – Slight to Moderate

Biotic Integrity Rating – Slight to Moderate

Photo of Assessment 2 - 2011



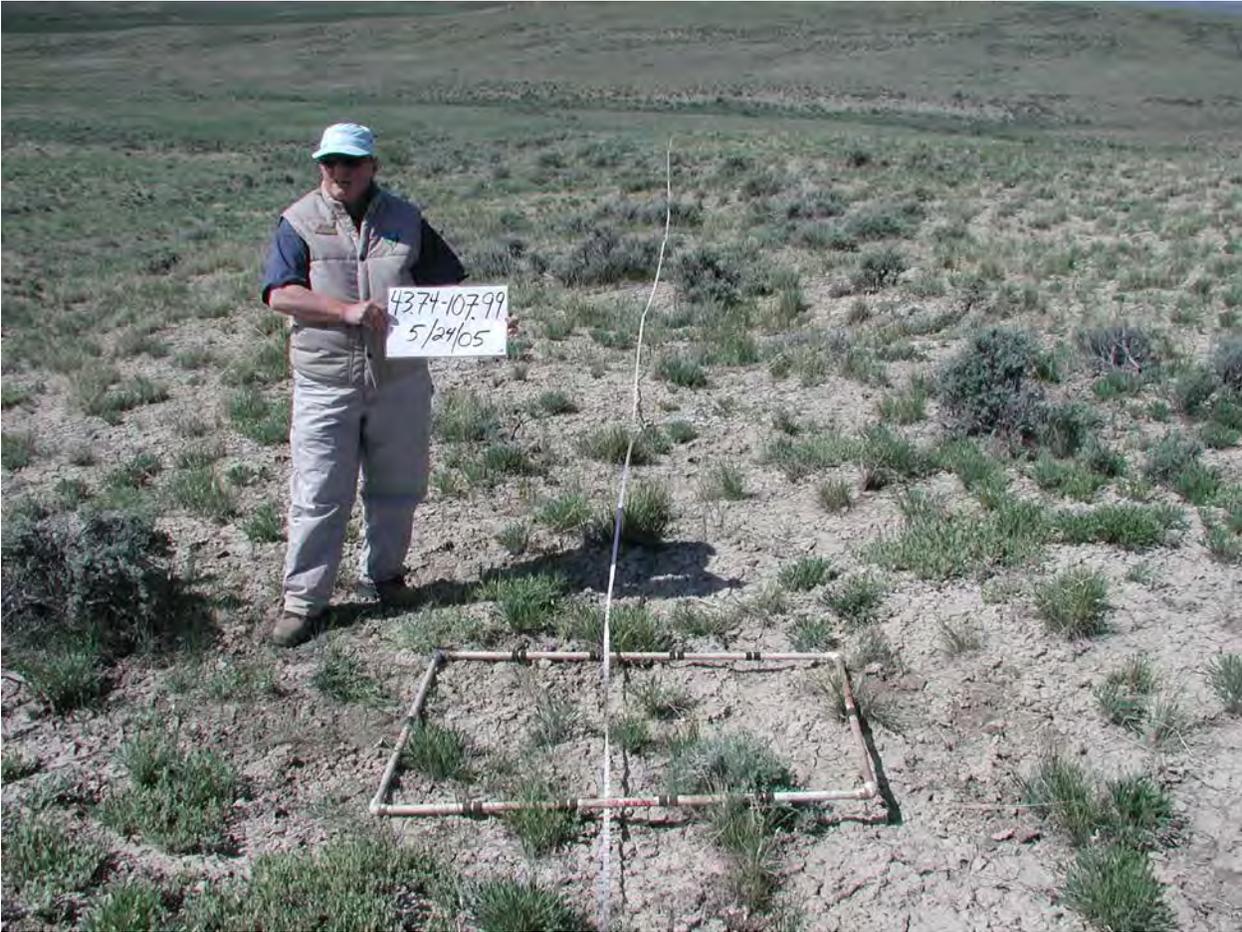
The first 2005 assessment (43.738790– 107. 98645) was located in the north pasture on a Saline Upland 10-14 inch precipitation zone ecological site. The attribute rating justification for soil site stability and hydrologic function was determined to be slight to moderate. The biotic integrity was determined to be none to slight.

Table 5: Assessment 1 – Soil/Hydrologic/Biotic Integrity Ratings

Indicator	Departure from Reference
1. Rills	Slight to Moderate
2. Water Flow Patterns	Slight to Moderate
3. Pedestals and/or Terracettes	Slight to Moderate
4. Bare Ground 65 percent	Moderate (20 - 45 percent expected)
5. Gullies	Slight to Moderate
6. Wind-Scoured, Blowouts, and/or deposition areas	None to Slight
7. Litter Movement	None to Slight
8. Soil Surface Resistance to Erosion	None to Slight
9. Soil Surface Resistance to Degradation	None to Slight
10. Plant Community Composition and Distribution Relative to Infiltration	None to Slight
11. Compaction Layer	None to Slight
12. Functional/Structural Groups	None to Slight
13. Plant Mortality/Decadence	Slight to Moderate
14. Litter Amount 6 percent	Slight to Moderate (10 -30 percent expected)
15. Annual Production	None to Slight
16. Invasive Plants	None to Slight
17. Reproductive Capability of Perennial Plants	None to Slight

Attribute Rating Justification Summary
 Soil and Site Stability Rating – Slight to Moderate
 Hydrologic Function Rating – Slight to Moderate
 Biotic Integrity Rating – None to Slight

