Rangeland Health Assessment

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 Cattle Group Allotment No. 00007

DRAFT

BLM

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

FY 2013/2014

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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 Worland Cattle Group Allotment No. 00007. 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 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 Worland Cattle Group Allotment is located approximately 3 miles south of Worland, WY. The allotment encompasses approximately 12,683 acres of public land, 2,075 acres of Wyoming State land, 58 acres of Bureau of Reclamation land, and 96 acres of private land, for a total of 14,912 acres (Map 1). For management priorities, the allotment is classified in the "I" (Improve) category. The Nowater Stock Trail runs through the center of the allotment.

2.2 Climate/Air Quality

The allotment is within the 5-9 inch Big Horn Basin Precipitation Zone (Precip Zone). The average annual precipitation collected at the BLM Demer rain gauge, located 2 miles south-east of the allotment, is approximately 7.7 inches. Approximately one-half of the annual precipitation falls during the critical growing season of April through June.

The following general climate description is provided by the US Department of Agriculture, Natural Resources Conservation Service (NRCS), Ecological Site Description, Loamy Range Site, 5-9" Big Horn Basin Precipitation Zone (Site ID 032XY122WY):

> Annual precipitation ranges from 5-9 inches per year. The normal precipitation pattern shows peaks in May and June and a secondary peak in September. This amounts to about 50% of the mean annual precipitation. 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 is 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.
>
> High winds are generally blocked from the basin by high mountains, but can occur in conjunction with an occasional thunderstorm.
>
> Growth of native cool-season plants begins about April 1 and continues to about July 1. 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 "Emblem" climate station:

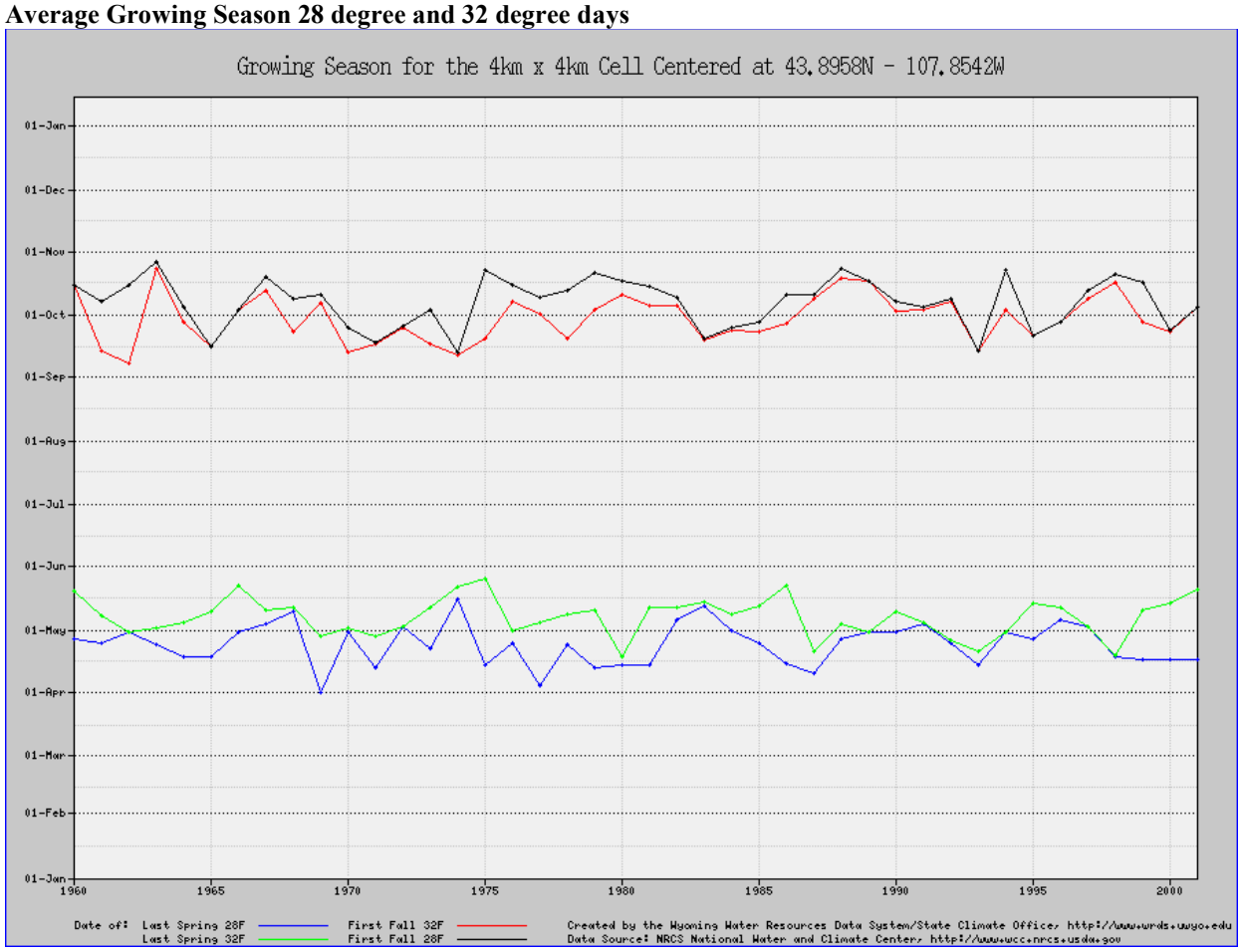
	Minimum	Maximum	5 yrs. out of 10 between
Frost-free period (days):	98	171	May 13 – September 19
Freeze-free period (days):	120	184	May 1 – October 5
Annual Precipitation (inches):	3.22	10.97	

> Mean annual precipitation: 7.42 inches
> Mean annual air temperature: 45.01°F (31.2°F Avg. Min. to 58.7°F Avg. Max.)
> For detailed information visit the Natural Resources Conservation Service 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".

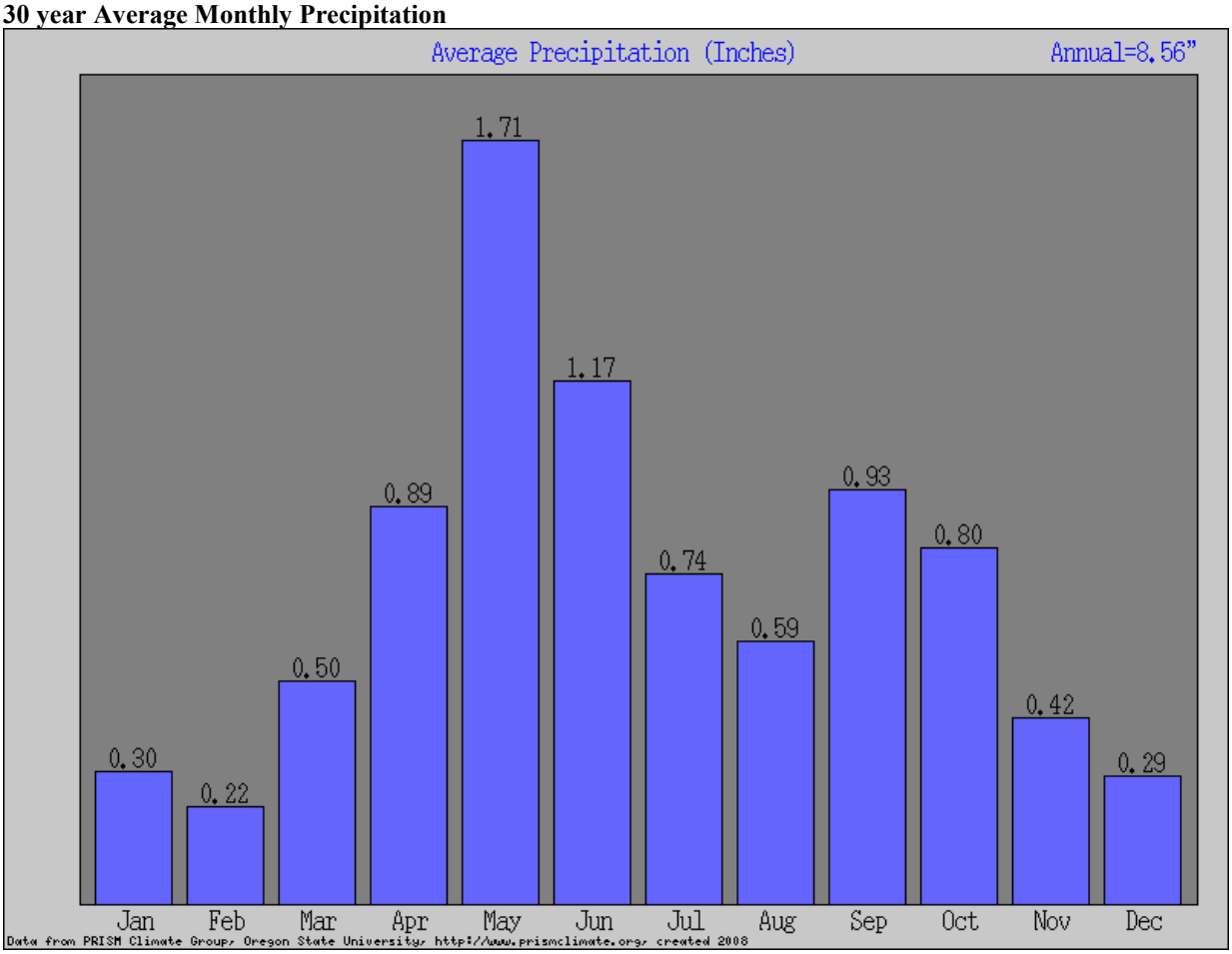
Two climate sources are referenced to present overall climate data. According to the PRISM (Parameter-elevation Regressions on Independent Slopes Model), overall averages form monthly precipitation, mean annual precipitation,

mean annual air temperature, have been sampled from 4 kilometer x 4 kilometer grid cell selected is centered at 43.8958 N, 107.8542 W, that was approximated to be to average for the watershed. In total 40 percent of the total precipitation is during the months of April-June. The 30 year frost free period for 28 and 32 degree days for the watershed is displayed below.

