

Bureau of Land Management

WIND RIVER/BIGHORN BASIN DISTRICT
Worland Field Office

Murdoch Allotment #17741

**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

Worland Field Office, Wind River/Bighorn Basin District, Wyoming



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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TABLE OF CONTENTS

1.0 INTRODUCTION	4
1.1 STANDARDS	4
2.0 AFFECTED ENVIRONMENT – ALLOTMENT DESCRIPTION, RESOURCE VALUES, AND USES... 5	5
2.1 LOCATION AND LAND OWNERSHIP	5
2.2 CLIMATE/AIR QUALITY	5
2.3 SOILS	6
2.4 HYDROLOGY/RIPARIAN	7
2.5 UPLAND VEGETATION	8
2.6 INVASIVE SPECIES	8
2.7 LIVESTOCK GRAZING MANAGEMENT	8
2.8 WILDLIFE	8
2.9 THREATENED, ENDANGERED, CANDIDATE, OR SENSITIVE SPECIES	9
3.0 SUMMARY OF MONITORING DATA / ASSESSMENTS..... 9	9
3.1 MONITORING DATA	9
3.2 SOILS AND SITE STABILITY	11
3.3 HYDROLOGY	11
3.4 UPLAND VEGETATION	12
3.5 WILDLIFE HABITAT	15
4.0 CONCLUSIONS..... 16	16
4.1 STANDARD 1	16
4.2 STANDARD 2	17
4.3 STANDARD 3	17
4.4 STANDARD 4	17
4.5 STANDARD 5	18
4.6 STANDARD 6	18
4.7 GUIDELINES FOR LIVESTOCK GRAZING MANAGEMENT	19
5.0 RESOURCE SPECIALIST SIGNATURES 20	20
6.0 DETERMINATION..... 21	21
7.0 FACTORS RELATED TO NONCONFORMANCE WITH STANDARDS 21	21
8.0 REFERENCES 21	21
APPENDIX 22	22
MAP 1: ALLOTMENT MAP (NOT TO SCALE).....	22
MAP 2: SOILS, ECOLOGICAL SITES, AND ASSESSMENT SITES	23
MAP 3: HYDROLOGIC GROUP B, C AND HYDROLOGIC GROUP D SOILS %	24
MAP 4: HYDROLOGY/RIPARIAN/WATERSHED (NOT TO SCALE)	25
MAP 5: HYDROGEOLOGY MAP	26
MAP 6: WILDLIFE HABITAT RESOURCES	27
MAP 7: UPLAND VEGETATION STANDARD CONFORMANCE (STANDARD 3).....	28

1.0 Introduction

The Bureau of Land Management (BLM) grazing regulations at 43 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 Murdoch Allotment No. 17741. The results of this assessment are presented in this report. This assessment will serve to inform the 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 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.
- 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 Murdoch Allotment (**Map 1**) is located approximately nine miles west of Embar, Wyoming. The elevation of the allotment is approximately 6500 feet above sea level. The allotment encompasses approximately 510 total acres including 420 public acres and 90 private land acres.

2.2 Climate/Air Quality

Annual precipitation for the Murdoch Allotment ranges from 10-14 inches per year. The normal precipitation pattern peaks the latter part of May and a secondary peak may occur 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 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	

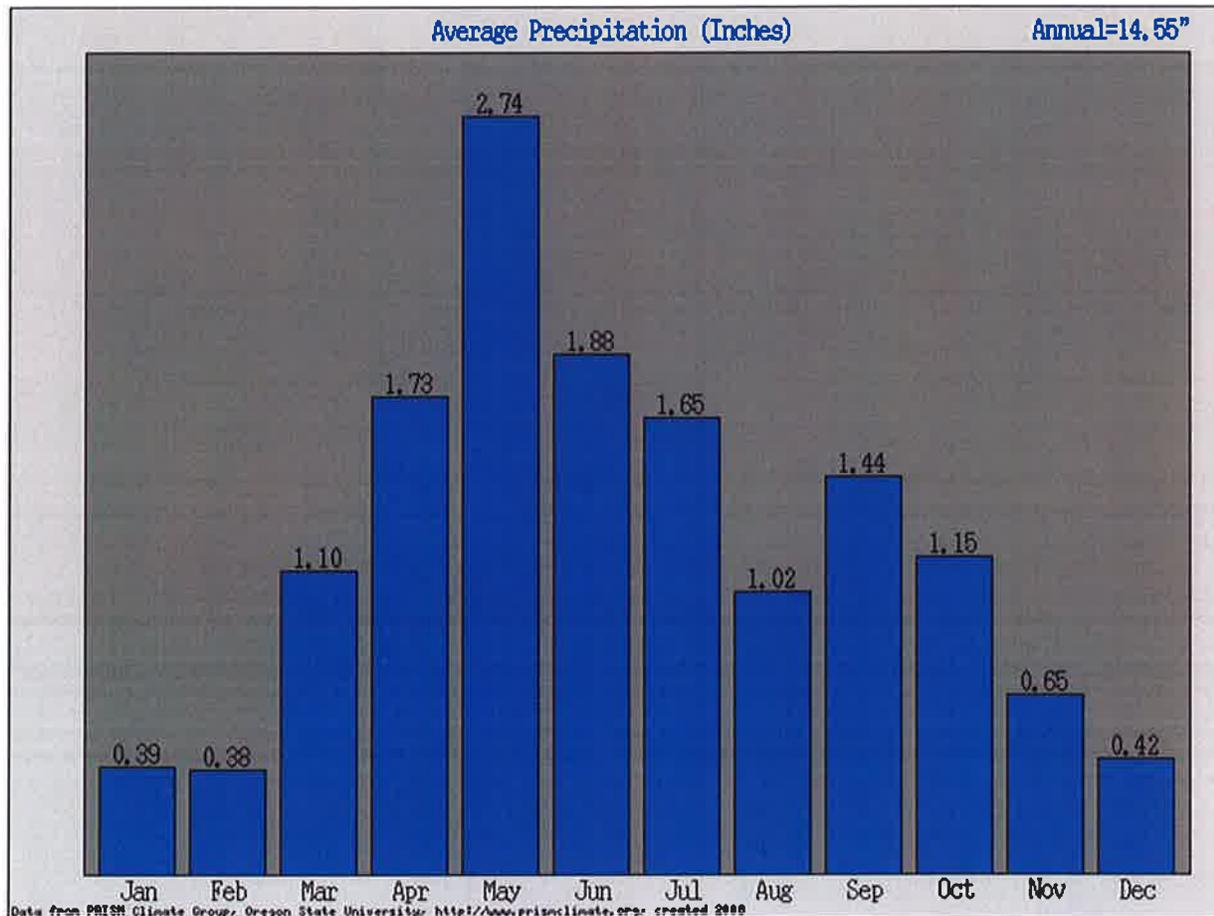
Mean annual precipitation: 12.35 inches

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 “Grass Creek 1E”, “Thermopolis”, “Thermopolis 25NW”, “Buffalo Bill Dam” and “Black Mountain”, (Information taken from the United States Department of Agriculture (USDA) NRCS Technical Guide Section IIE Rev. 05/23/08).

Precipitation

Precipitation in the area has average 10.76 inches over the last 37 years (1978 – 2014) according to the O. B. Reservoir Rain Gauge. There is an additional site specific climate source using the PRISM climate model for T.43N. R.100W. Section 9 that is estimated to be the center of the allotment (PRISM, 2008). The overall average is 14.55 inches with the monthly precipitation amount displayed in the graph below.