Photo of Assessment 1 - 2005



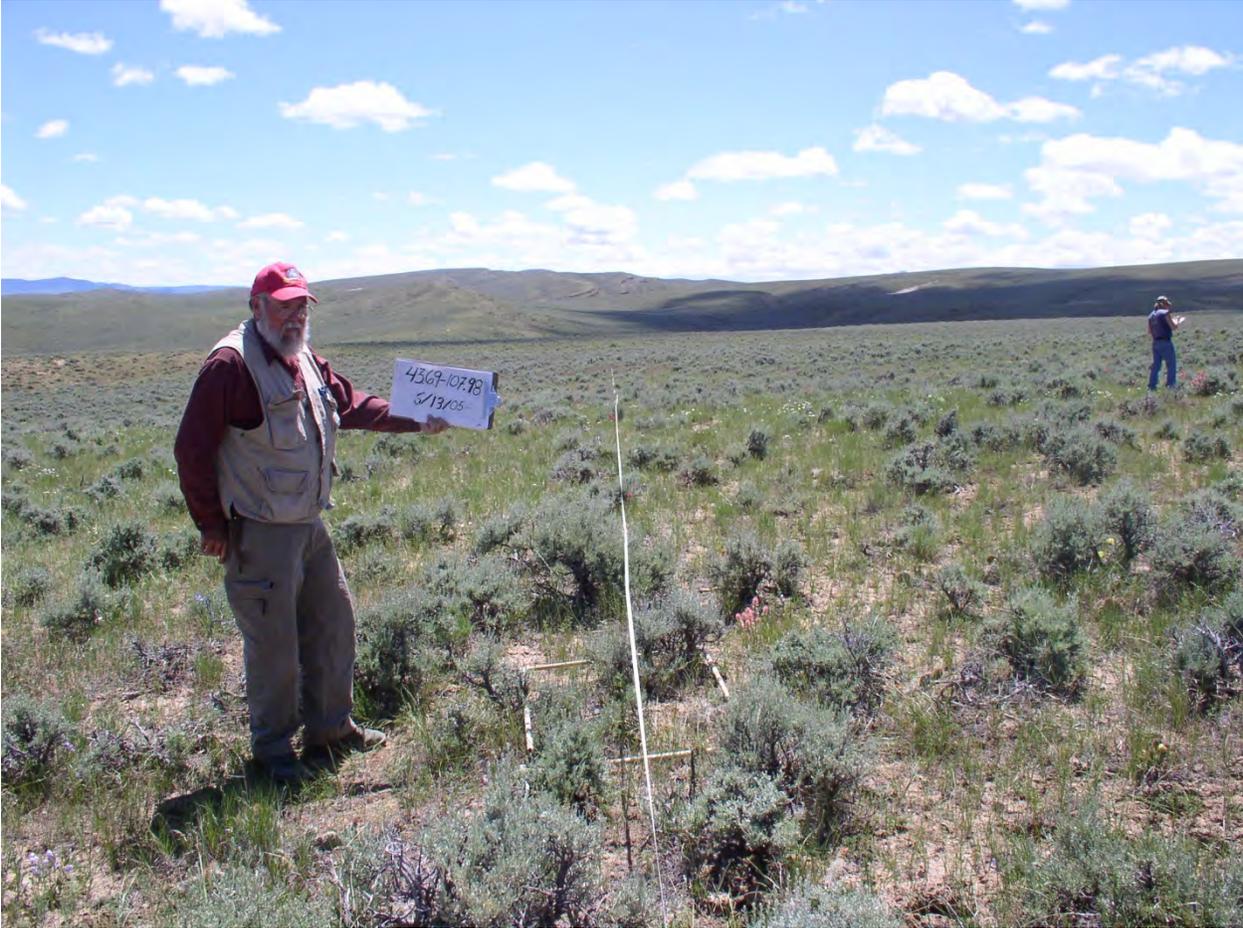
The second 2005 assessment (43.69439 – 107.97898) was located in the south pasture on a Shallow Clayey 10-14 inch precipitation zone ecological site. The attribute rating justification for soil site stability and hydrologic function was determined to be none to slight. The biotic integrity was determined to be slight to moderate.

Table 6: Assessment 2 – Soil/Hydrologic/Biotic Integrity Ratings

Indicator	Departure from Reference
1. Rills	None to Slight
2. Water Flow Patterns	None to Slight
3. Pedestals and/or Terracettes	None to Slight
4. Bare Ground 21 percent	None to Slight (20 to 50 percent expected)
5. Gullies	None to Slight
6. Wind-Scoured, Blowouts, and/or deposition areas	None to Slight
7. Litter Movement	None to Slight
8. Soil Surface Resistance to Erosion	Slight to Moderate
9. Soil Surface Resistance to Degradation	None to Slight
10. Plant Community Composition and Distribution Relative to Infiltration	None to Slight
11. Compaction Layer	None to Slight
12. Functional/Structural Groups	Moderate
13. Plant Mortality/Decadence	None to Slight
14. Litter Amount 32 percent	None to Slight (20 to 30 percent expected)
15. Annual Production	None to Slight
16. Invasive Plants	Slight to Moderate
17. Reproductive Capability of Perennial Plants	None to Slight

Attribute Rating Justification Summary
 Soil and Site Stability Rating – None to Slight
 Hydrologic Function Rating – None to Slight
 Biotic Integrity Rating – Slight to Moderate

Photo of Assessment 2 - 2005



The third 2005 assessment (43.70155 – 107.95105) was located in the south pasture on a Loamy 10-14 inch precipitation zone ecological site. The attribute rating justification for soil site stability, hydrologic function, and biotic integrity was determined to be none to slight.

Table 7: Assessment 3– Soil/Hydrologic/Biotic Integrity Ratings

Indicator	Departure from Reference
1. Rills	None to Slight
2. Water Flow Patterns	None to Slight
3. Pedestals and/or Terracettes	None to Slight
4. Bare Ground 25 percent	None to Slight (10 to 30 percent expected)
5. Gullies	None to Slight
6. Wind-Scoured, Blowouts, and/or deposition areas	None to Slight
7. Litter Movement	None to Slight
8. Soil Surface Resistance to Erosion	None to Slight
9. Soil Surface Resistance to Degradation	None to Slight
10. Plant Community Composition and Distribution Relative to Infiltration	None to Slight
11. Compaction Layer	None to Slight
12. Functional/Structural Groups	Slight to Moderate
13. Plant Mortality/Decadence	None to Slight
14. Litter Amount 32 percent	None to Slight (5 to 30 percent expected)
15. Annual Production	None to Slight
16. Invasive Plants	Moderate
17. Reproductive Capability of Perennial Plants	None to Slight