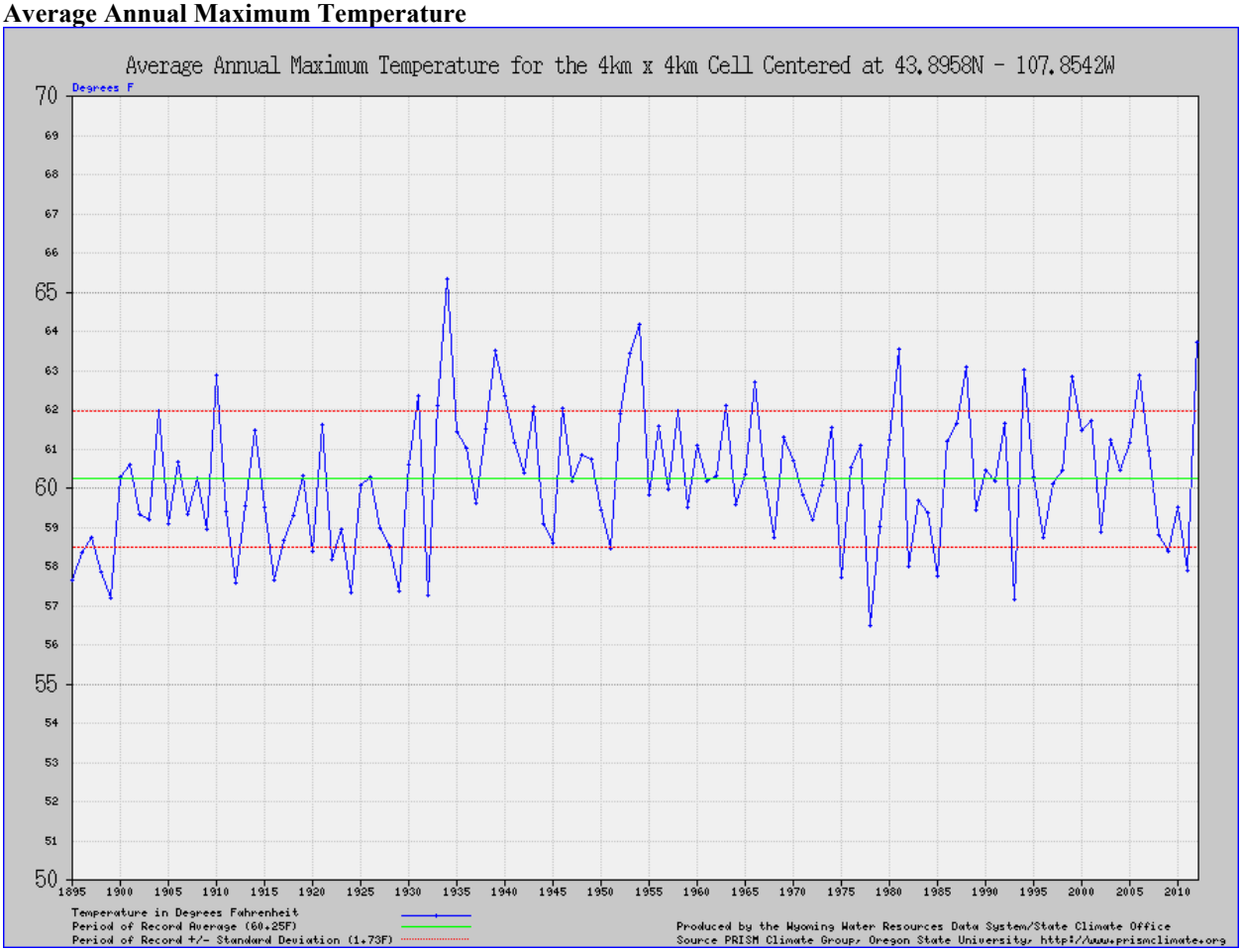
Average Growing Season 28 degree and 32 degree days



30 year Average Monthly Precipitation



Average Annual Maximum Temperature



Elevation Ranges/ Slope Average by Allotment

Allotment	**Max Elev (ft)**	**Min Elev (ft)**	**Average Elev (ft)**	**Average Slope (% Rise) 10m**
HoneyCombs	5341	4373	4669	17.0
Worland Cattle Group	**4577**	**4134**	**4327**	**8.2**
Denver Jake	4550	4216	4367	9.0
Demer Nowater	4705	4311	4491	10.0
East Fork	4751	4321	4488	13.0
Antelope Draw	5335	4331	4692	16.4
Mileski	5508	4452	4803	13.0
Healy	4810	4301	4521	14.0
Slickwater	4665	4176	4403	12.7
Nowater	4849	4298	4570	15.2
Badlands	5013	4465	4715	18.0

2.3 Soils

The soils 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 sandstone and soft shale bedrock common below the substratum. The soils typically have a light brown surface layer. Loamy and sandy surface textures dominate most of the landscape. The subsoil often reflects an increase in clay being expressed as an argillic horizon. Increases in sodium are also common being reflected as a natric horizon in the subsoil. Slopes range from 0 to 60 percent, but are generally less than 30 percent.

The Worland Cattle Group Allotment is situated within the 5-9 inch Big Horn Basin Precip Zone as depicted by NRSC spacial data. Based on the soil survey data for Washakie County, the dominant ecological sites found in the allotment are listed below:

Loamy 5-9" Precip Zone	R032XY122WY
Shallow Loamy 5-9" Precip Zone	R032XY162WY
Sandy 5-9" Precip Zone	R032XY150WY
Saline Upland 5-9" Precip Zone	R032XY144WY
Shale 5-9" Precip Zone	R032XY154WY
Saline Lowland 5-9" Precip Zone	R032XY138WY

Three rangeland health assessments utilizing the methodology described in *Interpreting Indicators of Rangeland Health, BLM Technical Reference 1734-6*, were relied upon in the analysis of the Worland Cattle Group Allotment. The assessments were conducted at monitoring sites selected for this analysis.

The North and Central Monitoring Sites were located in Map Unit 73, Wallson Loamy Fine Sand. The soils at this location support a Sandy 5-9 inch precip zone ecological site.

The South Monitoring Site was located in Map Unit 23, Fruita-Neiber-Muff Association. The soils at this location support a Loamy 5-9 inch precip zone ecological site.

Refer to Map 2 - Soils and Ecological Sites, located at the end of this document.

<u>Hydrologic Group B, C and Hydrologic Group D soils %</u>

The soil hydrologic group displays the distribution of the dominant soil hydrologic group that is assigned to the watershed. Group B type soils are those with moderate/high infiltration rates, locally in the watershed these areas are located within the floodplain area of the East Fork of Nowater and other sandy ranges sites in the Slickwater and Nowater watersheds. The group C soils are from loamy range sites in the watershed. The group D soils are very common in the eastern and badland sections of the watershed where rock out crops are common and the depth to the bedrock is less than 50 centimeters.

Refer to Map 3- Soil Hydrologic Groups, located at the end of this document.

2.4 Hydrology / Riparian

2.4.1 Surface Water/Watershed

Within the Worland Cattle Group Allotment there are four different level #6 sub-watersheds that are identified by the United States Geological Survey (USGS) by name and Hydrologic Units Codes or (HUC). In total 45% of the allotment is located in the East Fork of Nowater Creek sub-watershed consisting of 20.9 % of the total sub-watershed. This watershed drains into the Bighorn River with the BLM portion of the sub-watershed which consists of the main lower reach of the East Fork of Nowater Creek that flows in a western direction through the middle of the allotment (Map 4). The remaining 33% percent of the allotment is located in the Nowater Creek sub-watershed and consists of 10.1 % of the sub-watershed. Also, 15 percent of the allotment is within the Bighorn River Slick Creek that consists of 5% of the sub-watershed and 5% of the allotment is located within the Bighorn River-Coal Draw which consist of 2.4% of the that sub-watershed (table below).

Watersheds			
Watershed (HUC) Level #6	**Acres (mi²)**	**Acres (mi²) Within Allotment**	**% of Acres of Watershed in the Allotment**
Bighorn River-Slick Creek	32692 (51.1)	2300 (3.6)	7.0
East Fork Nowater Creek	32588 (50.9)	6800 (10.6)	20.9
Bighorn River-Coal Draw	35500 (55.4)	840 (1.3)	2.4
Nowater Creek- Zimmerman Draw	49500 (77.3)	5000 (7.8)	10.1

The overall total miles of ephemeral/intermittent channels for the Worland Cattle Group allotment is 162.6 total miles that consist of 100.8 within the East Fork Nowater Creek and 22.8 channel miles in the Sage/Slick Creek sub-watershed. There is also 39 channel miles within the Nowater Creek watershed. Rainfall patterns in arid and semi-arid regions influence when streamflow is most likely (EPA 2008).

Rosgen Types – These channels are dominantly Rosgen G5type streams that are defined as (Rosgen 1996) entrenched, narrow, and deep channels with a low to moderate sinuosity. These types have high bank erosion rates and a high sediment supply. The main channel material or d50 for the East Fork is a classified as sand. These channel types generate naturally high bed-load and sediment transport rates and flow only in response to precipitation events between 2-5 percent of the total days in the average year (Hedman 1983). Rosgen F5 type channels are described as entrenched, meandering channels which are deeply incised in valleys of relatively low relief such as the East Fork Nowater Creek sub-watershed. They contain highly weathered rock and erodible materials, and high lateral extension rates and bar deposition following infrequent storm events. Other less entrenched reaches of the East Fork Nowater Creek are classified as Rosgen C5 channels, where there is still periodic flooding and access to the floodplain from high flow events. Comparison of 1980 historic photo points and 2013 photography has revealed active down-cutting of tributary channels with estimated advancement rates of one to two feet per year. The average main channel slope is the lowest of all the other allotments in the watershed.

Drainage Pattern – The dominant land forming topographic process is from alluvial forces of erosion. The drainage pattern is a dendritic drainage pattern that reflects horizontal sedimentary bedrock over which it was formed. The drainage density or amount of drainages per square mile is high, and very high along badland on steep rock outcrops of the allotment.

Allotment	**Total Miles Intermittent/Ephemeral Channels**	**Watershed (HU 10)**					
		East Fork Nowater	**(%) of Total East Fork Nowater Channel Length**	**Nowood R-Sand Ck**	**Bighorn R-Sage/Slick Ck**	**Nowood R-Big Cottonwood Ck**	**Nowater Ck**
Worland Cattle Group	**162.6**	**100.8**	**14**	**0**	**22.8**	**0**	**39**
Total	**1035.8**	**712.3**	**100.0**				

Allotment	**Main Channel**	**Average Main Channel Slope**	**Rosgen Channel Types**
Badlands	East Fork Sand Creek	0.51	G5b,F5b

2.4.2 Groundwater

The area is located in a highly erosive area with high amounts of runoff and very low permeability due to very fine grained geologic outcrops of primarily Tertiary aged outcrops of the Willwood and Fort Union Formations. The northern half of the allotment is dominantly mapped as the Tertiary Willwood Formation. The southern portions of

the allotment are mapped as the Fort Union Formation. There are minor amount of Quaternary alluvium and colluvium unconsolidated deposits that are mapped along the lower portions of the main drainages (Map 6). The average annual minimum depth to groundwater is found along the floodplain areas of the main drainages and is mapped at a depth of 151-175 centimeters annually. There are no known springs or seeps in the allotment.

Ground-water recharge in arid and semi-arid regions has generally been viewed as the sum of several different distinct pathways including mountain-block recharge, mountain-front recharge, spatially distributed recharge, and ephemeral stream channel recharge. Recent research has expanded this view to include the mediating role of vegetation (i.e. water use by vegetation), and the greater role of ephemeral stream channel recharge in basin floors (EPA 2008 p.22). The ground-water recharge for this watershed is likely in the form of ephemeral stream channel recharge.

2.4.3 Water Quality

The main drainages of East Fork Nowater and Nowater Creek in the allotment are classified by the Wyoming Department of Environmental Quality (DEQ) as class 3B type streams. The associated beneficial uses for class 3B streams are found in the table below. These streams support other aquatic life, recreation, wildlife, agriculture, industry, and provide scenic value throughout portions of the year.

WY DEQ Surface Water Use Class and TMDL Summary

	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

The main segment of the East Fork of Nowater Creek supports a limited number of Cottonwood trees throughout the segment. These stands are supported by groundwater that is at depths greater than 170 centimeters throughout the year. The depth to available water prohibits the establishment of a herbaceous riparian/wetland area.

2.5 Upland Vegetation

Vegetative communities within the allotment are highly variable. Basin Grassland / Shrub Communities are predominately found on sandy and loamy sites. These sites are dominated by Wyoming big sagebrush *(Artemisia tridentata)*, with an under story of bluebunch wheatgrass *(Agropyron spicatum)*, western wheatgrass *(Agropyron smithii)*, needle-and-thread *(Stipa comata)*, Sandberg bluegrass (Poa secunda), and Indian ricegrass *(Oryzopsis hymenoides)*. Salt Desert Shrub and Salt Bottom Communities are predominately found on saline upland, saline lowland, and lowland sites. These sites are dominated by Gardner's saltbush *(Atriplex gardneri)*, bottlebrush squirreltail *(Sitanion hystrix)*, Sandberg bluegrass, and Indian ricegrass. Cheatgrass *(Bromus tectorum)* and numerous annual forbs are readily observed in areas of the allotment. No known threatened or endangered plant species have been documented in the allotment.