2.3 Soils

The Murdoch Allotment is situated within the 10-14 inch Big Horn Basin Precipitation zone. Based on the soil survey data for Hot Springs County, the dominant ecological sites found in the allotment are shown on **Map 2** and listed below:

Shallow Loamy 10 – 14 inch precipitation zone R032XY362WY
 Loamy 10-14 inch precipitation zone R032XY322WY

Assessment 1 was located on Map Unit 723, Blazon-Delphil Loams on a Shallow Loamy ecological site. The soils are shallow (less than 20 inches to bedrock) well-drained soils formed in alluvium over residuum or in residuum. These soils have moderately slow to moderate permeability and may occur on all slopes. The bedrock may be any kind which is virtually impenetrable to plant roots, except igneous. The surface soil will have one or more of the following textures; very fine sandy loam, loam, silt loam, sandy clay loam, silty clay loam, and clay loam. The soil characteristics having the most influence on the plant community are the shallow depth, and potential for elevated quantities of soluble salts. The surface texture was a sandy clay loam with a moderate depth. The A horizon was three inches in depth and the B horizon was three to five inches. There was a slight surface effervescence in the A horizon and a strong surface effervescence in the B horizon. The pH was not noted.

A review of the Loamy ecological sites included Map Unit 736, Forelle-Pinelli Loams. These soils are very deep to moderately deep (greater than 20 inches to bedrock); moderately well to well-drained and moderately slow to moderate permeable. The soil characteristic having the most influence on the plant community is the available moisture and the potential to develop soluble salts near the surface.

Using the weighted average of the soil map units, the dominant soil hydrologic groups found in the allotment are approximately half are B type soils with moderate infiltration and the other half are type D soils with very low amounts of infiltration (**Map 3**).

2.4 Hydrology/Riparian

2.4.1 Surface Water/Watershed

The Murdoch allotment falls entirely within the Owl Creek USGS (level #5) watershed. The allotment contains the middle reaches of the foothills of the Lower North Fork of Owl Creek sub-watershed (level #6) in Owl Creek. The allotment consists of only 1.5 % of the total area of the sub-watershed (**Map 4** and the table below).

Sub-Watershed Name (HU12)	HUC 12	Acres	(mi)	Allot Acres	Allot mi ²	% of Acres of Sub-watershed in the allotment
Lower North Fork Owl Creek	1008000702	34435	53.8	504	0.8	1.5

There is a portion of Rattlesnake Creek located in southeast quarter of section 9, that is naturally ephemeral however; it receives flow through sub-irrigation that occurs on private land above the segment. In addition there are two unnamed ephemeral drainages on the southern portion of the allotment that confluence with Rattlesnake Creek one mile downstream and into the North Fork of Owl Creek several miles east of the allotment. These drainages originate from volcanic and other sandstone outcrops and trend in an eastern direction in the allotment. There are no reservoirs on public land in the allotment.

2.4.2 Groundwater

The area is within a complex geological transition with volcanic aquifers and Quaternary unconsolidated surface layers present that are capable of storing water. Due to the small size of the allotment there are no springs or water wells that have been developed, (**Map 5**).

2.4.3 Water Quality (Surface)

The nearest downstream connected drainage is Rattlesnake Creek and also the lower North Fork of Owl Creek. The flow regime of the drainages in the allotment is an ephemeral flow using the definition of flow being present in the channel less than 30 days per year on average, with the water table permanently below the surface (Hedman, 1983). The Rattlesnake Creek is a tributary to the North Fork of Owl Creek which is classified by the Wyoming DEQ as a 2C type stream (DEQ, 2001). This use classification supports the beneficial uses as outlined in the table below:

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

2.4.4 Riparian

There is a small segment of Rattlesnake Creek that receives intermittent flow during portions of the year. There is flow in the channel due infiltration from irrigation of pastures located above the segment on private land. This segment has a minor component of herbaceous riparian vegetation as a result. There are no shrubs or tree canopy present. The length of the segment is approximately .20 miles with a width of 10 feet for an estimated total of 0.5 acres.

2.5 Upland Vegetation

The vegetation in the allotment consists of cool-season perennial grasses. Other significant vegetation includes winterfat, big sagebrush, and a variety of forbs. Vegetation in the allotment is variable and dependent upon the range site.

Assessment 1 was conducted on a Shallow Loamy 10-14 inch ecological site. The native plant species identified during the assessment (N43° 41.912' – W108° 50.920') included bluebunch wheatgrass, needleandthread, muttongrass, western wheatgrass, sandberg bluegrass, green needlegrass, prairie junegrass, threadleaf sedge, phlox, plains pricklypear cactus, scarlet globemallow, American vetch, Bessey's locoweed, yellow violet, Wyoming big sagebrush, winterfat, bud sagebrush, lichens and biological crusts.

A review of the vegetation on the Loamy 10-14 inch ecological site found it similar to the vegetation on the Shallow Loamy site although the functional/structural groups were slightly modified. The expected plant species of bluebunch wheatgrass, needleandthread, Indian ricegrass, and rhizomatous wheatgrass still exist, but are reduced in frequency. Sandberg bluegrass, prairie junegrass, and threadleaf sedge have increased in frequency. Phlox, plains pricklypear cactus, scarlet globemallow, fringed sagewort, daisy, American vetch, Wyoming big sagebrush, and lichens were observed throughout the area.

2.6 Invasive Species

There have been no weed inventories conducted on the allotment. Field pennycress, an annual weed in the mustard family was observed along the county maintained road in the northern area of the allotment.

2.7 Livestock Grazing Management

The Murdoch Allotment was formerly the Anchor pasture of the Three Peaks Anchor Allotment #00661. The grazing authorization for the allotment did not separate out the large pasture (Three Peaks) and the small pasture (Anchor). As a result, historical grazing information is not available. There have been no authorized livestock in the allotment for approximately ten years.

2.8 Wildlife

The Murdoch allotment provides habitat for several big game species, as well as other non-game and special status wildlife species throughout the year. Topographically the majority of the allotment is open

and flat to rolling with a few knobs and shallow ephemeral drainages, with the dominant vegetation being the sagebrush/bunchgrass community. The entire allotment is mapped as crucial winter range for mule deer. Antelope are also common, and smaller numbers of both mule deer and antelope inhabit the allotment yearlong. There are numerous other species like coyote, cottontail rabbit, white-tail jackrabbit, badger, bobcat, and a variety of passerines, raptors, small mammals and predator species that inhabit this allotment throughout the year.

2.9 Threatened, Endangered, Candidate, or Sensitive Species

The sagebrush/bunchgrass communities mentioned above, in addition to providing big game winter and yearlong range, are likely providing seasonal sage-grouse habitats as well as breeding, nesting and foraging habitat for sagebrush obligate passerine species like the sage thrasher, sage and Brewer's sparrow. The entire allotment is within Core sage-grouse habitat, and along the northwestern portion of the allotment a sage-grouse winter concentration area has been identified here and north into the neighboring allotments. The closest occupied leks are .9 miles north and 2.3 miles southwest, but none have been identified within this allotment. Both sage-grouse wintering and breeding habitats have been documented through inventory and monitoring efforts. Nesting and late brood rearing habitats have not been well documented, however in an analysis of sage-grouse studies conducted in seven areas in Wyoming since the mid-1990s, Holloran and Anderson (2005) found that 45% of nests were located within 2 miles (3km) of the lek where the hen was bred, and 64% of the nests were within 3 mile (5 km) of the lek. Therefore, female sage-grouse from the two neighboring occupied leks are likely using suitable sagebrush habitats within this allotment for nesting habitat. Male sage-grouse lek attendance, as well as the peak and low male counts for these leks is provided in the Section 3.5 A single sage-grouse habitat assessment transect was conducted within representative sage-grouse habitat in the south central portion of this allotment, (Map 6). Data from this assessment is summarized in Section 3.5.

There are no known threatened or endangered wildlife species within this allotment, but the sage-grouse listed as a Candidate species. The sage thrasher, sage and Brewer's sparrow, are all Wyoming BLM sensitive species. There are several other raptor and migratory bird species inhabiting these allotments, at least seasonally, that were not mentioned.

3.0 Summary of Monitoring Data / Assessments

3.1 Monitoring Data

During the summer of 2014, one vegetation assessment site was selected in the allotment as part of the Rangeland Health Assessment process. Ecological site, soil type, vegetative community, topography, location of water sources, and livestock grazing history are some of the factors that were considered in the selection of this assessment site.