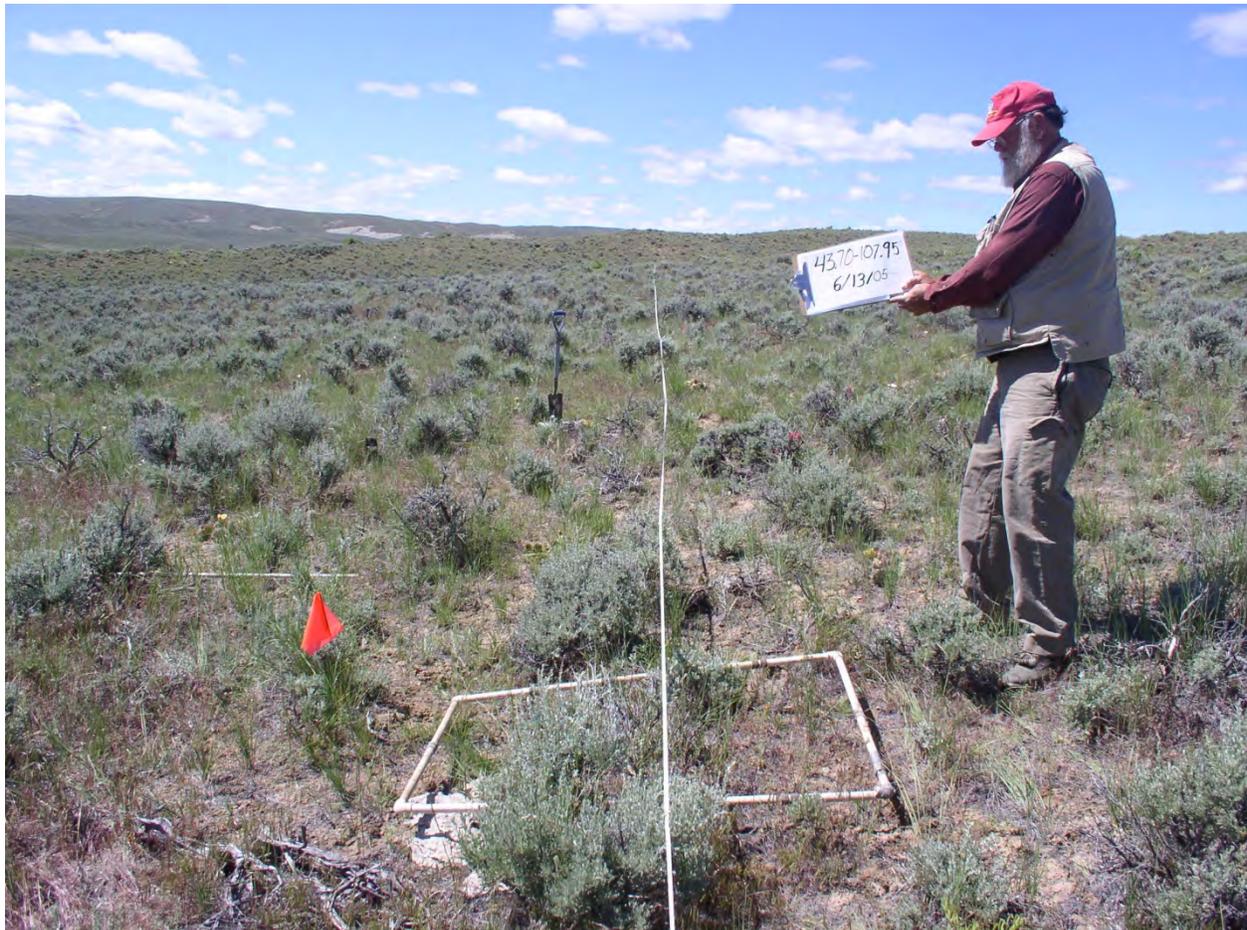
Attribute Rating Justification Summary

Soil and Site Stability Rating – None to Slight

Hydrologic Function Rating – None to Slight

Biotic Integrity Rating – None to Slight

Photo of Assessment 3 - 2005



3.2 Range Data

Sheep and cattle graze in the allotment from October 1 through May 31. The permit authorizes 1044 Active public AUMs and 438 AUMs on private and State Lands for a total of 1482 AUMs. For management priorities, the allotment is classified in the "I1" (Improve) category.

The NRCS's Ecological Site Description for a 10 – 14 inch precipitation Loamy Range sites in the Perennial Grass/Big Sagebrush Plant Community is 3.3 acres per AUM, Saline Upland sites in the Gardner Saltbush/Rhizomatous Wheatgrass is 5.0 acres per AUM, and Shallow Clayey sites in the Perennial Grass/Mixed Sagebrush Plant Community is 5.8 acres per AUM. This rate is based on assuming continuous season long grazing under average conditions. The allotment as a whole is stocked at 9.7 acres per AUM which is well below the estimated livestock carrying capacity.

Historically, water availability on public lands has been limited to Kirby Creek and several reservoirs which rarely hold water and a windmill.

Actual Use

Authorized use has averaged 1015 public AUMs over the past 30 years, (1983-2012).

Precipitation

The Kirby Creek Rain gauge (T.44N. R.94W. Section 36) near the allotment has a recorded 28 year average (1984-2011) of approximately 9 inches of precipitation.

Monitoring

There are seven years of utilization data available for the allotment. Forage utilization on key perennial bunchgrasses is shown below in Table 8. Precipitation in 1995, 1997, 1998, and 2011 was above average. Precipitation in the years 2000 and 2001 was below average. Production in 2000 and 2001 was also noted as being below average due to the lack of moisture. Two key areas were established in the allotment in 2011, one in the north pasture and one in the south pasture. Utilization has been collected at these sites since 2011. Use levels in the allotment can be expected to be less than moderate use (41 – 60%) under the current grazing permit authorization.

Table 8: Forage Utilization Data

Year	Pasture	Utilization	Actual Use (AUMs)	Precipitation (Inches)
1995	North/South	0 – 20%	1039	13.21
1997	North/South	<35%	1027	11.00
1998	North/South	0 – 20%	1039	10.89
2000	North	0 – 5%	1039	6.25
	South	0 – 40%		
2001	North	21 – 40%	778	5.06
2011	North/South	0 – 5%	1039	12.37
2012	North	19%	1039	Not Available
	South	0%		