2.6 Invasive Species

Noxious weed species inventoried within the allotment include saltcedar *(Tamarix chinensis)*, Russian olive *(Eleganus angustifolia)*, Russian knapweed *(Acroptilon repens)*, and Canada thistle *(Cirsium arvense)*. Occurrence is primarily near roads and reservoirs or other previously disturbed areas. Cheatgrass (Bromus tectorum) is also

found within the allotment. It is readily observed in some areas of the allotment while non-existent or nearly so in other areas of the allotment.

2.7 Livestock Grazing Management

The Worland Cattle Group Allotment is permitted for cattle grazing in the spring and fall. A total of 1,106 animal unit months (AUMs) of livestock grazing use are permitted as follows:

245 Cattle	03/01-05/13	100% Public Land	596 AUMs
250 Cattle	10/15-12/15	100% Public Land	510 AUMs

The calculated livestock grazing use since 2000 in the following table:

Livestock Grazing Use			
Year	**Estimated Actual Use (AUMs)**		
	Spring	**Fall**	**Total**
2000	69	436	505
2001	596	298	894
2002	478	108	586
2003	436	505	941
2004	542	460	1,002
2005	589	376	965
2006	595	510	1,105
2007	580	499	1,079
2008	596	405	1,001
2009	596	363	959
2010	580	485	1,065
2011	596	506	1,102
2012	540	510	1,050
2013	437	499	936
Average	**516**	**426**	**942**

Since 2000, livestock grazing use has averaged 87% of permitted use in the spring, 84% of permitted use in the fall, and 85% of permitted use overall.

2.8 Wildlife

Wildlife habitat on the Worland Cattle Group 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. The allotment is roughly bisected by the East Fork of the Nowater with all drainages flowing into that stream. 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 year round. Historically there have been various raptors sighted along the East Fork drainage with occasion reports of nesting activity. The entire allotment is designated as crucial big game winter habitat for mule deer and antelope, and approximately three quarters of the allotment lies within a sage grouse core breeding area. The allotment also contains habitat identified as sage grouse winter range in proximity to the one sage grouse lek that lies within the allotment, along with a lek in the neighboring Denver Jake allotment to the east. 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.

2.9 Threatened, Endangered, Candidate, or Sensitive Species

No known threatened or endangered species have been identified on the allotment, however Greater sage grouse can be found there at various seasons of the year. Various additional sage brush obligate avian species such as the Sage sparrow, Brewer's sparrow, and Sage Thrasher may also utilize habitat within the allotment.

3.0 Summary of Monitoring Data / Assessments

3.1 Monitoring Data

In the summer of 2013, three vegetation monitoring sites were 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 these monitoring sites. Map 1, located at the end of this document, illustrates the monitoring site locations.

Line intercept cover transects (approximately 200 points per transect) were completed in each monitoring site. A summary of the cover data collected from each monitoring site is shown in the table below:

Vegetation Monitoring Data						
Monitoring Site	**Ecological Site**	**Basal Vegetative Cover**	**Litter**	**Bare Ground**	**Sagebrush Canopy Cover**	**Brte presence ((hits/transect points)*100))**
North	Sandy 5-9”	33%	44%	12%	25%	24%
Central	Sandy 5-9”	23%	38%	17%	28%	12%
South	Loamy 5-9”	23%	48%	13%	26%	22%
Badlands Allotment #00016 Line Intercept 3	Loamy 5-9”	4%	57%	29%	0	13%

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.

Data from a line intercept cover transect completed in the Badlands Allotment #00016 is also included in the above table. This monitoring site is representative of the drainage bottoms and first level terraces above the drainage bottoms found in the Worland Cattle Group Allotment.

Rangeland Health Assessments were conducted at the monitoring sites by an interdisciplinary team on 09/05/2013 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 Sandy 5-9” Precipitation Zone (R032XY150WY) at the North and Central Monitoring Sites, and the Reference Sheet for the Loamy 5-9” Precipitation Zone (R032XY122WY) at the South Monitoring Site to determine departures from normal. Individual ratings for the *Rangeland Health Indicators* are displayed for each monitoring site in the Worland Cattle Group Allotment, as well as the Line Intercept 3 (LI3) monitoring site in the Badlands Allotment, in the table below.

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

3.2 Soils and Site Stability

Data collected for the Rangeland Health Assessments were used to evaluate soil and site stability on the allotment. 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.

North Monitoring Site

Rill formation was not observed. Water-flow patterns were short and discontinuous. Pedestals up to 2 inches were common at the bases of sagebrush, and around blue grama. Pedestalling appeared to be historic, and not an active process. Transect data determined bare ground to be 12 percent and litter cover to be 44 percent. Both bare ground and litter were within the guidelines described in the reference sheet. The low amount of bare ground and high amount of litter was primarily attributed to the amount of cheatgrass present. Gullies were not observed. No wind scoured or blow-out areas were observed. Some small litter appeared to be displaced in depressions and plant innerspaces. The soil stability index (SSI), an indicator of the soil surface resistance to erosion, was 5.4. This is within the guideline described in the reference sheet. Coverage of biological soil crusts was 11%. When the 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. The presence of a 5-inch A horizon does not indicate historic soil loss. No soil compaction was observed.

Central Monitoring Site

Rill formation was not observed. Water-flow patterns were short and disconnected. Pedestals less than 2 inches were observed at the bases of sagebrush, with some small terracette formation on cactus. It appeared that some soil movement by wind occurred at this site, although wind scoured and blow-out areas were small and infrequent. Transect data determined bare ground to be 17 percent and litter cover to be 38 percent. Both bare ground and litter are within the guidelines described in the reference sheet. Gullies were not observed. Some small litter appeared to have moved in depressions and open spaces. The soil stability index (SSI), an indicator of the soil surface resistance to erosion, was 5.3. This is within the guideline described in the reference sheet. Coverage of biological soil crusts was 11%. When the 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. The reduced abundance of mid-stature grasses in the plant community may contribute to slightly increased runoff and reduced infiltration. The presence of a 4-inch A horizon does not indicate historic soil loss. No soil compaction was observed.

South Monitoring Site
Rill formation was not observed. Sporadic water-flow patterns were observed in bare areas with less litter cover. Pedestals 1 to 2 inches tall were observed at the bases of sagebrush. Transect data determined bare ground to be 13 percent and litter cover to be 48 percent. Both bare ground and litter are within the guidelines described in the reference sheet. The low amount of bare ground and high amount of litter was primarily attributed to the amount of cheatgrass and annual forbs present. Gullies were not apparent on the site. No wind scoured or blow-out areas were observed. The amount of litter movement observed matched that expected for the site. The soil stability index (SSI), an indicator of the soil surface resistance to erosion, was 5.8. This is within the guideline described in the reference sheet. Coverage of biological soil crusts was 14%. When the 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. A 4-inch A horizon was observed, with no indication of historic soil loss. No soil compaction was observed.

Based on the observations made at the monitoring sites, the attribute ratings for *Soil and Site Stability* were rated as a "None to Slight" departure from the reference sheet at the North and South Monitoring Sites, and a "Slight to Moderate" departure from the reference sheet at the Central Monitoring Site. The attribute ratings for *Hydrologic Function* were rated as a "None to Slight" departure from the reference sheet at the North Monitoring Site, and a "Slight to Moderate" departure from the reference sheet at Central and South Monitoring Sites.

Map 3 displays the distribution of the dominant soil hydrologic group that is assigned to the watershed. Group B type soils are those with moderate/high infiltration rates, locally in the watershed these areas are located within the floodplain area of the East Fork of Nowater and other sandy ranges sites in the SlickWater and Nowater watersheds. The group C soils are from loamy range sites in the watershed. The group D soils are very common in the eastern and badland sections of the watershed where rock out crops are common and the depth to the bedrock is less than 50 centimeters.

3.3 Hydrology

3.3.1 Surface Water/Watershed

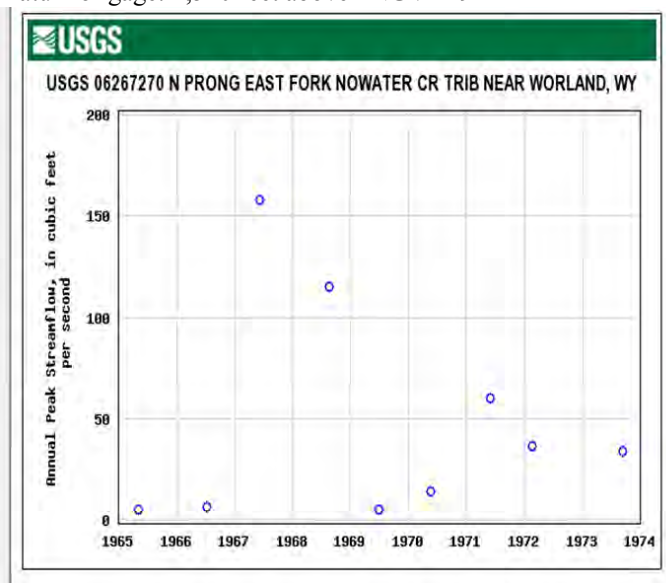
USGS Data – The USGS has historic data from two monitoring sites (06267260, 06267270) located in the T.46N. R.91W. Sections 18 and 19. These sites monitored peak flow from two tributaries to the East Fork of Nowater Creek with drainages areas of 1.7 and 2.11 miles. During the years from 1965-1984 the flows ranged from 5 cubic feet per second (cfs) to over 346 cfs mainly following 35 storm events in May and June. These sites represent the numerous smaller drainage areas from upland areas that are common within the East Fork watershed and are applicable to all of the allotments with similar ecological sites. These stations contain 20 years of historic runoff data and were collected for analysis of the runoff rates, and runoff volumes and correlated with other semi-arid sites throughout the state of Wyoming. This was done in order to estimate runoff from rainfall on small basins in semiarid areas. This study included hydrologic modeling for runoff, rainfall, and other simulated runoff hydrologic curves for the small basin following natural and simulated rainfall events (Rankl 1990). The physical attributes give an accurate estimate of flow volume generated from small drainages that are common within the allotment. The majority of the significant runoff events occur during the growing season summer months of April through October, the contributions of snowmelt runoff from the watershed was not considered significant (Craig and Rankl 1978).

There is an historic surface water gauging stations located in the allotment. This USGS gauging station (USGS Site 06267400) is located at latitude 43°54'55", longitude 107°55'46" this station provides average and peak flow records along with water quality samples from 1971 through 1991 when the station was discontinued due to lack of funding.

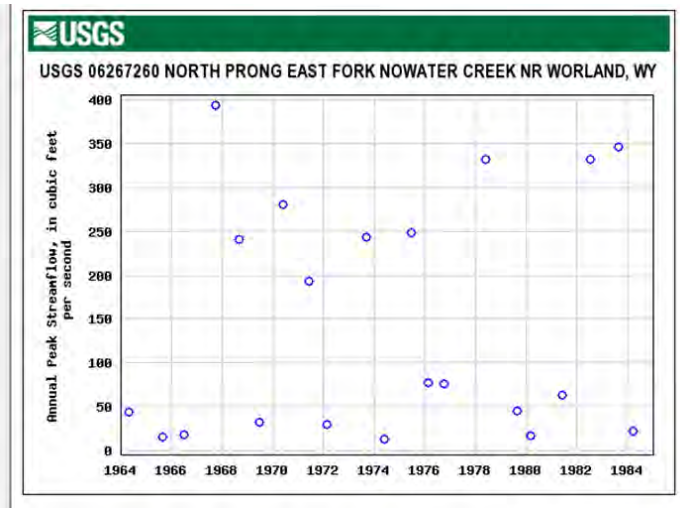
The average peak flows ranged from 160 cfs in 1980 to 3,040 in 1978 (Table 14). The annual discharge average for this period of record ranged from 1.19 cfs in 1974 to 13.2 cfs in 1978 (Table 15). This includes flow for the East Fork of Nowater and Denver Jake level 6 watersheds.