A Rangeland Health Assessment was conducted at Assessment 1 by an interdisciplinary team using the 17 Indicators of Rangeland Health as described in BLM Technical Reference 1734-6. Field observations were compared to the Reference Sheet for the Shallow Loamy 10 – 14 inch precipitation zone (R032XY362WY) to determine departures from normal. A review of the Loamy range sites in the allotment found that the indicators on these sites were similar to the Shallow Loamy range sites. The soils in the allotment are made up of largely loams resulting in an equal expression of both Shallow Loamy and Loamy range site characteristics. Individual ratings to the Rangeland Health Indicators on both the Shallow Loamy and Loamy range sites are displayed in the table below:

Assessment 1 - Soil /Hydrologic/Biotic Integrity Ratings

Indicator	Assessment 1
1. Rills	N-S
2. Water-flow patterns	N-S
3. Pedestals and/or terracettes	S-M
4. Bare ground	N-S
5. Gullies	S-M
6. Wind-scoured, blowouts, and/or deposition areas	N-S
7. Litter movement	N-S
8. Soil surface resistance to erosion	N-S
9. Soil surface loss or degradation	N-S
10. Plant community composition and distribution relative to infiltration	S-M
11. Compaction layer	N-S
12. Functional / structural groups	S-M
13. Plant mortality / decadence	N-S
14. Litter amount	N-S
15. Annual production	N-S
16. Invasive plants	S-M
17. Reproductive capability of perennial plants	N-S
Indicator Summary	Assessment 1
Soil / Site Stability (<i>Indicators 1-9, 11</i>)	N-S
Hydrologic Function (<i>Indicators 1-5, 8-11, 14</i>)	N-S
Biotic Integrity (<i>Indicators 8-9, 11-17</i>)	S-M
N-S None to Slight S-M Slight to Moderate M Moderate M-E Moderate to Extreme E-T Extreme to Total	

A line intercept cover transect was completed at Assessment 1. A summary of the cover data collected is shown in the table below:

Monitoring Site	Ecological Site	Basal Vegetative Cover	Litter	Bare Ground	Brte presence ((hits/transect pts)*100)
Transect 1	Shallow Loamy	21%	16%	20%	0%

Cheatgrass presence is derived from total “hits” on cheatgrass, canopy or basal, throughout the transect. It is a representation of the amount times the plant was encountered along a transect in relation to the amount of points observed on the transect.

3.2 Soils and Site Stability

Data collected for the Rangeland Health Assessment was used to evaluate soil and site stability on the allotment. Standard 1 for Healthy Rangelands is 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 conducted in the allotment was compared to the Reference Sheet for the Shallow Loamy 10-14 inch precipitation zone (R032XY362WY) ecological site dated 5/23/2008 to determine departures from normal.

Assessment 1

Rill formation and water flow patterns were not observed. Pedestals and/or terracettes were easily identified on the Threadleaf sedge patches on the water flow patterns. Transect data determined bare ground to be 20 percent (15 – 45 percent expected) and litter cover to be 16 percent (10 – 25 percent expected). Gullies were slight to moderate. No wind scoured or blow-out areas were observed. No litter movement was observed. The soil stability index (SSI), an indicator of the soil surface resistance to erosion, was 3.0 with a greater than or equal to 3 expected. Coverage of biological soil crusts was 16%. When the Soil Surface Integrity (SSI) is combined with vegetation, litter, and soil crust cover, the soil is reasonably stable and possesses a limited resistance to rain drop impact and to the erosive force of overland flow. No soil compaction was observed.

Based on the observations made at the monitoring sites, the attribute ratings for *Soil and Site Stability* and *Hydrologic Function* were rated as “None to Slight”.

3.3 Hydrology

3.3.1 Surface Water

The hydrologic and soil rangeland health indicators as outlined and discussed in the table above were assessed to determine current conditions in the allotment related to runoff and soil water retention. The overall rating from the site is found in the table in section 3.1 above. Assessment 1 in the allotment had an overall rating of none to slight for the hydrologic indicators.

Generally in areas where a moderate or greater departure was referenced for soil or hydrologic function, these areas are not currently meeting standards. Therefore, the current ground and cover conditions are supporting the soils definition for meeting standard 1.

3.3.2 Ground Water

There are no wells or springs in the allotment. Any potential groundwater recharge would occur in where the Frontier Aquifer is present and from infiltration along drainages. Currently, there is no demand for additional groundwater in the allotment.

3.3.3 Water Quality (Surface)

There is no BLM or other DEQ water quality data for this allotment. The drainages are upland ephemeral drainages of Owl Creek.

The following was taken from the Wyoming 2012 semi-annual 305b report p.27. The most recent 2014 report is currently in draft. The majority of the assessment by the DEQ applies to lower segments of Owl Creek, however it appears the North Fork of Owl Creek is currently supporting the class 2C beneficial uses as described in section 2.4.3.

“In Owl Creek, sodium and sulfates, together with silt and clay, naturally affect water quality (Ogle, 1992). In 1995, AML reclaimed a historic sulfur mine which had been affecting water quality in the Owl Creek watershed. Owl Creek was listed in 2002 as threatened for not supporting its contact recreation use based on fecal bacteria data from WDEQ and USGS. Hot Springs Conservation District (HSCD) has sponsored the formation of the Owl Creek Watershed Planning Committee and has been monitoring E. coli levels in the creek. The committee finalized a watershed plan in 2006 and is implementing several BMPs as part of the plan (WACD, 2007).” TMDLs are anticipated in July 2012 for the bacterial listings on Owl Creek.

3.3.4 Riparian

The riparian segment located in the southeast quarter of section 9 was evaluated to be an intermittent type herbaceous riparian area along a segment of Rattlesnake Creek. This area is supplied by a ground water source that likely originates as a result of irrigation of pastures above the segment on private land. The area consists of only 0.5 acres; however it does appear to be stable and functioning at potential for an intermittent segment with limited flow. There are no noticeable head cuts, bare banks, or excessive erosion present in the segment. The area appears to be meeting the standard 2 as outlined in section 4.2.

3.4 Upland Vegetation

Data from the line intercept cover transect, the 17 Indicators of Rangeland Health, and other field observations were used to evaluate the vegetative community on the allotment. Standard 3 for Healthy Rangelands is evaluated based on the attribute ratings for Biotic Integrity using rangeland health indicators 8 through 9, and 11 through 17.

The vegetative community, ground cover, and soil surface attributes for Assessment 1 was noted, measured and compared to the ecological site description (ESD) and corresponding reference sheet (Shallow Loamy 10-14 inch precipitation zone (R032XY362WY) ecological site - 5/23/2008).

The Historic Climax Plant Community (HCPC) for this ecological site is a Bluebunch wheatgrass/Needleandthread plant community. This community would be dominated by cool season grasses (75%) followed by a nearly even balance of forbs (10%) and woody plants (15%). With moderate continuous season long grazing or extended droughts a transition from HCPC to a Perennial Grass/Mixed Shrub Plant Community may occur. This state is dominated by cool season grasses but short warm season grasses and various forbs are present and shrubs would be a conspicuous part of the site. This state has a hydrologic, soil, and biotic community that is stable and intact. From this state, with frequent and severe grazing and lack of fire, it can be converted to a Mixed Shrub/Bare Ground Plant Community and eventually a Blue grama sod plant community. More saline sites will convert to a Salt Tolerant

Shrub/Bare Ground Plant Community. A Salt Tolerant Shrub/Rhizomatous plant community can occur where prescribed grazing is implemented in the Salt Tolerant Shrub/Bare Ground Plant Community. States beyond the Perennial grass/Mixed Shrub 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 is diminished without mechanical treatments, reseeding efforts, soil remediation efforts, and intense grazing management.

The data collected at Assessment 1 indicates that this site has characteristics of a **Perennial Grass/Mixed Shrub Plant Community**. The attribute rating justification for the Biotic Integrity at this assessment was "Slight to Moderate." The functional/structural groups were slightly reduced. The cool season midstature grasses and rhizomatous wheatgrasses were slightly reduced. Bluebunch wheatgrass, green needlegrass, western wheatgrass, and needleandthreadgrass were all present in the transect area. The cool season short stature grasses and grass like plants such as sandberg bluegrass, prairie junegrass, threadleaf sedge, and mutton bluegrass were slightly more dominant than the mid-stature grasses. The forbs were what was expected for the site. While big sagebrush dominated the over-story there was also the presence of winter fat and bud sagebrush. There was good plant diversity with all the expected grass species present.