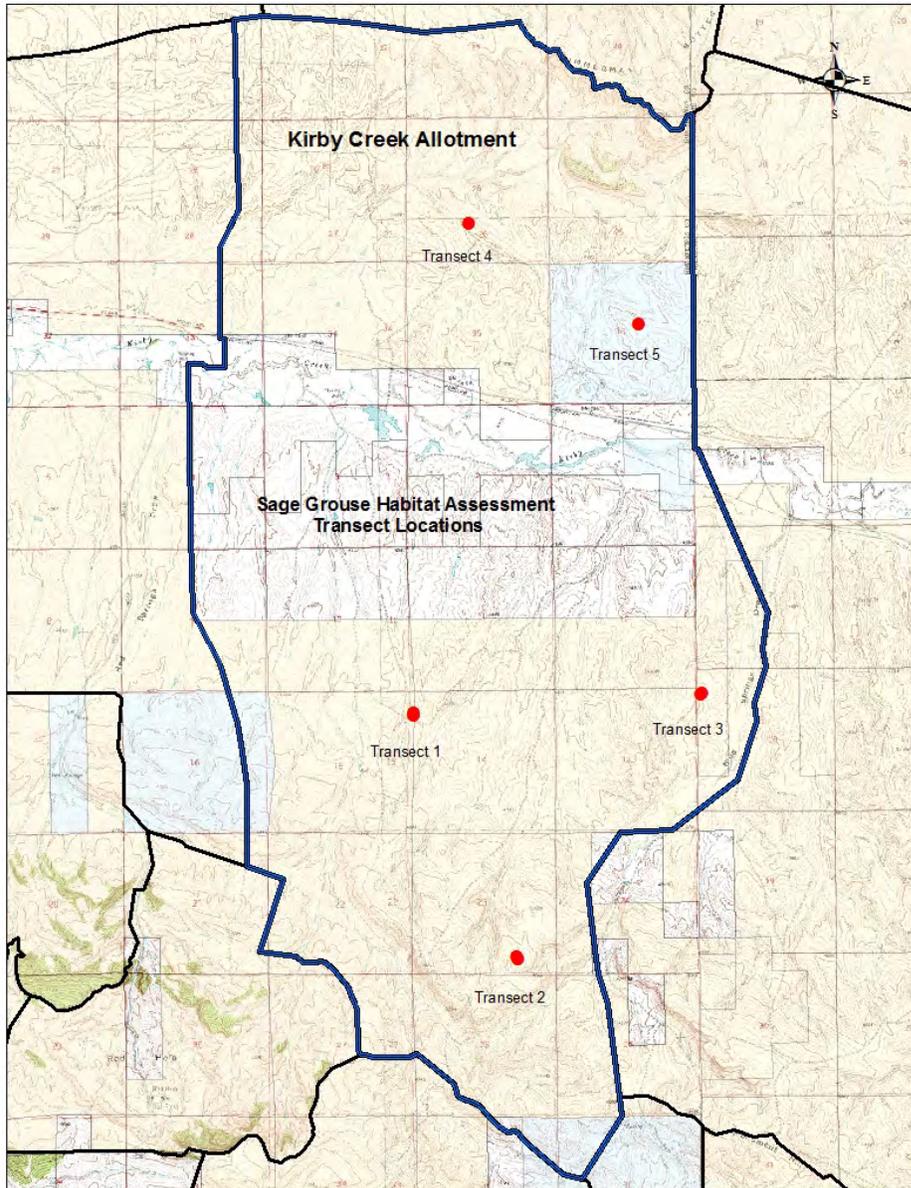
3.3 Wildlife Data

Sage grouse habitat assessments were performed using line intercept, belt transect, and Daubenmire cover class and height sampling methods. Five separate transects were recorded in representative sage grouse habitat within the allotment. Percent live sage brush canopy cover ranged from 8 to 23. Average sage brush height ranged from 9 to 12 inches. The percent mature sage brush component ranged from 50 to 90. This data indicates a condition that is capable of sustaining viable populations of sage brush obligate wildlife species including sage grouse, appropriate to the habitat type, topography, and precipitation zone characteristic of the allotment. There have been two historic leks within the allotment boundary. The South Dave Jones lek has had as many as an average of 16 birds counted in 2005 to only 2 total birds in 2012. The lek designated as W-21-11 has not had any recorded observations in recent years and has most likely become inactive.

Plant species recorded during the wildlife transects in 2011 included Cheatgrass (*Bromus tectorum*), Bitter root (*Lewisia rediviva*), Western wheatgrass (*Pascopyrum smithii*), poa spp., Lupine spp., Aster spp., Sandwort (*Arenaria obtusiloba*), pepperweed, salsify, American vetch (*Vicia americana*), Textile Onion (*Allium textile*), Hawksbeard (*Crepis acuminata*), Scarlet globemallow (*Sphaeralcea coccinea*), snake weed, parsley, Sandberg bluegrass (*Poa secunda*), shadscale, Winterfat (*Eurotia lanata*), and bottlebrush squirrel tail. The location of the Sage Grouse Habitat Assessments transects are located on **Map 7**.

Sage Grouse Habitat Assessment Transect Data			
	% Live Sage Brush Canopy Cover	Average Sage Brush Height in Inches	% Mature Sage Brush
Transect 1	8	9	90
Transect 2	15	10	71
Transect 3	23	12	75
Transect 4	10	11	59
Transect 5	13	12	50

Map 7 – Sage Grouse Habitat Assessments



Sage Grouse Habitat Assessment Transect 1



Sage Grouse Habitat Assessment Transect 2



Sage Grouse Habitat Assessment Transect 3



Sage Grouse Habitat Assessment Transect 4



Sage Grouse Habitat Assessment Transect 5



3.4 Riparian Data

The segment was evaluated for the proper functioning conditions of lotic riparian areas using BLM manual 1737-16. The segment was found to be functioning at risk with an upward trend in the most recent field assessment that was conducted during September 2011. The segment was stabilized by various sedges and rush plant species. There were also debris dams that were the result of naturally occurring bank erosion from bedrock outcrop areas. The area has been fenced to excluded grazing use from the floodplain and associated riparian area. The segment has steep slope sides and access from the north is difficult. The segment was rated at risk due to upstream diversions that are on private land and channel modifications that has altered the natural flow in Kirby Creek below the diversion structure that have limited the potential. Kirby Creek throughout has numerous head cuts that have been identified and mapped in 2010, the system has been prone historically to vertical instability (PBS&J,2010).

Photo 1 Example of Rosgen Gc type channel in Kirby Creek -



3.5 Water Quality Data

Kirby Creek is listed by the Wyoming Department of Environmental Quality (DEQ) on the 2010 305 (b) annual report to the EPA (DEQ,2010) as threatened for exceedence of bacterial for supporting its designated primary contact recreational uses. According to the DEQ the section of Kirby Creek in the allotment is currently classified as a type 2C stream (**Table 9**). Class 2C waters are those waters, including their perennial tributaries and adjacent wetlands, known to support or having the potential to support only nongame fish populations or spawning and nursery areas at least seasonally. The threatened section Kirby Creek extends from the confluence with the Bighorn River upstream an undetermined distance above the confluence with Lake Creek (PBS&J, 2010 p.3.65). Bacterial monitoring was performed on several segments when flowing for full results refer to Hurley, 2003. Additional water quality sampling has been collected by the Hot Springs County Conservation district in order to reclassify Kirby Creek from a primary contact recreation to secondary contact recreation requirements; this use reclassification is pending DEQ approval. This data will likely provide the foundation for TMDL development in the Kirby Creek watershed. Other water quality information such as discharge permits and locations are found in the PBS&J watershed study (PBS&J, 2010).

Table 9: WY DEQ Use Designations

WY DEQ Use Designations										
Surface Water Classes	Drinking Water	Game Fish	Non-Game Fish	Fish Consumption	Other Aquatic Life	Recreation	Wildlife	Agriculture	Industry	Scenic Value
2AB	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
2C	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
3B	No	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes

3.6 Soil Site Stability and Upland Hydrology Data

Two rangeland health assessments were conducted in 2011. Standard 1 for Healthy Rangelands was evaluated based on the attribute ratings for *Soil and Site Stability* and *Hydrologic Function* using rangeland health indicators 1 through 11 and 14. The rangeland health assessment were compared to the Reference Sheet for the Loamy 10-14 inch precipitation zone (R032XY322WY) ecological site dated 5/1/2008 to determine departures from normal.

The 2005 assessment were conducted without the benefit of a NRCS reference sheet, as these were not available until 2008. For consistency, these assessments were also compared against the appropriate reference sheets to better determine departure from normal.

Assessment Site 1 (2011) (43.68412 – 107.98654 in south pasture)

This assessment location was on an eight percent slope. Rills were not observed at the assessment location however, they are occasionally present on steeper shale bedrock slopes. Water flow patterns are two to three feet long with little connectivity, terminating on terracettes. Small terracettes are generally less than one inch tall capture and slow runoff. One inch pedestals were observed under sagebrush. Transect data determined bare ground to be 22 percent; this is within that described in the reference sheet, which ranges bare ground from 10 to 30 percent. Litter cover expressed as “total canopy” was determined to be 21 percent; the reference sheet describes “total canopy litter” as ranging from 5 to 30 percent. Litter movement consisting of fine grasses was observed in waterflow channels on the leeward side of shrubs. No active gullies were observed. No wind-scour or blowout areas were observed. The soil stability index (SSI), an indicator of soil surface resistance to erosion is 4.9; the reference sheet places the average SSI at 3.0 or greater. Stability is further enhanced by biological soil crusts which account for seven percent of the surface cover. The small soil pit that was dug as part of the investigation revealed a two inch A horizon which could indicate historic soil loss.

Based on the observations discussed above the attribute rating for *Soil/ Site Stability* and *Hydrologic-Function* were rated as “slight to moderate”.