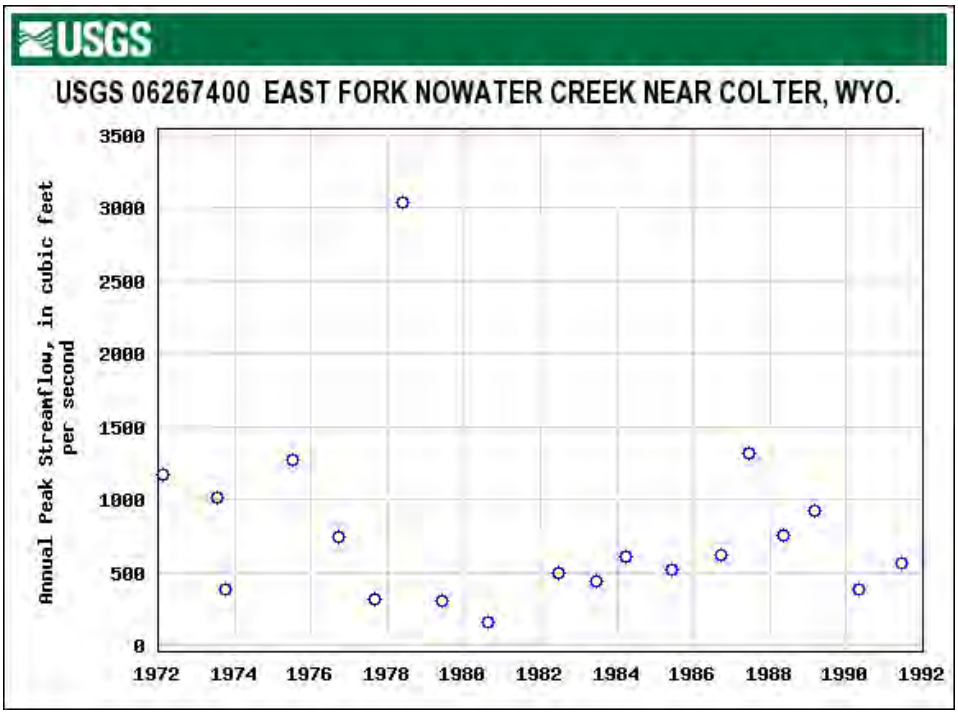
BLM – Range Hydrologic Condition – The current conditions of runoff specific to the allotment are tied to the upland health hydrologic indicators. The overall hydrologic indicators measured for all the three of the key areas were none-slight and slight to moderate overall departure from reference conditions. Low amounts of infiltration and high amount of water flow patterns in the form of pedestals and terracettes were noted to have a moderate departure at the central reference site. Although semi-arid ecological sites naturally have these features, they were expressed beyond normal reference conditions and rated accordingly as moderate.

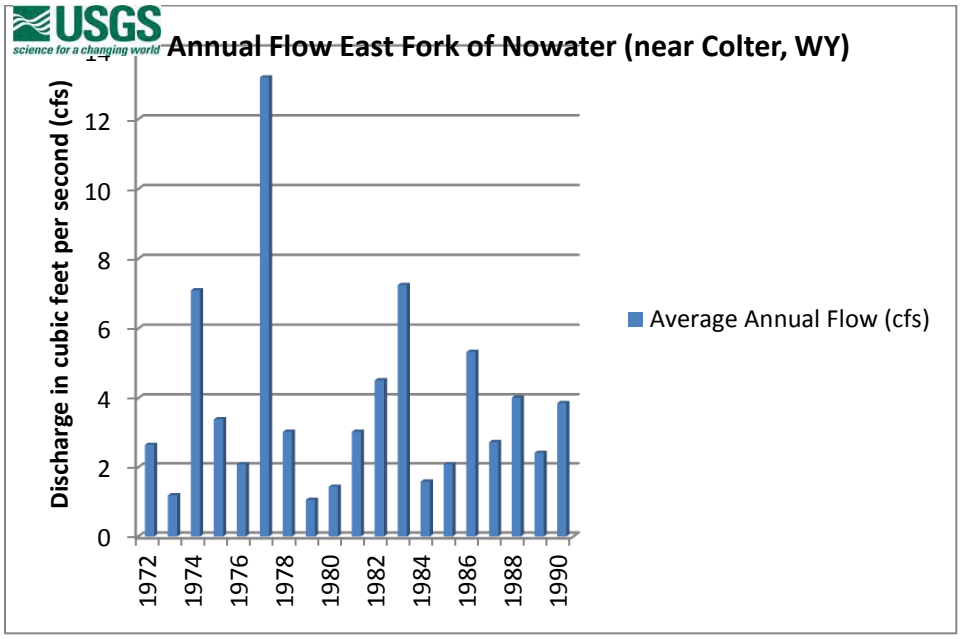
DESCRIPTION: USGS Site 06267270
Latitude 43°56'37", Longitude 107°48'20" NAD27
Washakie County, Wyoming, Hydrologic Unit 10080007
Drainage area: 2.11 square miles
Datum of gage: 4,520 feet above NGVD29



Description: USGS Site 06267260
Washakie County, Wyoming
Hydrologic Unit Code 10080007
Latitude 43°56'45", Longitude 107°48'37" NAD27
Drainage area 3.77 square miles
Gage datum 4,420 feet above NGVD29







Human Influence

Anthropogenic uses and activities on the landscape can have significant impacts – both good and bad – on water quality and the health of a watershed. Human-related disturbances are numerous and include livestock grazing, land clearing, mining, timber harvesting, ground- water withdrawal, stream flow diversion, channelization, urbanization, agriculture, roads and road construction, off-road vehicle use, camping, hiking, and vegetation conversion. Biological stressors include habitat loss, alteration, effluent discharge, and degradation from decline in water quality, and changes in channel and flow characteristics (EPA 2008 p.65).

Many of the first order tributaries in the basin can be classified as G-Type channels, or gullies. These channels are highly erosive, generate high sediment volumes, and can result in the loss of productive lands and destabilize upland

conditions. Observation of many of these channels indicates that while the major stream channels appear to have achieved a level of stability, the upper reaches of the watershed are still suffering a level of destabilization. These channels could be forming in response to one or more of numerous stimuli including but not necessarily limited to: channel realignment (straightening), road and culvert construction, rangeland management practices, or base-level lowering associated with main channel incision (Anderson 2009 p.3.100).

The nearest population center is Worland Wyoming that is located 8 miles to the northwest of the watershed. There are cattle and sheep grazing that occurs throughout the watershed and is discussed in greater detail in other sections of this document. There are numerous historic prospecting wells (oil and gas) and abandoned wells that were drilled throughout 1950's- through 1970's. Human activity has created demand for existing roads in the watershed.

The majority of the reservoirs were constructed from the 1950's-1970 and these impoundments have altered the runoff volume and sediment transmission rates from impounded drainages.

There are 50 miles of two track and primitive roads accessing oil field facilities, recreation and various stock ponds. There are 15 miles of county road that is out sloped and ditched throughout. This amount totals 145 acres of road disturbance. This was derived from digitized roads using a 30 foot width for improved roads and 15 foot width for primitive roads and the actual amount is likely higher.

3.3.2 Ground Water

The estimated depth to groundwater is estimated to be greater than 100 feet in upland areas. The amount of evaporation as indicated in the Wyoming Climate Atlas is 30 inches per year for the Worland area. This exceeds the annual precipitation of 7 inches per year, and therefore the amount of groundwater recharge into the primary Willwood and Fort Union aquifers from upland areas in the areas is minimal. The majority of local rainfall events generate surface water runoff and minimal ground water recharge. The shallowest available groundwater is found along the floodplains of East Fork Nowater and Nowater Creeks. The sand material in the channel and hydrologic B type soils provide for increased groundwater recharge in floodplain areas. There are no water wells within the allotment. The average annual depth to groundwater for the allotment is found in the appendix as Map 5. This depth supports Cottonwoods (*Populus spp.)*, Rabbitbrush *Chrysothamnus nauseosus)*, and sporadic Coyote (*salix exigua*) willow species (Photo 3).

3.3.3 Water Quality

There are some tributaries that contain active head-cuts that appear to be migrating upstream. These areas are where new sediment is delivered into the drainage system. The watershed transmits large amounts of in-channel sediment into the system during primary snowmelt, and other storm events that are large enough to trigger overland flow. The drainages are classified by the WYDEQ as class 3B streams by default. The East Fork Nowater Creek is not on the WYDEQ 2012 305b as impaired. The contribution of water quality from upstream BLM sources is limited to storm water runoff events from ephemeral channels.

USGS Data

Water samples were taken during the months of March through July and were analyzed for conductance, turbidity, a full suite of metals, hardness etc. For a full detailed table visit (USGS 2009). The data indicates naturally very large amounts of sediment are transported through the watershed especially following large flow rainstorm events. The amount of suspended sediment ranged from 18 tons per day in July of 1981 to 509,000 tons per day following high flow event in April of 1978. The presentation of these data (1978 and 1981) assumes that the same range conditions, climatic conditions/events, management activities on the landscape are the same or similar to now in order to speculate that same would be true today which may not be true.

3.3.4 Riparian

The East Fork of Nowater was inventoried according to the BLM Manual 1737-15, for the Proper Functioning of Condition (PFC) of Lotic Riparian areas in 1994. This survey method was applied to ephemeral stream system, and an overall non-functioning rating was assigned to the whole segment due to the lack of herbaceous riparian understory. The following was taken from p.7 of BLM Manual 1737-15 *confusion over the distinction*

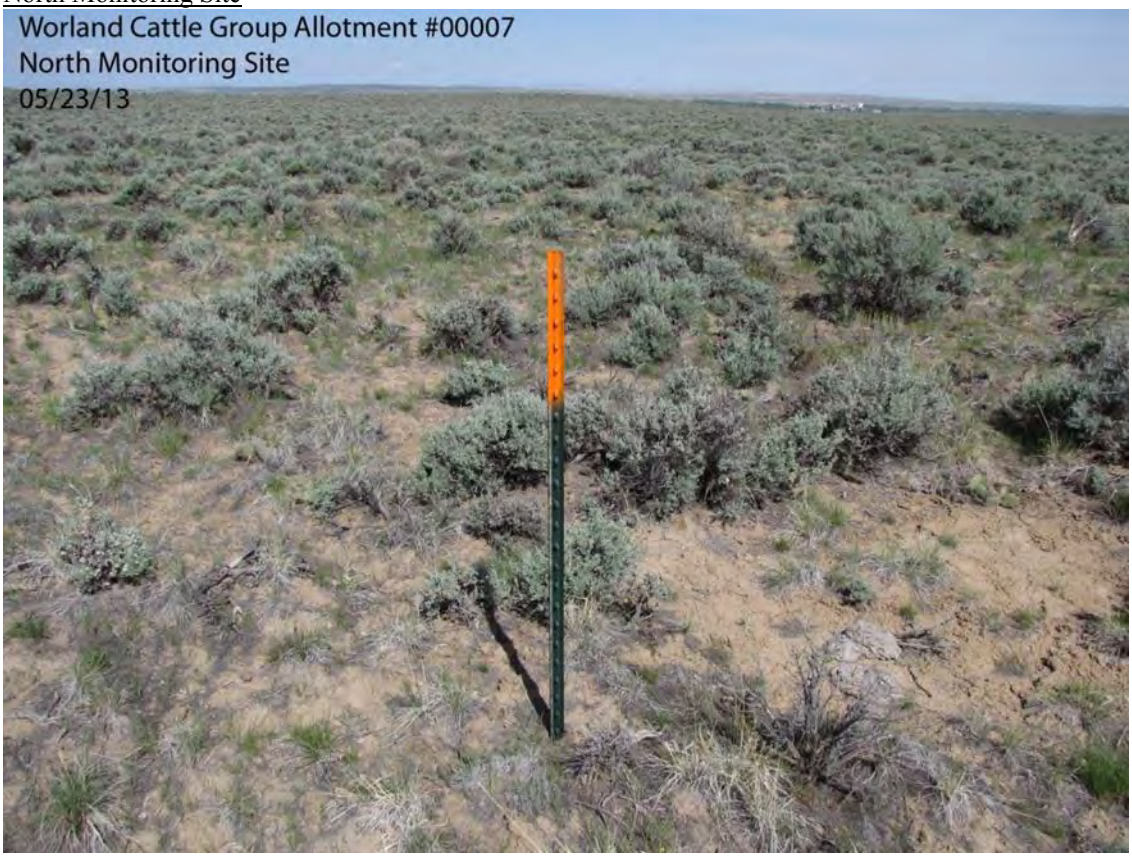
between intermittent and ephemeral streams may be minimized by applying Meinzer's (1923) suggestion that the term "intermittent" be arbitrarily restricted to streams that flow continuously for periods of at least 30 days and the term "ephemeral" be arbitrarily restricted to streams that do not flow continuously for at least 30 days. Intermittent or seasonal streams usually have visible vegetation or physical characteristics reflective of permanent water influence, such as the presence of cottonwood. The overall potential of the system was compared to an intermittent stream segment without analyzing the flow regime and flow duration data from the USGS gauge. Subsequent BLM guidance suggested that ephemeral systems did not meet the intent to be assessed for PFC and other monitoring and assessment methods.