Biological crusts and lichens were common in the area making up 15 percent of the basal cover in the transect. Plant mortality/decadence was considered none to slight. The percent litter was 16% which was what was expected (10-25%) for the site. The vegetation did produce an annual herbaceous understory that displayed a vigor representative of the amount of spring precipitation (April, May, and June) received 65% of average for the area. Total precipitation was 11.40 inches or 106% of average. This resulted in a slightly higher annual production expected for the site, (BLM O.B. Reservoir Rain Gauge). No invasive species were observed at the assessment site. The reproductive capability was what was expected for the site. Bare ground was 20 percent with 15 – 45 percent expected.



A review of the Loamy ecological range sites in the allotment found that the indicators on these sites were similar to the Shallow Loamy range sites. The soils in the allotment are made up of largely loams resulting in an equal expression of both Shallow Loamy and Loamy range site characteristics. The

functional/structural groups reflected the characteristics of a **Perennial grass/Big Sagebrush Plant Community**. The Historic Climax Plant Community (HCPC) for this ecological site is a Bluebunch wheatgrass/Rhizomatous Wheatgrass Plant Community. This community is dominated by cool season grasses (75%) followed by a nearly even balance of forbs (10%) and woody plants (15%). With moderate continuous season long grazing or extended droughts a transition from HCPC to a Perennial Grass/Big Sagebrush Plant Community may occur. This state is still dominated by cool season grasses but short warm season grasses and various forbs are present and Wyoming big sagebrush would be a conspicuous part of the site. This state has a hydrologic, soil, and biotic community that is stable and intact. From this state, with frequent and severe grazing and lack of fire, it can be converted to a Big Sagebrush/Bare Ground Plant Community and eventually a Blue Grama Sod Plant Community. More saline sites will convert to a Salt Tolerant Shrub/Bare Ground Plant Community. A Salt Tolerant Shrub/Rhizomatous plant community can occur where prescribed grazing is implemented in the Salt Tolerant Shrub/Bare Ground Plant Community.

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 is diminished without mechanical treatments, reseeding efforts, soil remediation efforts, and intense grazing

The native plant species observed on the Loamy 10-14 inch ecological site have been slightly modified. The expected plant species of bluebunch wheatgrass, needleandthread, Indian ricegrass, and rhizomatous wheatgrass still exist, but are reduced in frequency. Sandberg bluegrass, prairie junegrass, and threadleaf sedge have increased in frequency. Phlox, plains pricklypear cactus, scarlet globe mallow, fringed sagewort, daisy, American vetch, Wyoming big sagebrush, and lichens were observed throughout the area.



3.5 Wildlife Habitat

Below is the Sage-grouse Habitat Assessment transect data and transect photo, located within representative sage-grouse habitat in this allotment, (**Map 6**). This transect was run during the growing season of 2014, to determine and record the sagebrush canopy cover, shrub height, shrub age diversity and composition, and all other vegetation cover class composition and height.

Sage-grouse Habitat Assessment Transect for the Murdoch Allotment 6/ 20/2014

Line Intercept Canopy Cover		
Murdoch Allotment Transect (Core Area)		
Shrub Species		
Live Big Sagebrush	15	
Dead Big Sagebrush	1.7	
Other SPP: (Fringe sage)		
Other SPP: (Shadscale)		
Other SPP: (R Rabbit B)		
Shrub Height (inches)		
Live Big Sagebrush	16	
Other SPP: (Fringe sage)		
Other SPP: (Shadscale)		
Other SPP: (R Rabbit B)		
Belt Transect		
Species		
Big Sagebrush		
%Young	14	
%Mature	69	
%Decadent	14	
%Dead	3	
Daubenmire Cover Class & Vegetation Height Data		
Summary of Vegetation Height (inches)		
New Herbaceous Mean Height	7.8	
Residual Herbaceous Mean Height	2.5	
Summary Cover Class %		
New Perennial Grass	24	
New Annual Herbaceous	1.5	
Perennial Forb	0	
Residual Herbaceous	1.2	
Other	60	
Browse Utilization		
Species		
ATTR	Moderate	

Murdoch Allotment sage-grouse habitat assessment transect 1



4.0 Conclusions

This section draws conclusions and makes determinations regarding:

- A. Progress towards or attainment of the standards for rangeland health, and
- B. Whether livestock management is in conformance with the guidelines, and
- C. 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:

The overall rating for the soils was a none to slight departure from reference conditions. There were no signs of excessive soil loss, erosion, degradation, in the interspaces and underneath plant canopies. The soils are currently supporting their respective ecological sites given the land form and geology of the allotment. Runoff does not appear to be excessive and proper infiltration for plant growth as defined above is occurring.

Land Health Reporting Categories	Acres
Public Land Achieving Standard 1	420
Public Land Not Achieving Standard 1	0
Public Land where Land Health Standard 1 Does Not Apply or unevaluated	0
Total Public Land Acres	420

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 APPLICABLE

Rationale:

The riparian area consists of a 0.2 mile reach of Rattlesnake Creek. The riparian area encompasses approximately 0.5 acres of lentic wetland. There is sufficient herbaceous riparian and wetland vegetation structure, age, and diversity to meet the standard as explained above. There does not appear to be excessive erosion and the system appears to be in stable functioning condition.

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:

Based on the assessment of the data collected as well as observations throughout the allotment, the following table summarizes the number of public acres that were determined to meet Standards and the number of acres that no determination was made. This table is also visually represented by **Map 7** in the Appendix. As described in the monitoring section, Assessment 1 represents the Shallow Loamy 10-14 inch ecological site and the Loamy 10-14 inch ecological site.

Murdoch Allotment#17741

Ecological Site	Ecological State	Standard 3	Acres
Shallow Loamy 10-14"	Perennial Grass/Mixed Shrub Plant Community	MET	123.0
Loamy 10-14"	Perennial Grass/Big Sagebrush Plant Community	MET	297.0
Rock Outcrop 10-14"	None		0.0
TOTAL PUBLIC ACRES			420.0

As it pertains to the acres that did meet the standard, these sites are in a dynamic equilibrium with the Historic Climax Plant Community. 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 disturbances. The sites have a vegetative community that is stable, intact, resistant to change, and provides for soil and watershed stability.

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:

Two assessment site locations were chosen in the allotment for monitoring and evaluation purposes. One transect primarily for sage-grouse habitat assessment, and the one to measure soil and vegetative parameters for evaluating the 17 Indicators of Rangeland Health. The sage-grouse habitat assessment monitoring transect location was in the south central portion of the allotment where wintering sage-grouse have occasionally been observed. This transect was intentionally located in representative sage-grouse

habitat in the allotment with gentle topography and larger continuous sagebrush communities (see Sage-Grouse Habitat Assessment Transect Photo and Wildlife Resources Map for transect location). The other monitoring location where the 17 Indicators of Rangeland Health were assessed is more representative of the allotment in general. Sagebrush canopy cover measured at sage-grouse habitat assessment transect was 15%. Some level of sage-grouse wintering, nesting and early brood rearing could be occurring, primarily because these habitats were found to be suitable here, and this allotment is within proximity, .9 and 2.3 miles from known occupied leks (Rattlesnake Creek and Middle Fork Owl Creek leks). Sagebrush canopy cover within sagebrush stands used for nesting generally ranges from 15 to 25%, and winter habitat is generally defined as sagebrush stands with 10-30% canopy cover (Connelly et al. 2000a).