Assessment Site 2 (2011) (43.44969 – 107.59268) was located in the north pasture

This assessment location was on a 15 percent slope. Despite the steeper slopes, rills were not observed. Water flow patterns are short and stable (two to three feet) with little connectivity. The presence of terracettes and pedestals are within that expected on the slopes at the assessment location and common throughout the allotment. Terracettes are one to two inches tall. Pedestals are two to three inches tall occurring under sagebrush. Transect data determined bare ground to be 25 percent; this is within that described in the reference sheet, which ranges bare ground from 10 to 30 percent. Litter cover expressed as “total canopy” was determined to be 20 percent; the reference sheet describes “total canopy litter” as ranging from 5 to 30 percent. Minimal litter movement was observed, consisting only of fine grasses moving several inches within waterflow channels and accumulating on the leeward side of shrubs. No active gullies were observed. No wind-scour or blowout areas were observed. The soil stability index (SSI), an indicator of soil surface resistance to erosion is 4.5 well within that prescribed in the reference sheet. Stability is further enhanced by biological soil crusts which account for two percent of the surface cover. The small

soil pit that was dug as part of the investigation revealed a five inch A horizon. This would tend to indicate that there has been little historic soil loss; however, the location of the soil pit was in more of a depositional area.

Based on the observations discussed above the attribute rating for *Soil/ Site Stability* and *Hydrologic-Function* were rated as “slight to moderate”.

Assessment Site 1 (2005-1) (43.738790– 107. 98645) was located in the north pasture

This assessment location was on a 10 to 15 percent slope. Erosion indicators were more evident at this assessment location, due in part to steeper slopes, but to a larger extent, the saline upland ecological site and the prolonged drought were significant contributing factors. Rills were observed. Water flow patterns up to 10 feet in length were present. Pedestals, some approaching five inches in height were common. Pedestals were also observed beneath dead shrubs. Transect data determined bare ground to be 65 percent; this exceeds that described in the reference sheet, which ranges bare ground from 20 to 45 percent. Litter cover expressed was determined to be six percent; the reference sheet describes litter” as ranging from 10 to 30 percent. Minimal litter movement was observed but this could have been a reflection of the minimal litter cover. Two gullies were observed to either side of the transect location. Though they were small, nick points were noted in the gullies at slope breaks. Despite this observation, the gullies were well vegetated and appeared to be stable with little evidence that they were advancing into the uplands. No wind-scour or blowout areas were observed. The soil stability index (SSI), was not determined, instead soil stability was estimated by observing soil peds in a soil pH dish; using this method the soil surface was determine to be stable. There was no strong evidence of historic soil loss.

Based on the observations discussed above the attribute rating for *Soil/ Site Stability* and *Hydrologic-Function* were rated as “slight to moderate”.

Assessment Site 2 (2005) (43.69439 – 107.97898) was located in the south pasture

This assessment location was on a 12 percent slope. Despite the steeper slopes, rills were not observed and few water flow patterns were noted. Minor pedestalling was observed but tended to be restricted to the clayey ridge tops. Transect data determined bare ground to be 21 percent; this is within that described in the reference sheet, which ranges bare ground from 20 to 50 percent. Litter cover, consisting largely of cheatgrass and expressed as “total canopy” was determined to be 32 percent; the reference sheet describes “total canopy litter” as ranging from 20 and 30 percent. No litter movement was observed. There is no evidence of wind erosion, based on the absence of wind-scour or blowout areas. The soil stability index (SSI), was not determined, instead soil stability was estimated by observing soil peds in a soil pH dish. This method indicated the tendency of these soils to rapidly disperse in water. There was no strong evidence of historic soil loss.

Based on the observations discussed above the attribute rating for *Soil/ Site Stability* and *Hydrologic-Function* were rated as “slight to moderate”.

Assessment Site 3 (2005) (43.70155 – 107.95105) was located in the south pasture

Slopes at this assessment location were two to eight percent. Rills were not observed. Waterflow patterns were short and tended to be vegetated. Transect data determined bare ground to be 25 percent; this is within that described in the reference sheet, which ranges bare ground from 10 to 30 percent. Litter cover expressed as “total canopy” was determined to be 32 percent; the reference sheet describes ‘total canopy litter’ as ranging from 5 to 30 percent. There was some evidence of cheatgrass litter movement. There is no evidence of wind erosion, based on the absence of wind-scour or blowout areas. The soil stability index (SSI), was not determined, instead soil stability was estimated by observing soil peds in a soil pH dish; using this method the soil surface was determine to be stable. There was no strong evidence of historic soil loss.

Based on the observations discussed above the attribute rating for *Soil/ Site Stability* and *Hydrologic-Function* were rated as “none to slight”.

3.7 Upland Vegetation Biotic Integrity Data

Five assessments were conducted on the major ecological sites within the allotment. The majority of the allotment is well represented by the Loamy 10-14 inch precipitation ecological sites. In addition, a Shallow Clayey and Saline Upland 10 – 14 inch precipitation ecological site were also assessed.

The vegetative community, ground cover, and soil surface attributes for the assessment sites were noted, measured and compared to the Ecological Site Description (ESD) produced by the NRCS. This was to determine a rating to apply to the Biotic Integrity portion of the assessment through the use of the 17 indicators of rangeland health (Indicators 8, 9, and 11 through 17). This rating is dependent upon the assessment of the indicators and can vary from a “none to slight” to “extreme to total” deviation from the applicable ESD and corresponding reference sheet. The two 2011 assessments were rated as “Slight to Moderate”. Two of the 2005 assessments were rated as “None to Slight” while one was rated as “Slight to Moderate” for the biotic integrity.

2011 Assessments

The rangeland health assessment conducted at Assessments One and Two was compared to the Reference Sheet for the Loamy 10-14 inch precipitation zone (R032XY322WY) ecological site dated 5/1/2008 to determine departures from normal. According to the ecological site description, the Historic Climax Plant Community (HCPC) for this site is a **Bluebunch Wheatgrass/Rhizomatous Wheatgrass Plant Community**. Potential vegetation is about 75 percent grasses or grass-like plants, 10 percent forbs, and 15 percent woody plants. Moderate continuous season-long grazing or extended droughts will convert the plant community from HCPC to the **Perennial Grass/Big Sagebrush Plant Community**. This plant community is still dominated by cool-season grasses, while short warm-season grasses and miscellaneous forbs account for the balance of the understory. Wyoming big sagebrush would be a conspicuous part of the site. Soils are mostly stable and the surface shows minimum soil loss. The watershed is functioning and the biotic community is intact. Prescribed grazing or possible long-term prescribed grazing will convert this plant community to the HCPC. Frequent and severe grazing plus no fire, will convert the Perennial Grass/Big Sagebrush Plant Community to the **Big Sagebrush/Bare Ground Plant Community**. Frequent and severe grazing (yearlong grazing) plus wildfire or brush management will convert this plant community to a **Blue Grama Sod Plant Community**. Frequent and severe grazing on more saline soils will convert the plant community to the **Salt Tolerant Shrub/Bare Ground Plant Community**. The Salt Tolerant Shrub/Rhizomatous Wheatgrasses Plant Community can occur where the Salt Tolerant Shrub/Bare Ground Plant Community is rested and a prescribed grazing management practice is implemented.

States beyond the Perennial Grass/Big Sagebrush Plant Community are likely to have a biotic, soil, and hydrologic function that is at risk or not functioning. Herbaceous production will decline, the undesirable species increase as the desirable species decrease, and the ability to move towards HCPC becomes greatly diminished without mechanical treatments, reseeding efforts, soil remediation efforts, and intense grazing management.