The system is a considered a losing segment with surface water that is lost to ground water throughout the reach with the permanent water table located below the surface throughout the year. During the traditional base flow months of August through February there is little to no surface water available.

3.4 Upland Vegetation

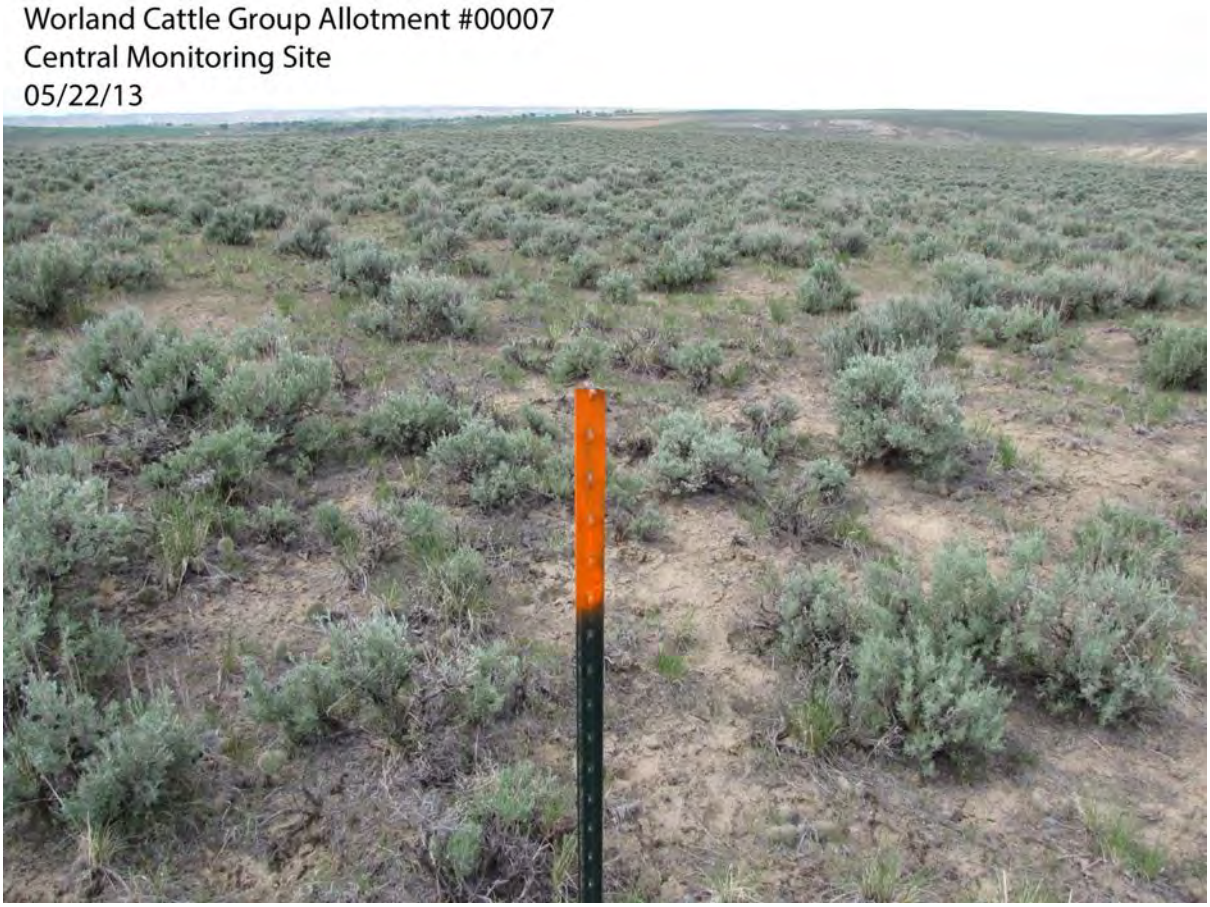
Data from the line intercept cover transects, the 17 Indicators of Rangeland Health, and other field observations were used to evaluate the vegetative community on the allotment. Standard 3 for Healthy Rangelands was evaluated based on the attribute ratings for Biotic Integrity using rangeland health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

North Monitoring Site



The dominant functional / structural groups at this monitoring site were shrubs, followed by annuals (cheatgrass), and then mid stature bunchgrasses and short stature grasses. Total coverage of cheatgrass at the site was 24%, contributing to a higher than expected amount of litter. While the frequency of cheatgrass on this site was high, desirable perennial grasses make up a large portion of the vegetative community. Slight decadence on sagebrush was observed, although no more than that expected for the site. Annual production was as expected for the site, considering recent climatic conditions. All plants exhibited good vigor and reproductive capability.

Central Monitoring Site



The dominant functional / structural groups at this monitoring site were shrubs, followed by mid stature bunchgrasses and short stature grasses, and annuals (cheatgrass). Total coverage of cheatgrass at this site was 12%. Desirable perennial grasses made up a large portion of the vegetative community. Slight decadence on sagebrush was observed. Annual production was estimated to be as expected for the site, considering recent climatic conditions. All plants exhibited good vigor and reproductive capability.

South Monitoring Site

The dominant functional / structural groups at this monitoring site were shrubs, followed by cheatgrass and annual forbs, with occasional mid stature bunchgrasses and short stature grasses. Total coverage of cheatgrass at this site was 22%, contributing to a higher than expected amount of litter. Annual forbs were abundant on this site, with some halogeton also present. No plant mortality or decadence was observed. Annual production was estimated to be as expected for the site, considering recent climatic conditions. All plants exhibited good reproductive capability and vigor.

Analysis

The North and Central Monitoring Sites are located on Sandy 5-9" Ecological Sites. The vegetative community, ground cover, and soil surface attributes for the assessment sites were noted, measured and compared to the ecological site description (ESD) and corresponding reference sheet (Sandy 5-9 Inch Precipitation Zone (R032XY150WY) Ecological Site). According to the ESD, the Historic Climax Plant Community for this ecological site is a *Needle-and-thread/Indian ricegrass Plant Community*. This plant community is dominated by cool-season mid stature grasses, with a variety of forbs and woody species. Over time, with moderate, continuous season-long grazing, and/or prolonged drought, the plant community can transition to a *Perennial Grass/Big Sagebrush Plant Community*. In this plant community, the sites are still dominated largely by cool-season grasses, but short statured warm-season grasses and forbs are more common, and big sagebrush is more prevalent.

With frequent and severe grazing, and protection from fire, the preferred cool-season grasses can be significantly reduced or eliminated, transitioning the site to a *Mixed Shrub/Bare Ground Plant Community*. Weedy annual species such as cheatgrass may occupy the site if a seed source is available. If fire is present to remove the sagebrush, the site can transition to a *Threadleaf Sedge and/or Blue Grama Sod Plant Community*.

Ideally, these sites would be dominated by cool season mid stature grasses, followed by shrubs, forbs, and short stature grasses. The plant community observed at the North and Central Monitoring Sites deviated somewhat from that specified in the reference sheet, in terms of the functional / structural groups present, and the presence of invasive plants (cheatgrass). At these monitoring sites, shrubs were the dominant plant species. Short and mid stature cool season grasses were present in abundance, and exhibited good vigor and seed production. Cheatgrass was present in higher amounts than desirable. Due to the time of year that monitoring took place, very few forbs were documented. Most forbs are usually dried up and un-recognizable by mid to late summer. Even though the functional / structural groups are not in balance with that specified in the reference sheet, and with the high frequency of cheatgrass present, these sites fit within the *Perennial Grass/Big Sagebrush Plant Community*, as described in the ecological site guide. Due to the shift in the functional / structural groups present at these sites, and the high occurrence of cheatgrass, the *Biotic Integrity* at the North and South Monitoring Sites in the Worland Cattle Group Allotment was rated as a "Slight to Moderate" departure from the reference sheet.

The South Monitoring Site is located on a Loamy 5-9" Ecological Site. The vegetative community, ground cover, and soil surface attributes for this assessment site were noted, measured and compared to the ecological site description (ESD) and corresponding reference sheet (Loamy 5-9 Inch Precipitation Zone (R032XY122WY) Ecological Site - 8/12/2005). According to the ESD, the Historic Climax Plant Community for these ecological sites is a *Bluebunch Wheatgrass/Rhizomatous Wheatgrass Plant Community*. This plant community is dominated by cool-season grasses, with a variety of forbs and woody species. Over time, with moderate, continuous season-long grazing, and/or prolonged drought, the plant community can transition to a *Perennial Grass/Big Sagebrush Plant Community*. In this plant community, the sites are still dominated largely by cool-season grasses, but short statured warm-season grasses and forbs are more common, and big sagebrush is more prevalent.

With frequent and severe grazing, and protection from fire, the preferred cool-season grasses can be significantly reduced or eliminated, transitioning the site to a *Big Sagebrush/Bare Ground Plant Community*. Weedy annual species such as cheatgrass may occupy the site if a seed source is available. If fire is present to remove the sagebrush, the site can transition to a *Blue Grama Sod Plant Community*. In areas with more saline soils, the plant community can transition to a *Salt Tolerant Shrub/Rhizomatous Wheatgrass Plant Community* or a *Salt Tolerant Shrub/Bare Ground Plant Community*.

At the South Monitoring Site, the perennial grass component was nearly absent from the plant community. This site is dominated by shrubs, cheatgrass, and weedy annual species. This monitoring site is in close proximity to the Nowater Stock Trail, and likely received significant historical grazing use from trailing livestock. It also appears that some parts of the allotment, such as this site, were used as historic sheep bedgrounds. While the few remaining perennial grasses found on this site exhibited good vigor and seed production, it appears that they are struggling to successfully compete with cheatgrass and other annuals. This plant community represents an ecological state similar to the *Big Sagebrush/Bare Ground Plant Community* type, with cheatgrass and other weedy annuals replacing the bare ground component. Due to the near loss of the perennial grass component on this site, and the high occurrence of cheatgrass and other annuals, the *Biotic Integrity* at the South Monitoring Site in the Worland Cattle Group Allotment was rated as a "Moderate" departure from the reference sheet.