As was mentioned above in the rationale for Standard 3, the assessment sites; Shallow Loamy 10-14" and Loamy 10-14", were found to be in a Perennial Grass/Mixed Shrub Plant Community and Perennial Grass/Big Sagebrush Plant Community, respectfully. These communities still retain appropriate pathways available to them to respond to favorable environmental conditions, and environmental disturbances. These communities are stable, intact, resistant to change, and provides for soil and watershed stability. The Biotic Attribute of Rangeland Health for these sites was rated at None to Slight or Slight to Moderate, and these sites maintain enough diversity and dominance by desirable perennial grasses to return to their HCPC. They provide for a diversity of plant species including an overstory of sagebrush and understory of bunchgrasses and forbs, and in turn provide for the diversity of wildlife habitat needs like cover, forage and nesting habitats. Most importantly these vegetation communities provide a diversity of native plant species that in turn provide for a diversity of animal species, of which all are appropriate to the habitat, and therefore do meet Standard 4.

4.5 Standard 5

Water quality meets State standards. UNKNOWN

Rationale:

The drainages in consideration of this standard are Rattlesnake Creek and other ephemeral drainages to the North Fork of Owl Creek. According to the (DEQ, 2001) this drainage is classified as 2c.

Class 2C streams are those surface waters known to support game warm water fish populations or spawning and nursery areas at least seasonally. Such waters are additionally protected for nongame fish, fish consumption, aquatic life other than fish, primary contact recreation, wildlife, industry, agriculture, and scenic value (DEQ, 2001).

There is no information currently available to indicate that this Standard is or is not being met. It can be concluded however that the soils and runoff conditions are appropriate for the allotment and lower amounts of sediment would be delivered from runoff in the allotment. Other management impacts that would have a potential to impair water quality such as excessive roads, mining, wildfire are not present in this allotment.

Therefore as per BLM state office policy, compliance with Wyoming State Water Quality Standards is unknown.

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 monitoring 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.

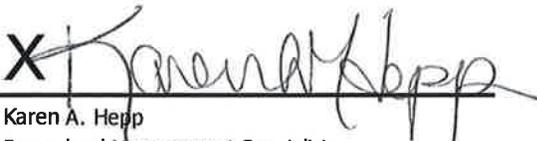
4.7 Guidelines for Livestock Grazing Management

*Guidelines provide for, and guide the development and implementation of, reasonable, responsible, and cost-effective management practices at the grazing allotment and watershed level. These management practices will either maintain existing desirable conditions or move rangelands toward statewide standards within reasonable timeframes. Appropriate guidelines will ensure that the resultant management practices reflect the potential for the watershed, consider other uses and natural influences, and balance resource goals with social, cultural/historic, and economic opportunities to sustain viable local communities. **NOT APPLICABLE***

Rationale:

The Murdoch Allotment was created out of the former Three Peaks-Anchor Allotment. No livestock grazing has been authorized on this public land for approximately 10 years.

5.0 Resource Specialist Signatures

X 
Karen A. Hepp
Rangeland Management Specialist

X 
John Elliott
Supervisory Rangeland Management Specialist

X 
Tim Stephens
Wildlife Biologist

X 
Jared Dalebout
Hydrologist

X 
Michael J. Phillips
Assistant Field Manager - Resources

6.0 Determination

Based on the information provided in this assessment, *I have determined that standards one, three, and four are being met. Standard two is not applicable, and standards five and six are unknown.*

X  **X** MAY 22 2015
Rebecca Good DATE
Worland Field Manager

7.0 Factors Related To Nonconformance with Standards

8.0 References

Connelly, J. W., M. A. Schroeder, A. R. Sands, and C. E. Braun. 2000a. Guidelines for management of sage grouse populations and habitats. Wildlife Society Bulletin 28:967-985.

Holloran, M.J, and S.H. Anderson. 2005. Spatial distribution of Greater Sage-Grouse nests in relatively contiguous sagebrush habitats. Condor 107:742-752.

WYDEQ, 2001. Wyoming Surface Water Classification List June 2001. Wyoming Department Environmental Quality. p A.15.

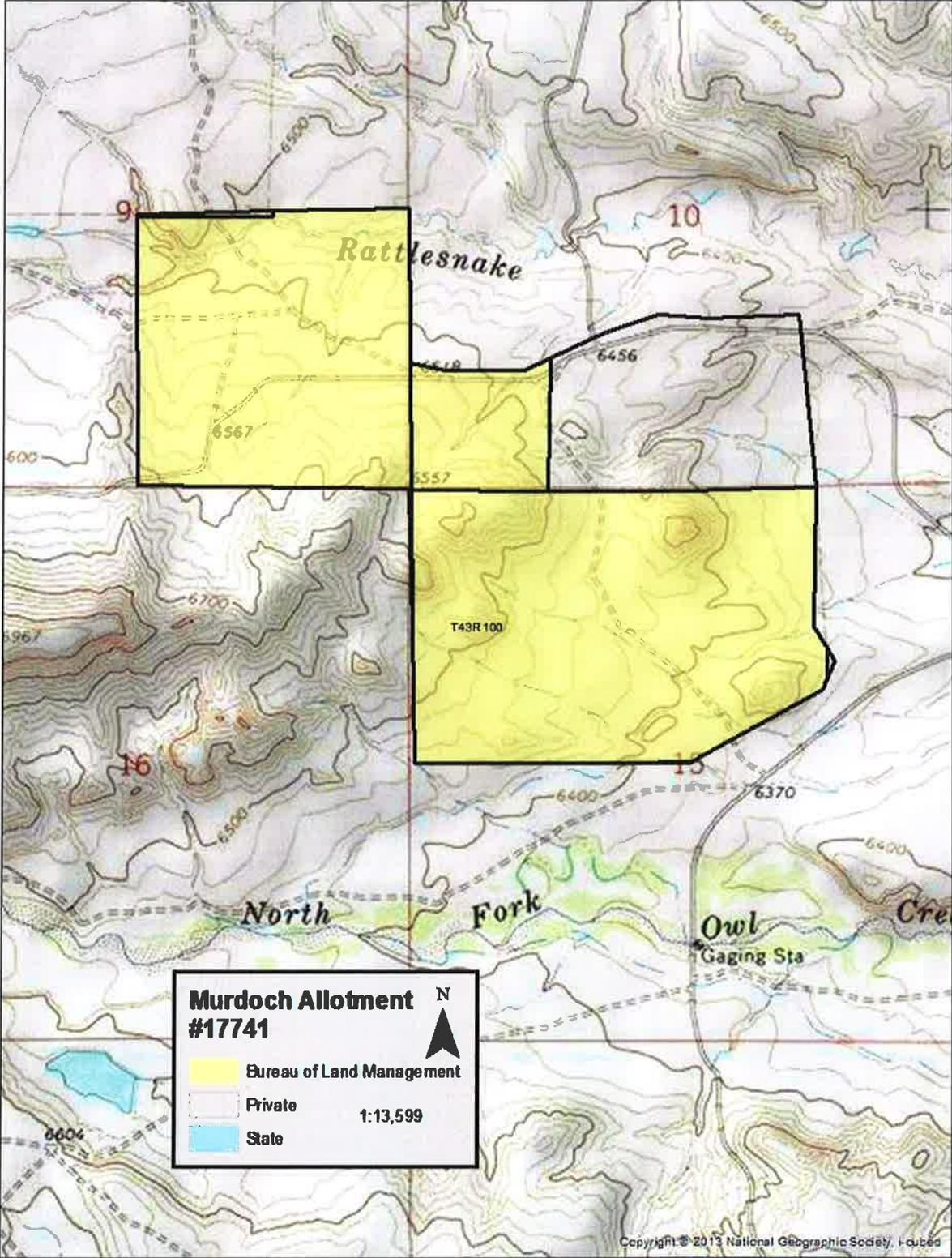
WYDEQ, 2012. Wyoming Water Quality Assessment and Impaired Waters List 2012 Integrated 305(B) and 303 (d) Report Wyoming Department of Environmental Quality. p 28.
Wyoming DEQ 2012 305b Report

U.S. Department of Agriculture, Natural Resources Conservation Service. 2008. Ecological Site Description System. Site ID: R032XY322WY, R032XY362WY, Available on the web at:
<http://esis.sc.egov.usda.gov/Welcome/pgReportLocation.aspx?type=ESD>