Data

The data collected at Assessment One indicates that this site has characteristics of a **Perennial Grass/Big Sagebrush Plant Community** in the current State and Transition Models from the NRCS Ecological Site Descriptions. The attribute rating justification for this assessment was “Slight to Moderate.” The functional/structural groups closely match that expected for the site. The herbaceous component is mostly intact and the plant vigor and replacement capabilities are sufficient. The vegetation on this site includes mid-size cool season bunchgrasses such as bluebunch wheatgrass and needleandthreadgrass although these plants were somewhat reduced in dominance. The rhizomatous wheatgrasses, forbs, perennial shrubs, and short cool season bunchgrasses closely match that expected for the site. Of the vegetative hits encountered in the cover transect; grasses/grass-like plants accounted for approximately 29 percent, forbs 9 percent and woody species 29 percent. Biological crusts and lichens accounted for 33 percent. Cheatgrass was present primarily in disturbed areas. Plant mortality/decadence was none to slight. Total canopy litter was 21 percent with 5 to 30 percent expected. Bare ground was 22 percent with 10 to 30 percent expected.

The assessment site did not achieve the status of a Historic Climax Plant Community as the mid-size cool season bunchgrasses were somewhat reduced in dominance. In addition, Wyoming big sagebrush was greater than 15 percent.

Data

The data collected at Assessment Two indicates that this site also has characteristics of a **Perennial Grass/Big Sagebrush Plant Community**. The attribute rating justification for this assessment was “Slight to Moderate.” The functional/structural groups closely match that expected for the site. The herbaceous component is mostly intact and the plant vigor and replacement capabilities are sufficient. The vegetation on this site includes mid-size cool season bunchgrasses such as bluebunch wheatgrass, needle and thread, and Indian ricegrass although these plants were

somewhat reduced in dominance. The rhizomatous wheatgrasses closely matched that expected for the site. The perennial shrubs such as winterfat, Wyoming big sagebrush, and four-winged saltbush were somewhat reduced in dominance than what was expected. The perennial forbs and short cool season bunchgrasses were a sub-dominant component and should be a minor component. Of the vegetative hits encountered in the cover transect; grasses and grass-like plants accounted for approximately 50 percent, forbs 25 percent, woody species eight percent and biological crusts accounted for 17 percent of the transect. Cheatgrass was present primarily in disturbed areas. Plant mortality/decadence was none to slight. Total canopy litter was 20 percent with 5 to 30 percent expected. Bare ground was 25 percent with 10 to 30 percent expected.

The assessment site did not achieve the status of a Historic Climax Plant Community as the mid-size cool season bunchgrasses were somewhat reduced in dominance.

2005 Assessments

The rangeland health assessment conducted at Assessments One was compared to the Reference Sheet for a Saline Upland 10-14 inch precipitation zone (R032XY344WY) ecological site dated 5/1/2008 to determine departures from normal. According to the ecological site description, the Historic Climax Plant Community (HCPC) for this site is a **Gardner's saltbush/Indian ricegrass/Bottlebrush Squirreltail Plant Community**. Potential vegetation is about 50 percent grasses or grass-like plants, 10 percent forbs, and 40 percent woody plants. Moderate, continuous season-long grazing or will convert the plant community from HCPC to the **Gardner's Saltbush/Rhizomatous Wheatgrasses Plant Community**. This plant community is still dominated by cool-season grasses, while short warm-season grasses, annual cool-season grass, and miscellaneous forbs account for the balance of the understory. Wyoming big sagebrush would be a conspicuous part of the site. Soils are mostly stable and the surface shows minimum soil loss. The watershed is functioning and the biotic community is intact. Prescribed grazing or possible long-term prescribed grazing may return this plant community to the HCPC. Frequent and severe grazing on less sodic soils will convert this plant community to a **Mixed Shrub/Blue Grama Sod Plant Community**. Frequent and severe grazing on more sodic soils will convert this plant community to **Gardner's Saltbush/Bare Ground Community**.

States beyond the **Gardner's Saltbush/Rhizomatous Wheatgrasses Plant Community** are likely to have a biotic, soil, and hydrologic function that is at risk or not functioning. Herbaceous production will decline, the undesirable species increase as the desirable species decrease, and the ability to move towards HCPC becomes greatly diminished without mechanical treatments, reseeding efforts, soil remediation efforts, and intense grazing management.

Data

The data collected at Assessment One indicates that this site has characteristics of a **Gardner's Saltbush/Rhizomatous Wheatgrasses Plant Community**. The attribute rating justification for this assessment was "None to Slight". The functional/structural groups closely match that expected for the site. The herbaceous component is mostly intact and the plant vigor and replacement capabilities are sufficient. Gardner's saltbush and rhizomatous wheatgrasses were components of this plant community along with bluebunch wheatgrass, needle and thread, and Sandberg bluegrass.

There was very little cheatgrass observed at the assessment site and surrounding area. There was light plant mortality/decadence possibly due to past drought conditions. Litter at six percent was slightly less than the expected 10 to 30 percent relative to site potential and weather. Bare ground at 65 percent was greater than the expected 20 to 45 percent.

This area does not fall into the historic plant community due primarily to the lack of Bottlebrush squirreltail and Indian ricegrass.

The rangeland health assessment conducted at Assessment Two was compared to the Reference Sheet for a Shallow Clayey 10 – 14 inch precipitation zone (R032XY358WY) ecological site dated 5/2/2008 to determine departures from normal. According to the ecological description, the Historic Climax Plant Community (HCPC) for this site is **Bluebunch Wheatgrass/Indian Ricegrass Plant Community**. Potential vegetation is about 75 percent grasses or grass-like plants, 10 percent forbs, and 15 percent woody species.

Moderate, continuous season-long grazing or drought will convert the plant community from HCPC to the **Perennial Grass/Mixed Sagebrush Plant Community**. This plant community is still dominated by cool-season grasses, while short warm-season grasses and miscellaneous forbs account for the balance of the understory. A variety of shrubs is now a conspicuous part of the overall production. Soils are mostly stable and the surface shows minimum soil loss. The watershed is functioning and the biotic community is intact. Prescribed grazing or possible long-term prescribed grazing will convert plant community to the HCPC. Frequent and severe grazing plus no fire on more saline soils will convert the plant community to the **Salt Tolerant Shrub/Bare Ground Plant Community**. Frequent and severe grazing (yearlong grazing) plus no fire on less saline soils, will convert the plant community to the **Mixed Sagebrush/Bare Ground Plant Community**.

Data

The plant community at this site has characteristics of a **Perennial Grass/Mixed Sagebrush Plant Community**. The attribute rating justification for this assessment was “Slight to Moderate”. The cool season bunchgrasses at this site were determined to be a moderate departure from the reference site. A good variety of forbs were noted but the departure was due to the number of functional/structural groups moderately reduced and replaced by cheatgrass. Cheatgrass was found to be present in primarily disturbed areas within the site. The plant mortality and decadence matched that expected for the site with some mortality on sagebrush, likely due to the past drought. Litter was slightly greater at 32 percent with 20 – 30 percent expected. Bare ground was 21 percent, with 20-50% expected. .