<u>Additional Allotment Observations</u>
Every ecological site on the allotment was not intensively monitored. The sites selected for monitoring were determined to be representative of the overall condition of the upland sites within the Worland Cattle Group Allotment. Field observations indicate that the majority of the drainage bottoms and first level terraces above the drainage bottoms are dominated by a near monoculture of cheatgrass, with scattered sagebrush and greasewood. While intensive monitoring was not conducted on these sites in the Worland Cattle Group Allotment, intensive monitoring was conducted on a similar site in a neighboring allotment (Line Intercept 3 Monitoring Site, Badlands Allotment No. 00016). See photo below.

Line Intercept 3, Badlands Allotment No. 00016

The data collected indicates that on these sites cool season perennial bunchgrasses are extremely reduced, with annual grasses and forbs comprising over 50% of the vegetative component. These sites are currently within an ecological state similar to the *Salt Tolerant Shrub/Bare Ground Plant Community*, with annuals replacing the bare ground component. The Biotic Integrity for these sites was rated as a "Moderate to Extreme" departure from the reference sheet.

3.5 Wildlife Habitat

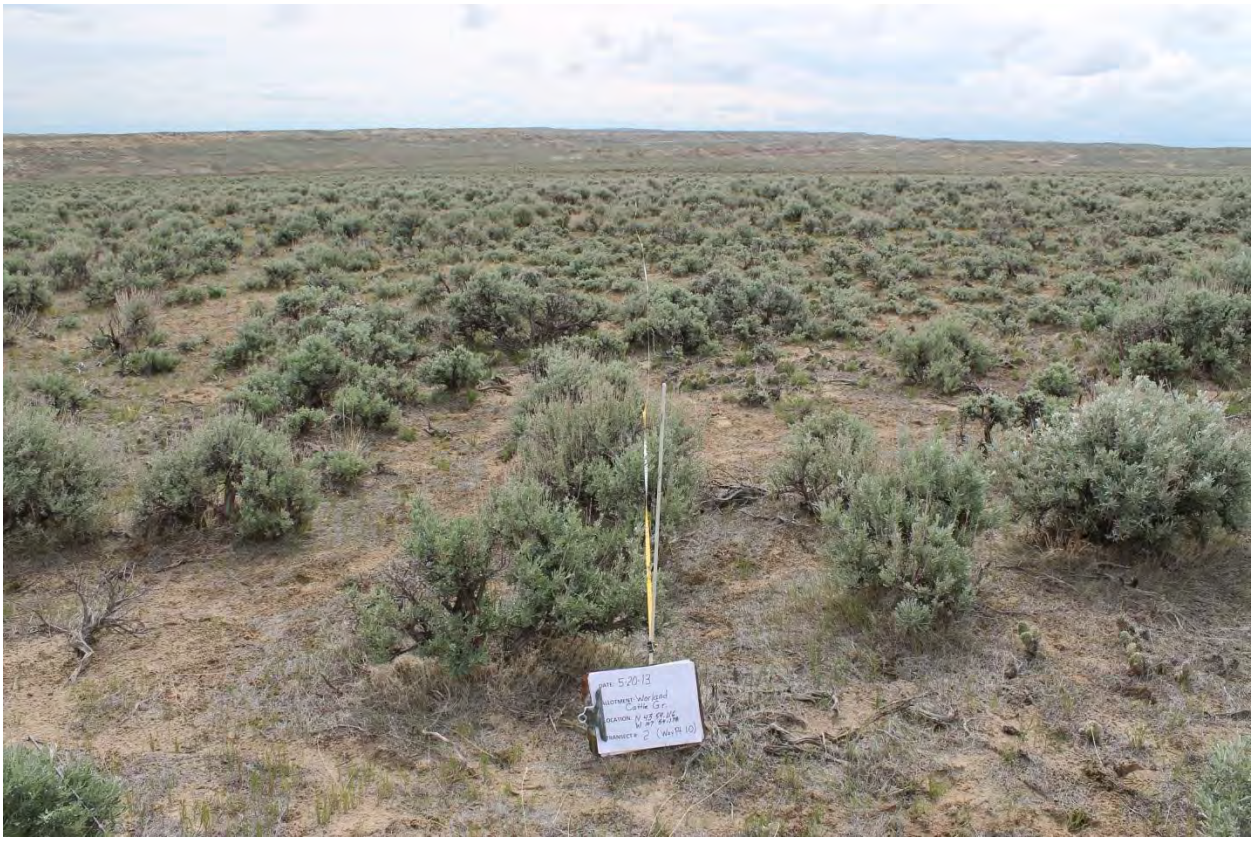
Two separate habitat assessment transects representative of the sage grouse habitat on the allotment were conducted during the growing season of 2013 to determine and record the canopy cover, brush height, and vegetation components of the wildlife habitat on the allotment. Live sage brush canopy cover was measured and found to range from 17 to 23 per cent at the two transect points. Sage brush height was found to be 18.3 and 13.1 inches. Belt transect surveys determined the mature sage brush component to be 59 and 83 per cent at the two transect points, indicating vigorous sage brush growth appropriate for this habitat and annual precipitation zone.

The one active sage grouse lek within the allotment boundary has had breeding activity shown by records dating as far back as 1983, when there were 17 males observed. The highest numbers of birds were recorded in 2006 with 25 males. Numbers of breeding birds have been as low as 1 to 4 males in 2003.

Sage-grouse Habitat Transect #1					
Date: 5/20/2013 Observers: Ken Stinson, Jim Andersen Allotment Name & #: Worland Cattle Group Location: LAT/LONG N. 43'55.814 W. 107*55.112					
Line Intercept Canopy Cover					
Species		**% Cover**			
Live Big Sagebrush		17%			
Dead Big Sagebrush		2%			
Other SPP: (Fringed)					
Other SPP: (Rabbit Brush)					
Shrub Species		**Average Height in inches**			
Live Big Sagebrush		18.3"			
Other SPP: (Gardner Saltbush)					
Other SPP: (Bud Sage)					
Belt Transect					
Species	**%Young**	**%Mature**	**%Decadent**	**%Dead**	
Big Sagebrush		59	23	18	
Gardner Saltbush					
Bud Sage					
Daubenmire Cover Class & Vegetation Height Data					
Summary of Vegetation Height	New Herbaceous Mean Ht: 7.13"		Residual Herbaceous Mean Ht: 3.78"		
Summary of Cover Class (%)	New Perennial Grasses: 12.8%	New Annual Grass: 2.7%	Perennial Forb: 0%	Residual Herbaceous: 13.85%	Other: 77%
Browse Utilization					
ATTR			Low		
Other Species:			Low		
Other Species:					

DATE: 5-20-13
ALLOTMENT:
Worland CattleGr.
LOCATION: 1008
TRANSECT #: 1

Sage-grouse Habitat Transect #2					
Date: 5/20/2013 Observers: Ken Stinson, Jim Andersen Allotment Name & #: Worland Cattle Group Location: LAT/LONG N. 43*54.116 W. 107*54.178					
Line Intercept Canopy Cover					
Species		**% Cover**			
Live Big Sagebrush		23%			
Dead Big Sagebrush		1%			
Other SPP: (Fringed)					
Other SPP: (Rabbit Brush)		1%			
Shrub Species		**Average Height in inches**			
Live Big Sagebrush		13.1”			
Other SPP: (Rabbit Brush)		5.0”			
Other SPP: (Bud Sage)					
Belt Transect					
Species	**%Young**	**%Mature**	**%Decadent**	**%Dead**	
Big Sagebrush		83%	10%	9%	
Gardner Saltbush					
Bud Sage					
Daubenmire Cover Class & Vegetation Height Data					
Summary of Vegetation Height	New Herbaceous Mean Ht: 4.4”		Residual Herbaceous Mean Ht: 3.3”		
Summary of Cover Class (%)	New Perennial Grasses: 3.95%	New Annual Grass: 6.35%	Perennial Forb: 0%	Residual Herbaceous: 3.9%	Other: 83.25%
Browse Utilization					
ATTR			Low		
Other Species:					
Other Species:					



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:

This standard is being met in the Worland Cattle Group 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 balance with the arid nature of the climatic setting and plant communities present. Of the 5 direct erosion indicators, only pedestalling consistently exceeded that which would be expected for the site. The pedestalling observed appeared to be historic, and not an active process. Rills were not observed. Water-flow patterns were observed at two monitoring sites, and they were small and unconnected. The amount of bare ground was within the guidelines described in the reference sheet for the ecological sites. The amount of litter observed was actually higher than that described in the reference sheet, due primarily to the abundance of cheatgrass. While the plant community in parts of the allotment is lacking in desirable perennial grasses to aid infiltration and reduce runoff, cheatgrass and cheatgrass litter appear to provide largely the same function. All indications are that the soils are stable and capable of

supporting healthy plant communities. Throughout the allotment, the soil structure, 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. ***MET / NOT MET (See Rationale)***

RATIONALE:
There are no naturally occurring riparian areas or wetlands within the allotment that have been documented, verified, and monitored. While there are some vegetative components of a riparian type of area (cottonwoods) they are few, segmented, and limited by the nature of the watershed and in this case the ephemeral nature of the desert ecosystem.

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 / NOT MET (See Rationale)***

As described in the monitoring section above there were multiple assessment sites that, after extensive field observation of the allotment, were determined to represent multiple areas within the allotment.

RATIONALE – MET:
As it pertains to the acres that ARE MEETING 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. These sites have a vegetative community that is stable, intact, resistant to change and provides for soil and watershed stability.

These areas are represented by the broad benches/flats above the drainages and draws or the steep ridges of the allotment that receive little or no disturbance.

RATIONALE – NOT MET:
Acres that were determined to have NOT MET the standard are those that have had a significant change or shift from the potential of the site and do not have an appropriate plant community capable of recovering or returning to a functional community without mechanical treatments, seedings, intensive grazing management, etc. These sites have little capability or probability of returning to a more desirable state.

The acres not meeting standards are the drainage bottoms and the first level terraces above the drainage bottoms, particularly in the southern half of the allotment. These acres are not meeting due to the invasion of cheatgrass and the loss of or moderate to extreme reduction of functional structural plant groups.

Prior to the Nowater adjudication process in 1964, most of the Nowater area, including the land that now comprises the Worland Cattle Group Allotment, consisted of unfenced use areas. During the adjudication, livestock grazing in the Nowater area overall was reduced 36%. Prior to the adjudication, forage demand in the Worland Cattle Group portion of the Nowater area was 2,194 AUMs. Following the adjudication, the permitted use in the Worland Cattle Group part of the Nowater area was reduced to 1,110 AUMs, constituting a 51% reduction in permitted use.

The Worland Cattle Group Allotment is currently permitted at 1,106 AUMs, which provides for a stocking rate of 13.5 acres per AUM annually. The stocking rate during April and May is 43 acres per AUM. Prior to the adjudication, the historic stocking rate on the allotment was 6.8 acres per AUM. Since 2000, the livestock grazing on the allotment has average 942 AUMs, providing for a stocking rate of 15.8 acres per

AUM. The NRCS Ecological Site Guides utilized throughout this document indicate that a continuous season long stocking rate appropriate for the defined range sites is 6 to10 acres per AUM on loamy and sandy range sites, and 12 to 20 acres per AUM on saline upland range sites.

The current stocking rate appears to be in line with that prescribed by the NRCS and there is no monitoring data to indicate that the current permitted livestock grazing on the allotment is contributing to further degradation of these acres. The current stocking rate provides for a conservative level and intensity of grazing. There are no indicators or data to indicate that the current grazing scheme is not in conformance with guidelines.

As such, the historic grazing use as described above in combination with the aggressive and opportunistic nature of cheatgrass is determined to be the causal factor for acres not meeting the standard.

The table below lists the ecological sites found on the Worland Cattle Group Allotment, and the acres of these ecological sites that are determined to be meeting or not meeting Standard 3. This information is also illustrated on Map 8, located at the end of this document.