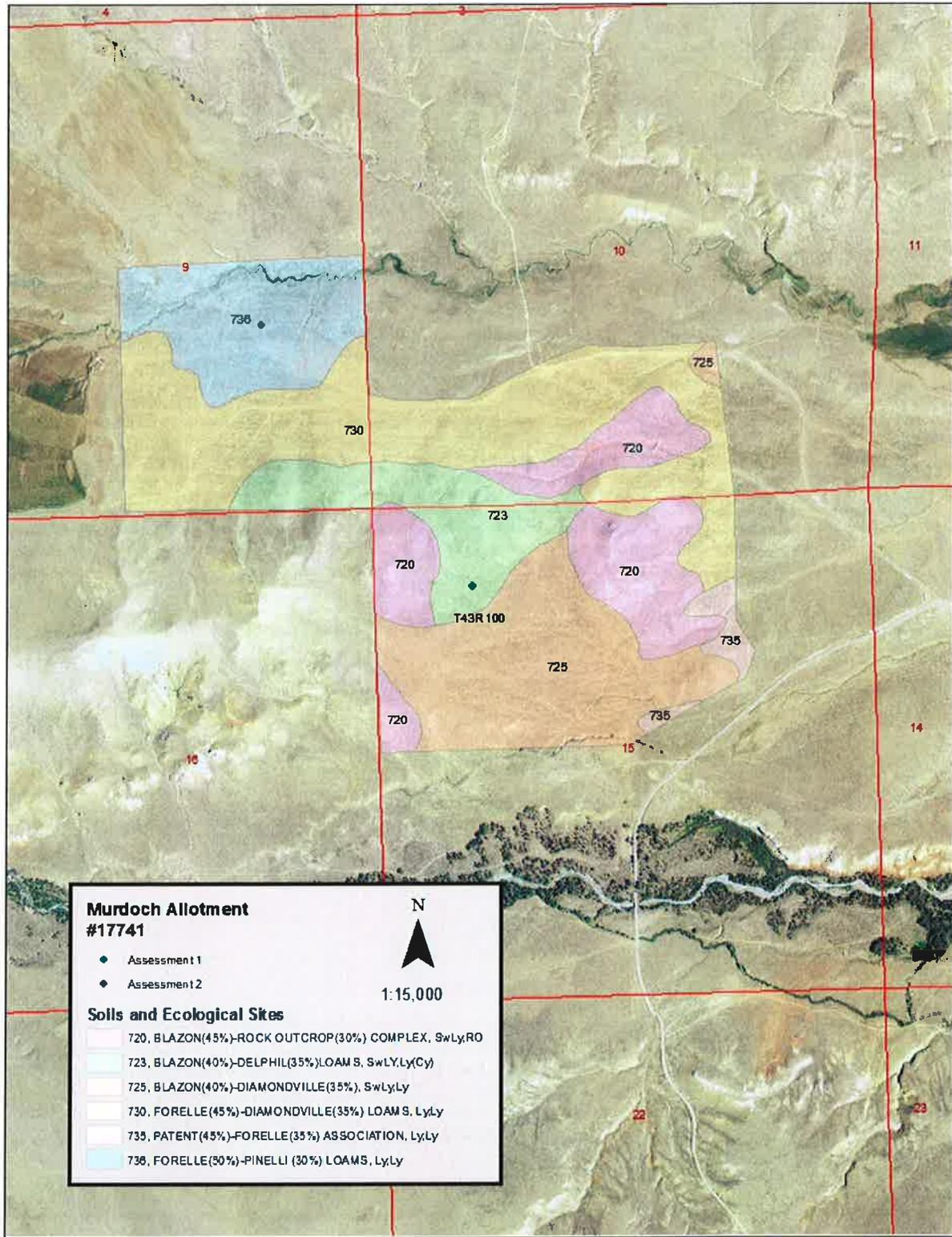
Pellant, M., P. Shaver, D.A. Pyke, and J.E. Herrick. 2005. Interpreting indicators of rangeland health, version 4. Technical Reference 1734-6. U.S. Department of the Interior, Bureau of Land Management, National Science and Technology Center, Denver, CO. BLM/WO/ST-00/001+1734/REV05.

U.S. Department of the Interior, Bureau of Land Management, Wyoming State Office. 1997. 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.

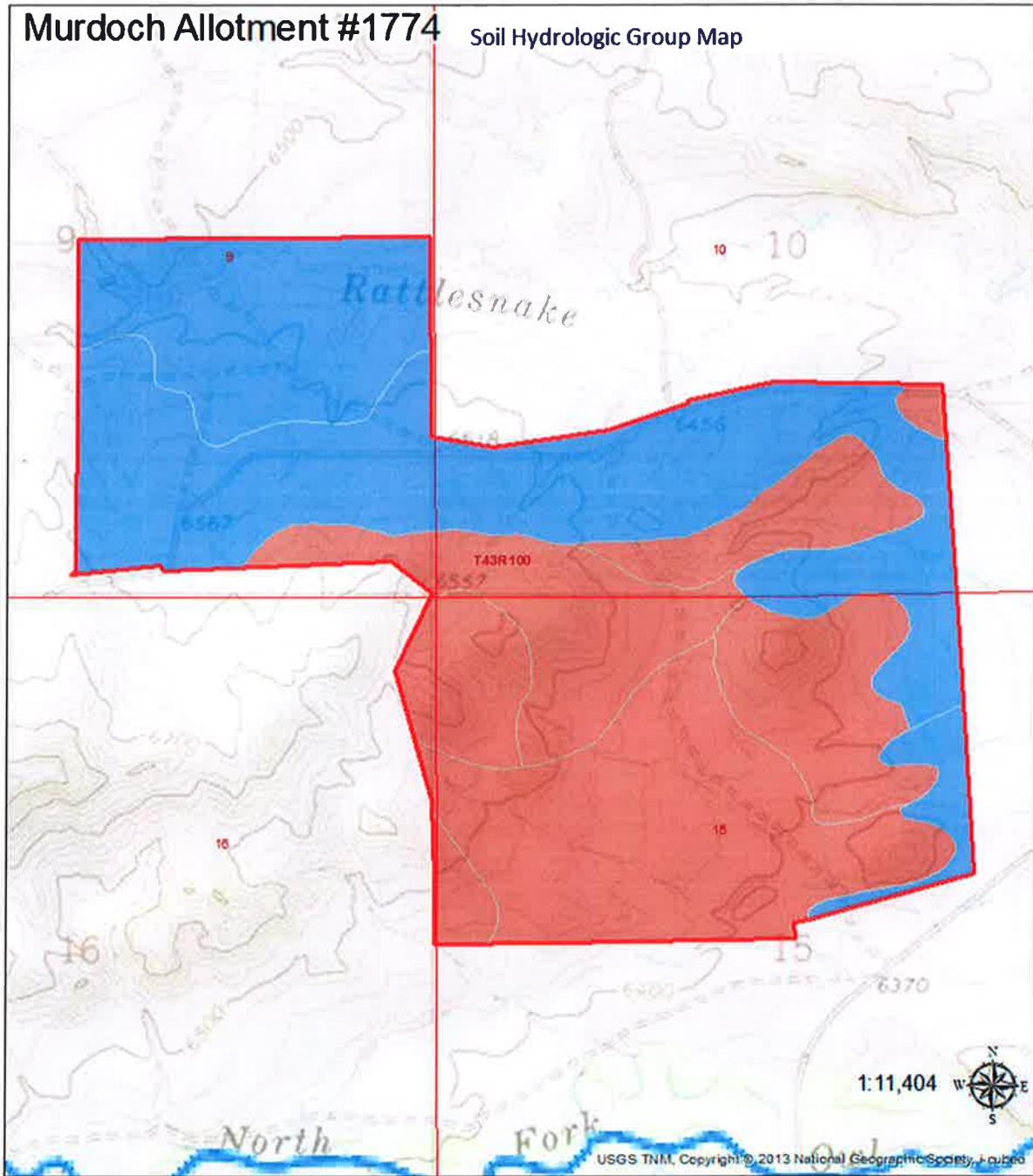
Appendix
Map 1: Allotment Map (Not to Scale)