The rangeland health assessment conducted at Assessment Three was compared to the Reference Sheet for a Loamy 10 – 14 inch precipitation zone ecological site (R032XY322WY). The plant community at this site has characteristics of a **Perennial Grass/Big Sagebrush Plant Community**. The attribute rating justification for this assessment was “None to Slight”. The cool season bunchgrasses at this site were determined to be a slight to moderate departure from the reference site. The functional/structural groups were considered slightly reduced due to the cheatgrass which was determined to be scattered throughout the site. The plant mortality and decadence matched that expected for the site with some mortality on sagebrush, likely due to the past drought. Litter was a little greater than expected at 32 percent with 5 to 30 percent expected. Bare ground was 25 percent with 10 – 30 percent expected.

The majority of the noxious weeds in the Kirby Creek Allotment occur along the roads, drainages and near reservoirs. Scattered populations exist of Canada thistle, field bindweed, saltcedar and Russian knapweed. Other invasive species in the area include curly dock, Swainsonpea, and cheatgrass/common brome. This allotment lies within the Kirby Creek Weed Management Area and is intensively managed and monitored for noxious and invasive weed species using a cooperative, integrated pest management strategy. Hot Springs County Weed and Pest District personnel treated noxious weeds within the allotment in the summer of 2011. Cheatgrass occurs across the allotment in varying abundances. It ranges from that expected, to scattered throughout the allotment.

In three of the five assessments invasive plants (cheatgrass) was present primarily in disturbed areas. One assessment noted that invasive plants were scattered throughout and one indicated that the invasive plants matched that expected for the site. Cheatgrass is scattered to common along many of the drainages, sheep bedgrounds, and terraces adjacent to Kirby Creek. The picture below shows an example of the cheatgrass (reddish brown vegetation in the background) in the sheep bedgrounds in the north pasture.



These sites are seldom cheatgrass monocultures as they often have functional/structural groups that are slightly to moderately reduced. They contain plant species such as western wheatgrass, needle and thread, and blue bunch wheatgrass but in reduced quantities. Often the sheep bedgrounds do not contain many shrubs and the drainages may or may not have shrubs.

4.0 CONCLUSIONS

This section draws conclusions and makes determinations regarding:

- Progress towards or attainment of the standards for rangeland health, and
- Whether livestock management is in conformance with the guidelines, and
- Whether existing grazing management or levels of grazing use are significant factors in failing to achieve the standards or conform to the guidelines.

4.1 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 surface runoff. **MET***

Rationale:

This standard is being met in the Kirby Creek Allotment. Water is being adequately retained on the landscape and the soils are stable and capable of supporting healthy plant communities. Runoff characteristics are in keeping with the arid nature of the climatic setting and plant communities.

Soil-site stability and hydrologic function are closely tied to the adequacy of vegetative cover and type. Commonly used erosion and sediment yield equations all depend upon accurate assessments of soil cover for making good estimates. Vegetative cover is the one factor that a land manager can control most directly. Slopes, climates, soil physical features, and soil textures are little affected by management changes. Vegetation and litter cover, and conversely, the amount of bare ground throughout the Kirby Creek allotment are within the parameters set forth in the reference sheets.

The primary upland erosion indicators (rills, water flow patterns, the presence of pedestals and terracettes) are well within the range described in reference sheets for the appropriate ecological sites. Where observed, rills are restricted to naturally occurring bare areas. The formation of water flow patterns is directly linked to slope, becoming more observable on slopes greater than eight percent. Excessive waterflow patterns and the presence of

pedestals and terracettes were only observed on a saline upland ecological site in 2005, following several years of drought where slopes were in excess of 10 percent. Gullies were found to be stable with little evidence that they were advancing into the uplands. Several locations revealed a thin A horizon. This is due in part to the desert environment in which the soils formed but could also be indicative of historic soil loss.

All indications are that the soils are stable and capable of supporting healthy plant communities. Water is being retained on the landscape and runoff is being minimized. Throughout the allotment, the soil structure, and vegetation and litter cover are adequate to protect the soil from rain drop impact and the erosive forces of overland flow.

4.2 Standard 2

*Riparian and wetland vegetation has structural, age and species diversity characteristic of the state of channel succession and is resilient and capable of recovering from natural and human disturbance in order to provide forage and cover, capture sediment, dissipate energy, and provide ground water recharge. **NOT MET***

Rationale:

The riparian segment along Kirby Creek (P0519X) was rated to be functioning at risk with an upward trend. There has been a documented improvement about the state of channel succession that is currently occurring along sections of Kirby Creek. Although the segment has an upward trend, more time is still required for the natural succession to occur to develop the riparian characteristics necessary to meet the standard as outlined above. The segment is excluded from grazing use and has the channel characteristics and traits that are capable of meeting the standard as outlined above with additional time to improve. There is sufficient vegetation and bank stability along the creek to provide sufficient energy dissipation from high flows in this reach; however other reaches outside of the allotment are in a historic degraded state of channel succession. The channel geometry also is favorable with access to the floodplain and vegetation to buffer energy from high flows along p0519X. Although the segment is at risk, the trend was rated as improving as evidenced from observed change from 1997 through 2011. With the current grazing management and fence protection this segment will likely have continued improvement and move to a proper functioning condition rating and meet the standard.

4.3 Standard 3

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

Rationale:

This standard is being met in the Kirby Creek Allotment. The assessment sites are represented by Loamy, Saline Upland, and Shallow Clayey 10 – 14 inch precipitation zone ecological sites. Rangeland health indicators 8, 9, and 11 through 17 were found to be within the normal range of variability expected for all assessment sites. The Biotic Integrity for three of the assessment sites were rated as a “None to Slight” departure from the Reference Sheet while two of the assessment sites were rated as a “Slight to Moderate” departure.

This qualitative analysis of the allotment shows that the rating variance of the indicators (vegetative cover, plant composition, diversity and vigor, bare ground and litter, and erosion) are appropriate for the ecological sites found on the allotment. All indications are that the soils are stable (see Standard 1) and are capable of supporting healthy vegetation. The condition of the habitat evaluated on this allotment and the variety of species recorded utilizing it indicate that it is providing wildlife forage and cover needs, and that it is capable of sustaining viable populations and a diversity of native plant and animal species appropriate to this habitat (see standard 4). Overall, the biotic community is stable, intact, and well adapted to grazing.

None of the assessment sites have crossed a threshold to a state where treatments are required to improve the plant community toward a preferred state. These sites are in a dynamic equilibrium with the Historic Climax Plant Community for these sites. This means that at this time these sites have appropriate pathways available to them to respond to proper grazing strategies, favorable environmental conditions, and environmental events such as wildfires. This situation lends further credence to the current plant communities being “resilient, diverse, and able to recover from natural and human disturbance”. Currently permitted grazing use would allow this to occur.

4.4 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 species, endangered species, species of special concern, or sensitive species will be maintained or enhanced. MET

Rationale:

Five separate habitat assessment transects representing the allotment were conducted during the growing season of 2011 to determine and record the canopy cover, brush height, and vegetation components of the wildlife habitat on the allotment. Live sage brush canopy cover was determined to range from 8 to 23 per cent over the entire allotment. Sage brush height averaged approximately 11 inches. Belt transect surveys determined the mature sage brush component to range from 50 to 90 per cent over the allotment, indicating an abundance of mature sage brush growth appropriate for this habitat and annual precipitation zone.