Standard 3 Conformance				
Surface Ownership	**Ecological Site**	**Ecological State**	**Conformance**	**Acres**
BLM	Shale/Rock Outcrop 5-9	Badlands	Badlands	2,730
BLM	Loamy/Shallow Loamy 5-9	Perennial Grass/Big Sagebrush	Met	2,090
BLM	Saline Upland 5-9	Gardner's Saltbush/Bottlebrush Squirreltail	Met	1,735
BLM	Sandy 5-9	Perennial Grass/Big Sagebrush	Met	3,673
BLM	Saline Lowland 5-9	Inland Saltgrass Sod	Not Met	932
BLM	Loamy/Shallow Loamy 5-9	Salt Tolerant Shrub/Bare Ground	Not Met	295
BLM	Saline Upland 5-9	Gardner's Saltbush/Bottlebrush Squirreltail	Not Met	1,182
BLM	Loamy/Shallow Loamy 5-9	Perennial Grass/Big Sagebrush	Not Met	25
BLM	Water	Reservoir	Water	21
			Total	**12,683**

Badlands and water comprise 2,751 acres of the 12,683 public acres within the Worland Cattle Group Allotment (22%). Monitoring data and field observations indicate that of the remaining 9,932 acres, 7,498 acres within the allotment (59%) are meeting Standard 3. The remaining 2,434 acres within the allotment (19%) are not meeting Standard 3.

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/NOT MET***

RATIONALE:
Two monitoring locations were chosen in the allotment for monitoring and evaluation purposes of wildlife/sagebrush habitats. Data from both transects indicates viable sage brush steppe rangeland capable of sustaining wildlife populations and a diversity of native plant and animal species appropriate to the habitat and precipitation characteristics of the allotment. (Photos and data tables are provided). 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. Data from these transects clearly falls within these parameters. Some level of sage-grouse use is occurring throughout the allotment where sagebrush densities are suitable. Nesting and early brood rearing could be occurring in the allotment in suitable habitats because of the proximity to leks. There are areas where there the nesting habitat conditions are marginal because of the low frequency of cool season bunch grasses and high frequency of invasive plants. In a study conducted in south-central Wyoming, Kirol et al. (2012) found that selection of microhabitat for nests was negatively correlated with cheatgrass, and Coates/Lockyer et al. (2011) in a similar study in Nevada found that adult females selected for perennial grasses while avoiding annual grasses at the nest site.

The North and Central monitoring areas (and those acres represented by these areas as described in Standard 3) were found to be in a perennial grass/big sagebrush community. This community type provides an overstory of woody species and understory of grasses and forbs. It provides for an adequate source of cover, feed, and nesting habitats. This is a community type that provides for and supports a variety of wildlife throughout the year and does meet the definition of Standard 4.

The South monitoring site (and those acres represented by these areas as described in Standard 3) was found to be in a big sagebrush/bare ground community-with bare ground being replaced by undesirable annuals. This community type would still offer feed and cover for larger ungulates but because of the reduced perennial grasses and forbs it would not provide for adequate foraging opportunities to upland game birds. While cover may be provided for in this community state the foraging values is diminished and as such would not meet the definition of Standard 4.

The LI3 monitoring site (and those acres represented by these areas as described in Standard 3) was found to be in a salt tolerant/bare ground community-with bare ground being replaced by undesirable annuals. This community is much reduced in plant spcies diversity. It would still offer some feed and cover for wildlife but because of the reduced perennial grasses and forbs the foraging opportunities would be minimal. While cover and foraging values is diminished and as such would not meet the definition of Standard 4.

4.5 Standard 5

Water quality meets State standards. ***UNKNOWN***

RATIONALE:
There is no information currently available to indicate that this Standard is or is not being met. There are no major drainages of significant size to be listed in the WYDEQ report.

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.

5.0 Resource Specialist Signatures

X _____

Cameron Henrichsen
Rangeland Management Specialist

X _____

John Elliott
Supervisory Rangeland Management Specialist

X _____

Ted Igleheart
Wildlife Biologist

X _____

Jared Dalebout
Hydrologist

X _____

Michael J. Phillips
Assistant Field Manager - Resources

X _____

Other_____

6.0 DETERMINATION

Based on the information provided in this assessment, ***I have determined that all of the standards ARE NOT being met but that livestock grazing IS in conformance with the standards.***

X _____

Rebecca Good
Worland Field Office Manager

DATE:_____

7.0 REFERENCES

Binkley, D., Brown, T. 1993. Management Impacts on Water Quality of Forests and Rangelands. USDA Forest Service. General Technical Report RM-239, pp 5-6.

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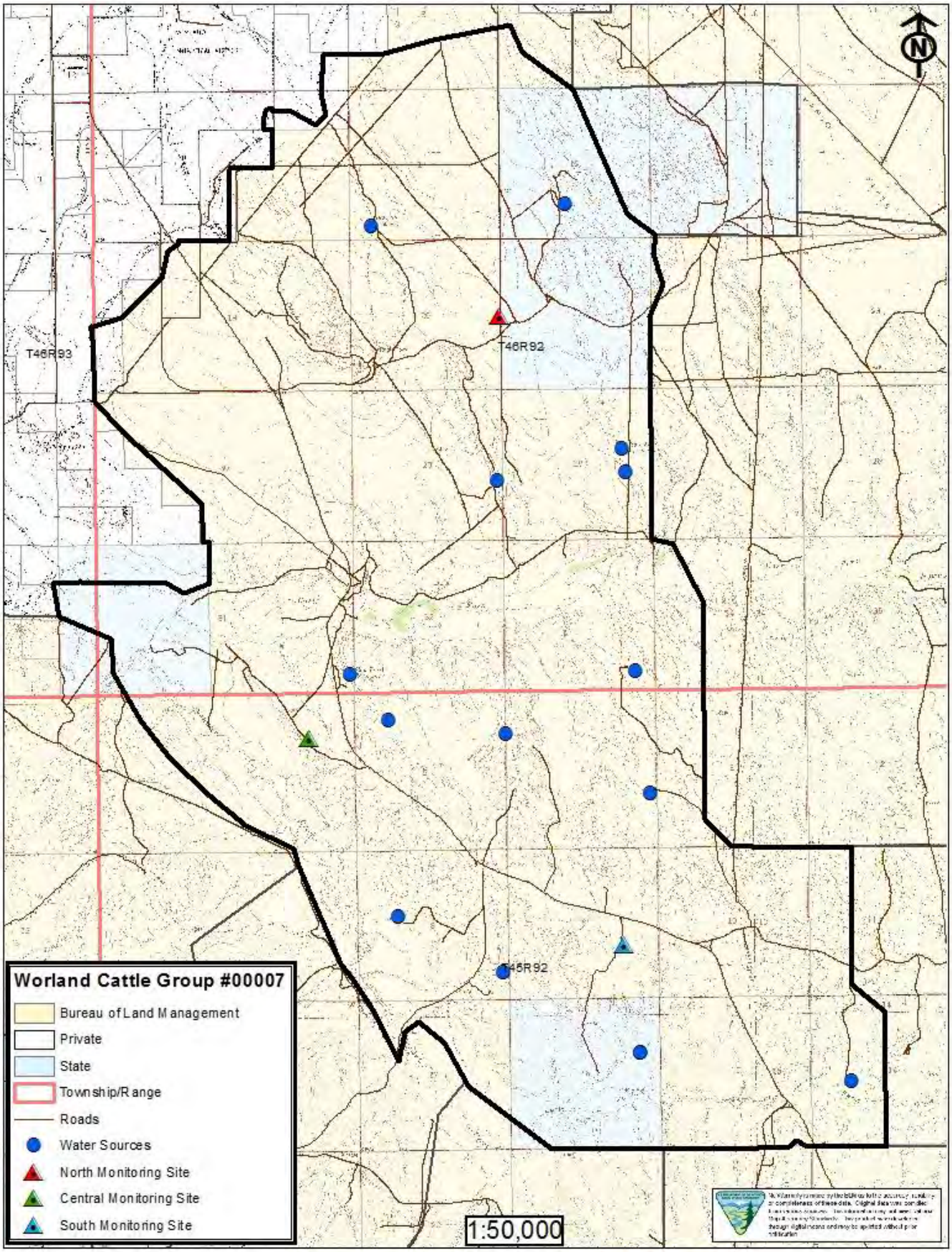
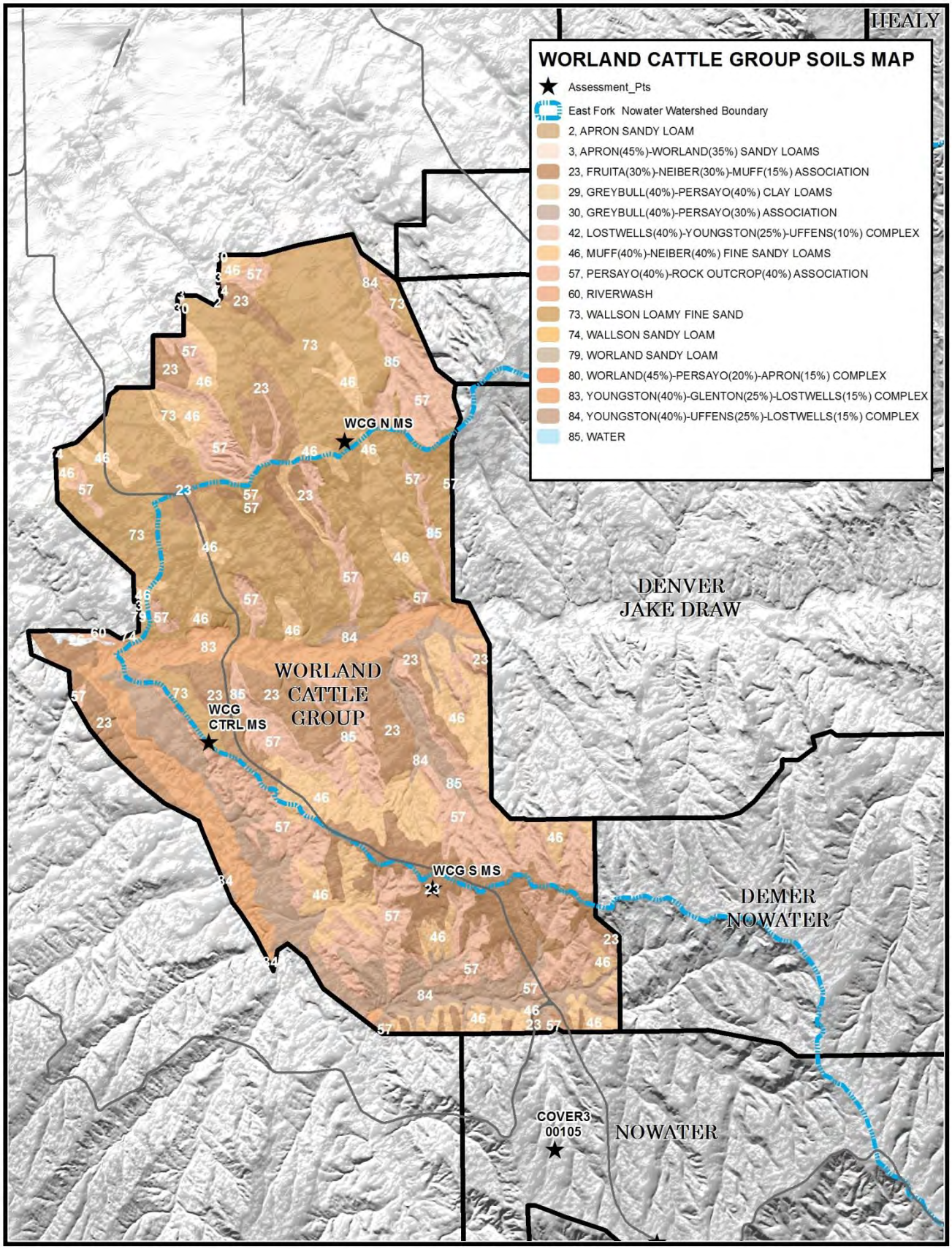
Wyoming DEQ 2012 305b Report