Map 2: Soils, Ecological Sites, and Assessment Sites



Map 3: Hydrologic Group B, C and Hydrologic Group D soils %



 Murdoch Allotment Boundary

Hydrologic

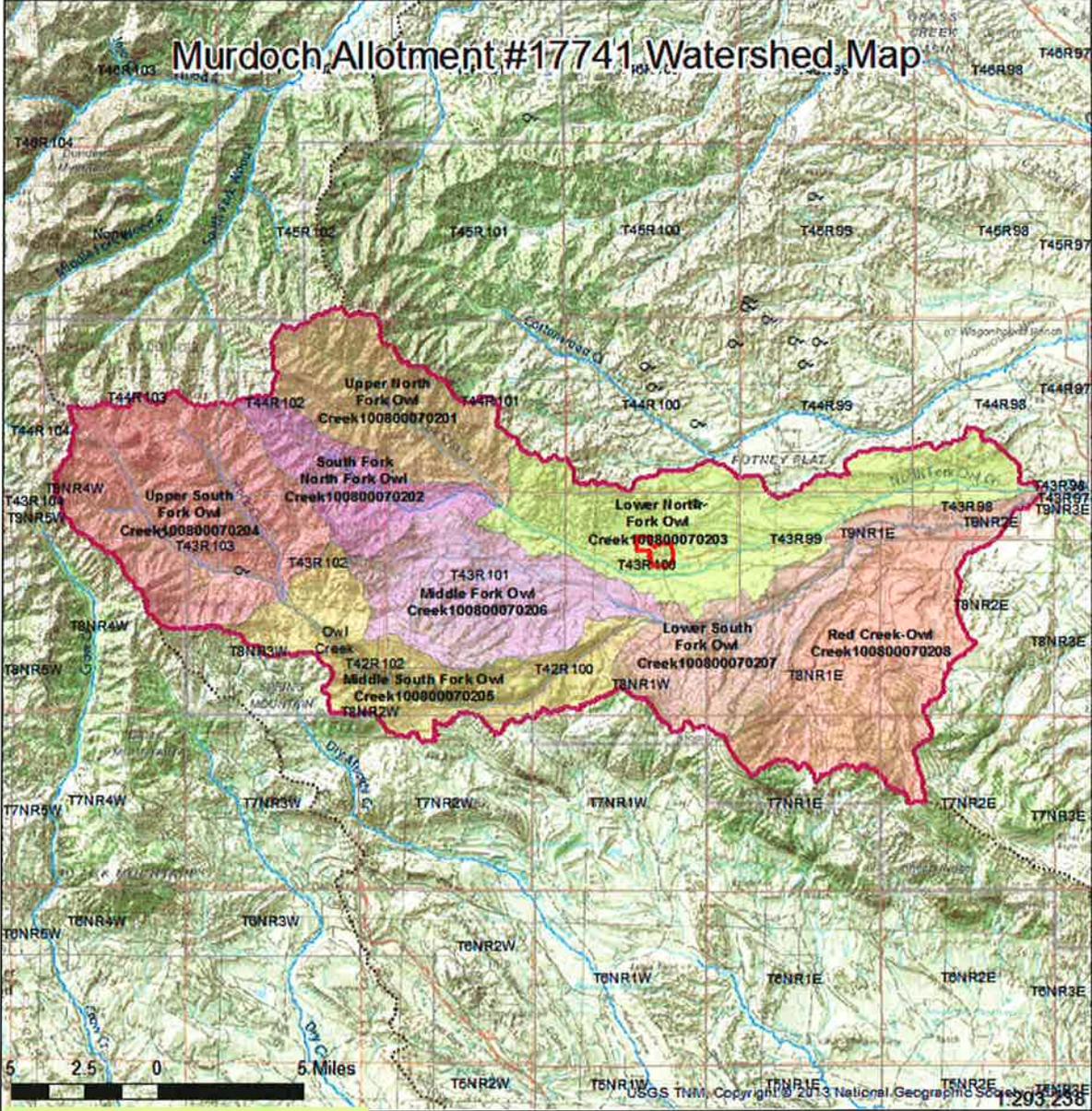
 B-Type

 D-Rock Outcrop

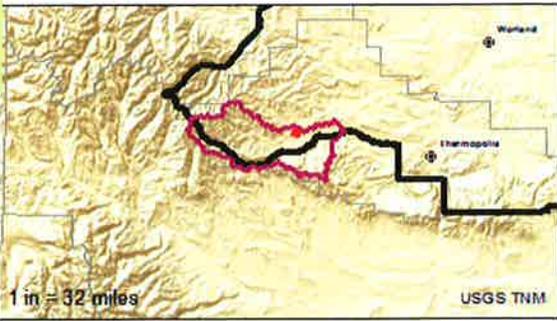
0.15 0.075 0 0.15 Miles



Map 4: Hydrology/Riparian/Watershed (Not to Scale)