Wildlife species observed during monitoring and transects were mule deer, antelope, cottontail rabbit, horned toad, western meadowlark, and numerous grassland passerines.

The condition of the habitat evaluated on this allotment and the variety of species recorded utilizing it indicate that it is providing wildlife forage and cover needs, and that it is capable of sustaining viable populations and a diversity of native plant and animal species appropriate to this habitat.

Ute ladies'-tresses (*Spiranthes diluvialis*) is the only USFWS endangered plant species known to potentially exist in the Big Horn Basin. However, the species has not been actually found in the basin. There is potential habitat along Kirby Creek. If a plant is found, consultation with the USFWS would be initiated and necessary mitigation implemented.

4.5 Standard 5

Water quality meets State standards. NOT MET

Rationale:

Wyoming's water quality laws are administered by the Wyoming Department of Environmental Quality (DEQ), Water Quality Division (WQD). The water quality is administered by the DEQ Non-Point Source program that oversees section 303d of the federal Clean Water Act. The DEQ publishes an annual 305 (b) using assessment methodology to determine surface water quality standards and associated uses of different waters as approved by the US Environmental Protection Agency.

Kirby Creek is listed by the DEQ on the 2010 305 (b) annual report to the EPA Integrated State Water Quality Assessment Report (DEQ,2010) as threatened for exceedence of bacterial for supporting its designated primary contact recreational uses. The "threatened" section of Kirby Creek extends from the confluence with the Big Horn River upstream an undetermined distance above the confluence with Lake Creek (WDEQ 2010). The TMDL for fecal coliform impairment listings in Kirby Creek will be developed using Wyoming's recently adopted numeric water quality standards for *E. coli*. According to the DEQ Wyoming Use Classification list the section of Kirby Creek in the allotment is currently classified as a type 2C stream (Table 10). Class 2C waters are those waters, including their perennial tributaries and adjacent wetlands, known to support or having the potential to support only nongame fish populations or spawning and nursery areas at least seasonally. Monitoring efforts completed by the Hot Springs County Conservation District will aide in the development of potential water quality improvement.

Potential management impacts to water quality from rangelands as outlined in (Binkley, 1993) such as: excessive livestock waste production, resource extraction, stream channel modification, bank erosion from floods, erosion following wildfires, or erosion from overgrazing are elements to consider as possible non-point source impacts to water quality. Note that a Use Attainability Analysis (UAA) for Kirby Creek has recently been completed to reclassify Kirby Creek from primary to secondary contact recreation use. The Wyoming DEQ recently posted a public notice for this proposed change. This reclassification may influence how TMDLs are completed in the Kirby Creek watershed.

Resource extraction of bentonite mining activities, that potentially impact water quality, does occur in the sub-watershed. The amount impact to Kirby Creek has not been determined by the state. Stream channel modification activities in lower sections of the watershed likely have impacted water quality in the form of historic down cutting and erosion. Bank erosion and vertical instability of the creek has impacted water quality throughout the watershed. Historic over-grazing in the watershed has also likely affected water quality, but current upland hydrologic indicators in the allotment are within acceptable limits.

The upland conditions indicated none to slight and a slight to moderate departure for rangeland health standards that is likely sufficient to avoid detrimental impacts to the water quality of storm water runoff following storm events. Continued cooperation with all watershed land owners to improve water quality is essential for water quality improvement.

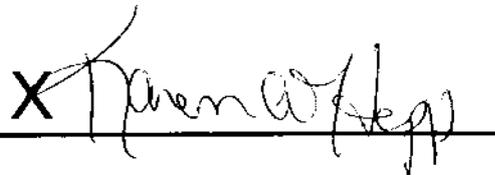
4.6 Standard 6

Air quality meets State standards. UNKNOWN

Rationale:

No information is currently available to indicate that this standard is or is not being met. An air quality monitoring station was recently established in the Bighorn Basin, but no data is available at this time. Until specific data becomes available, the determination for this standard is unknown, per direction from the BLM Wyoming State Office.

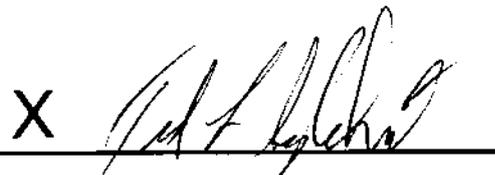
5.0 Resource Specialist Signatures

X 

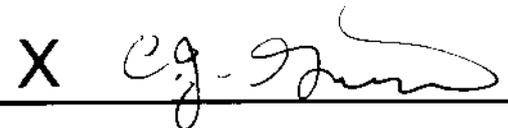
Rangeland Management Specialist

X 

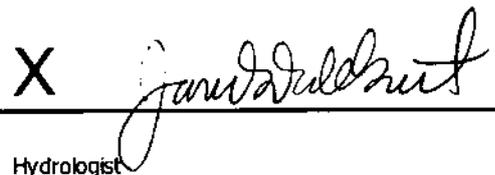
Supervisory Rangeland Management Specialist

X 

Wildlife Biologist

X 

Natural Resource Specialist, Weed Coordinator

X 

Hydrologist

X 

Assistant Field Manager, Resources

X Stephanie [Signature]

Natural Resource Specialist, Soils

X _____

Other _____

6.0 DETERMINATION

Based on information provided in this assessment, I have determined that standards 1, 3 and 4 are being met, standards 2 and 5 are not being met, and standard 6 is unknown.

as f X Rebecca A. Good [Signature]
Rebecca A. Good
Field Manager, Worland Field Office

DATE 5/24/2013

7.0 Factors related to nonconformance with standards:

Kirby Creek is listed by the DEQ on the 2010 305 (b) annual report to the EPA Integrated State Water Quality Assessment Report (DEQ,2010) as threatened for exceedence of bacterial for supporting its designated primary contact recreational uses.

8.0 Selected guidelines to implement change in grazing management:

The current grazing management practices in this allotment are meeting Guideline VI that states, *grazing management practices and range improvements will adequately protect vegetative cover and physical conditions and maintain, restore, or enhance water quality to meet resource objectives.* Fencing projects and other watershed development projects that implement Best Management Grazing Practices, throughout the entire watershed should likely have an effect on improving water quality of Kirby Creek in the future.

The riparian standard was not met due to historic alteration of the channel and associated vertical instability of the system. The public land riparian protection segment has been fenced for riparian protection. Kirby Creek also has numerous head cuts throughout the channel and have been identified and studied previously. Consideration for potential check dams or other structures to restore the natural channel geometry should be considered for all land owners. There has been a project for channel restoration completed on state land upstream that has had success in restoring the riparian area of Kirby Creek to healthy conditions.

Monitoring efforts completed by the Hot Springs County Conservation District will aid in the development of potential water quality improvement.

9.0 REFERENCES

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Wyoming Geographic Information Science Center (WYGISC). 1998. Draft estimated net annual aquifer recharge for Wyoming at 1:100,000. Laramie, WY.