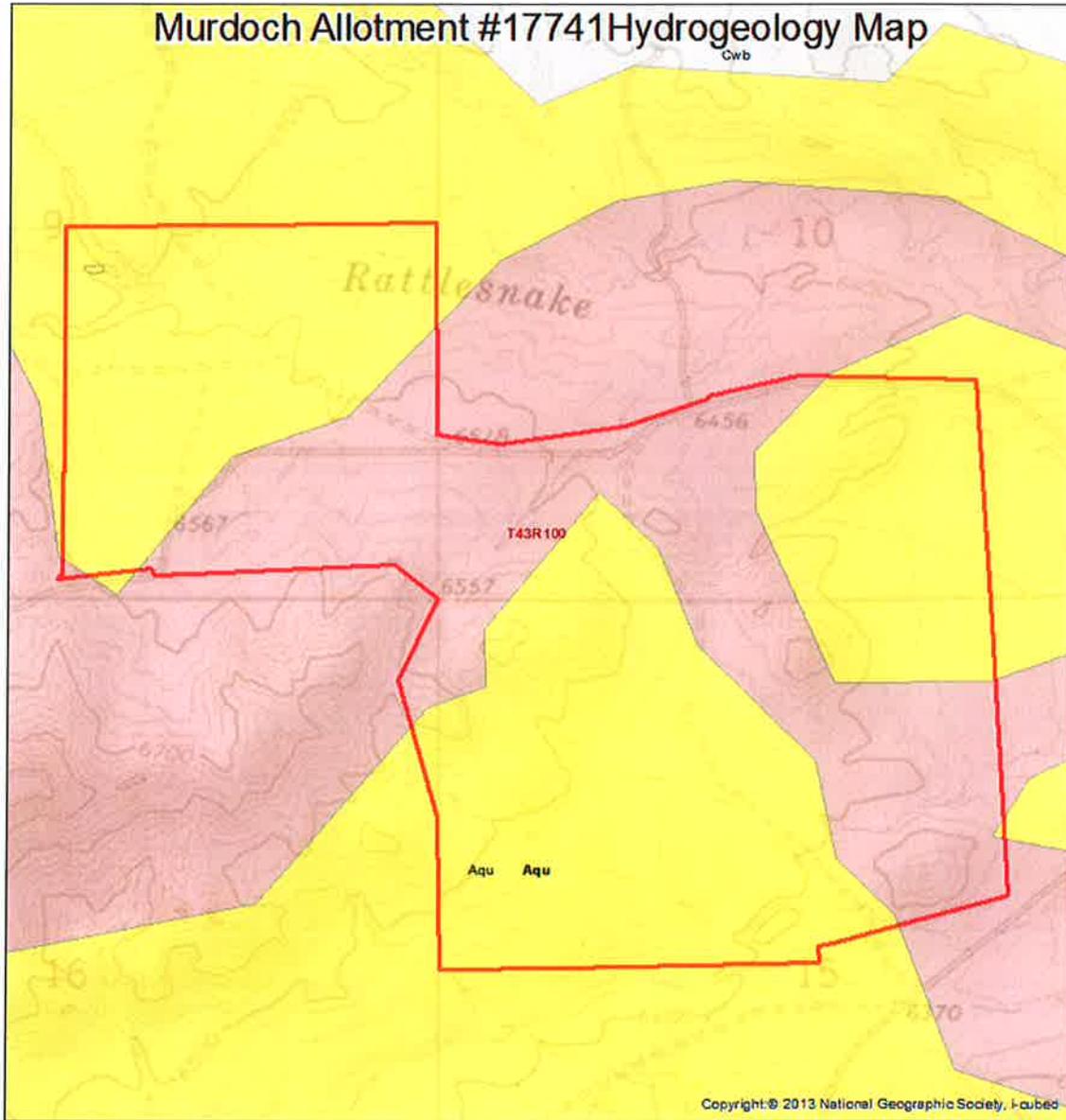


Murdoch Allotment Boundary
 NorthforkOwlCr_HUC



A north arrow pointing North (N), South (S), East (E), and West (W). Below the north arrow is the USGS logo, which features a mountain, a river, and a tree, with the text "NATIONAL SYSTEM OF PUBLIC LANDS" and "U.S. DEPARTMENT OF THE INTERIOR BUREAU OF LAND MANAGEMENT".

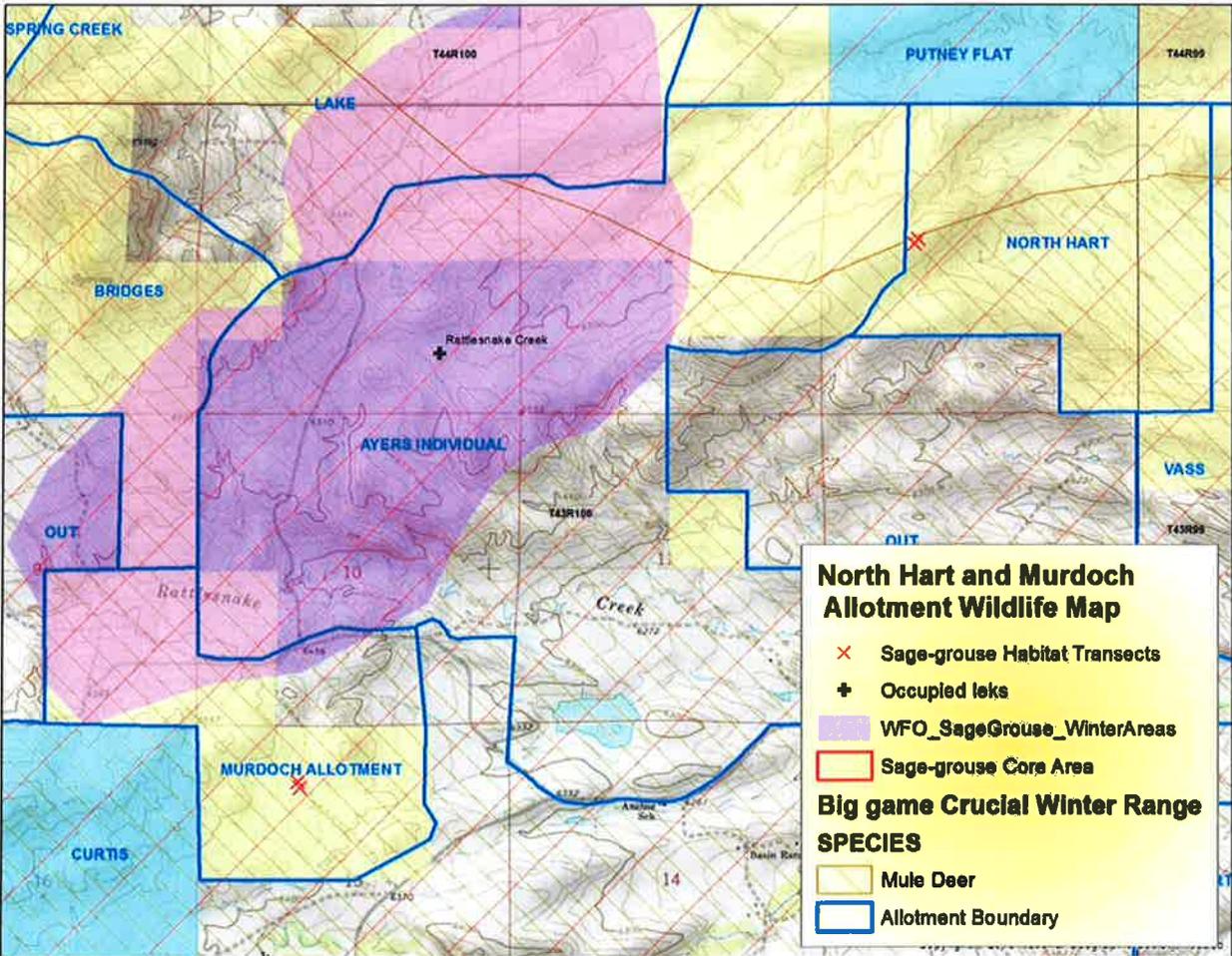
Map 5: Hydrogeology Map



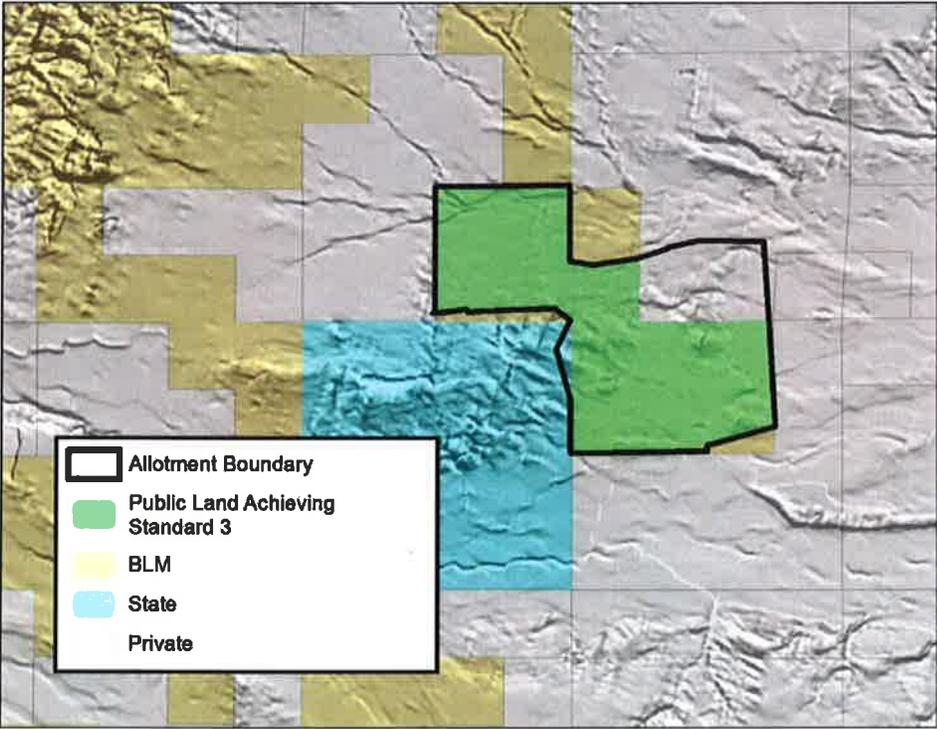
- BighornBasin_HydroGeologic_WSGS**
- Undefined Volcanic Deposits
 - Quaternary unconsolidated deposit aquifers, Aqu
 - WRBBD_SEO_Wells__All_2014
 - Murdoch Allotment Boundary
 - SPRING



Map 6: Wildlife Habitat Resources



Map 7: Upland Vegetation Standard Conformance (Standard 3)



Land Health Reporting Categories	Acres
Public Land Achieving Standard 3	420
Public Land Not Achieving Standard 3	0
Public Land where Land Health Standard 3 Does Not Apply or Unevaluated	0
Total Public Land Acres	420