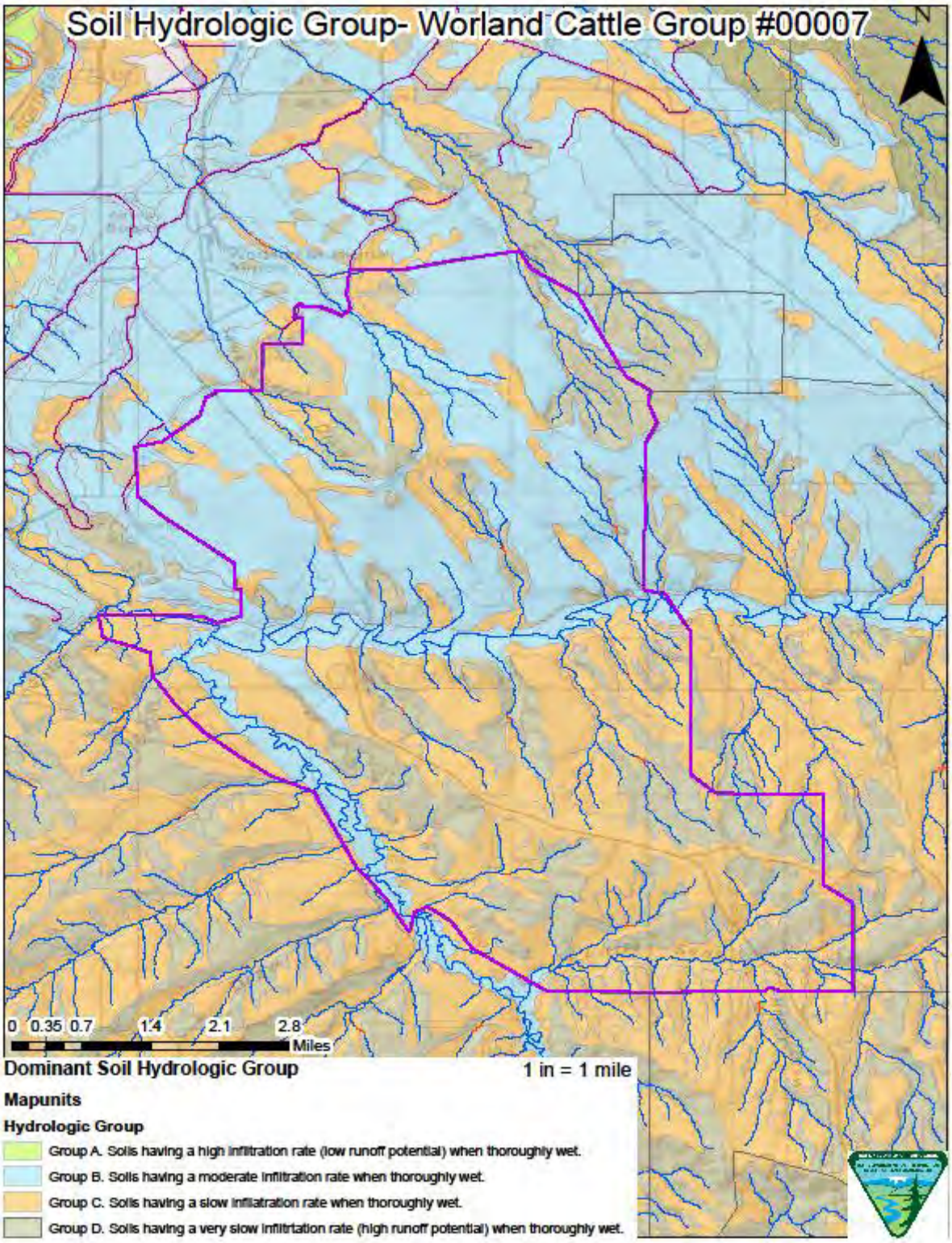
Map 1: Allotment Map (Not to Scale)



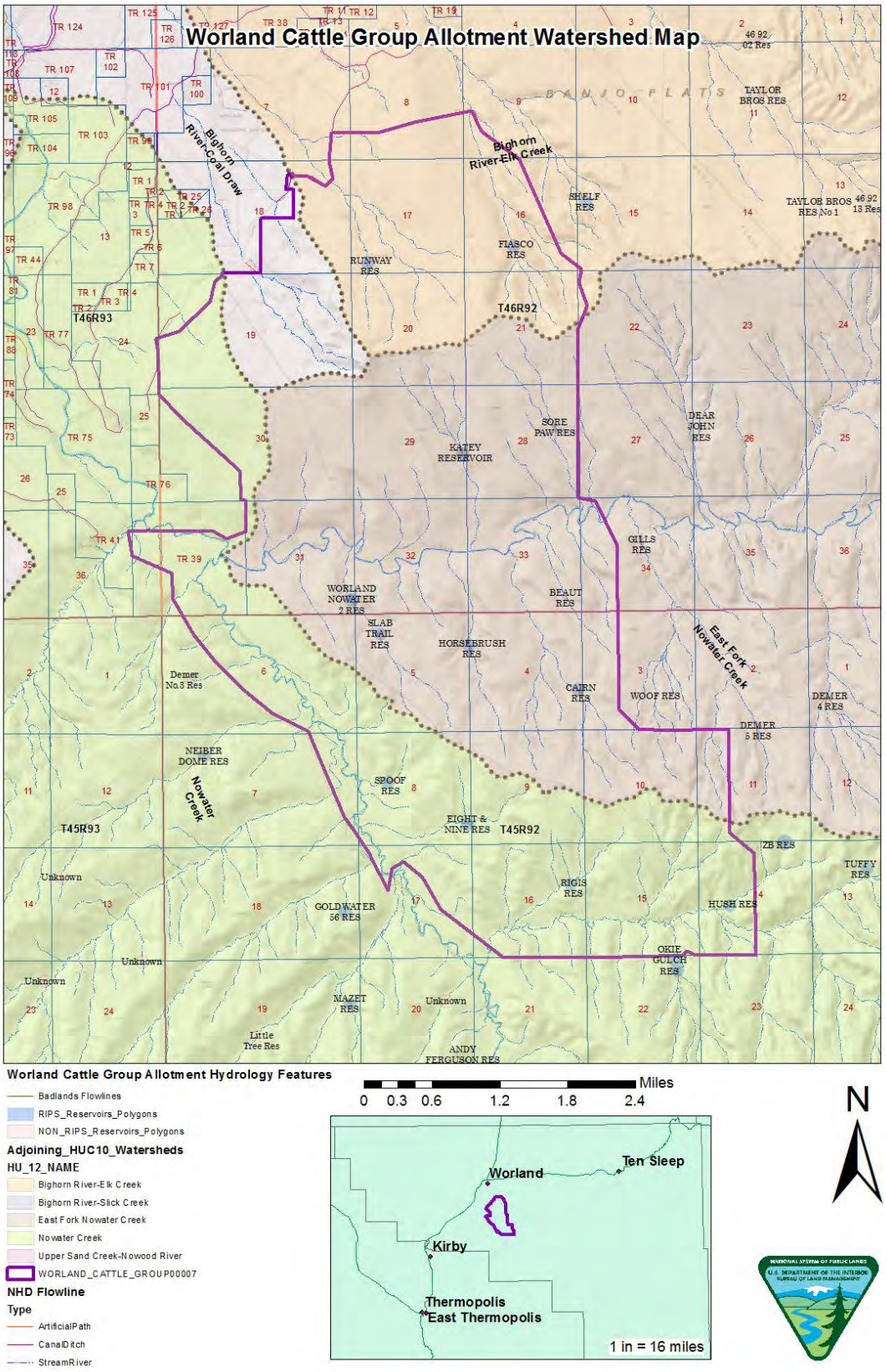
Map 2: Soils and Ecological Sites



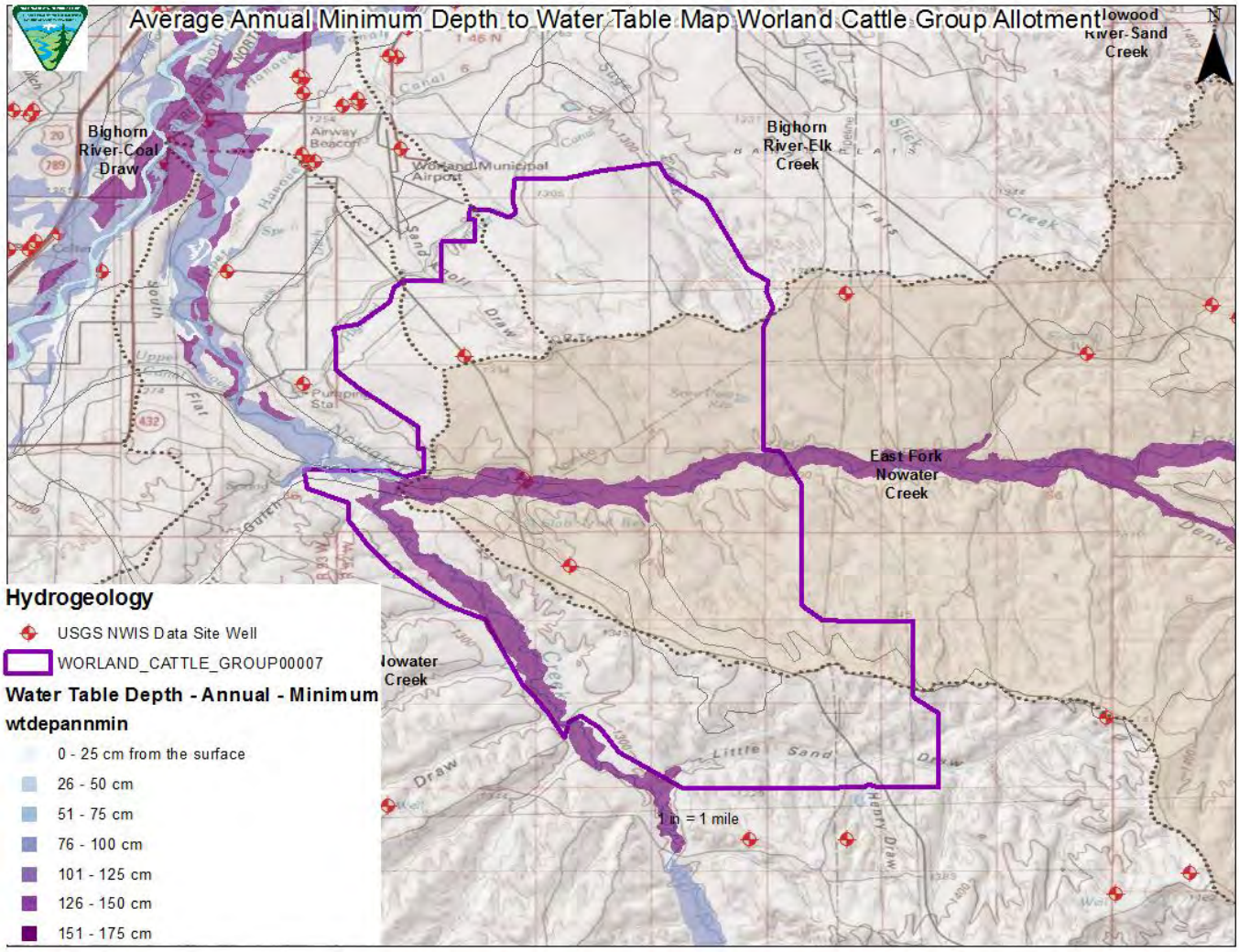
Map 3: Soil Hydrologic Group



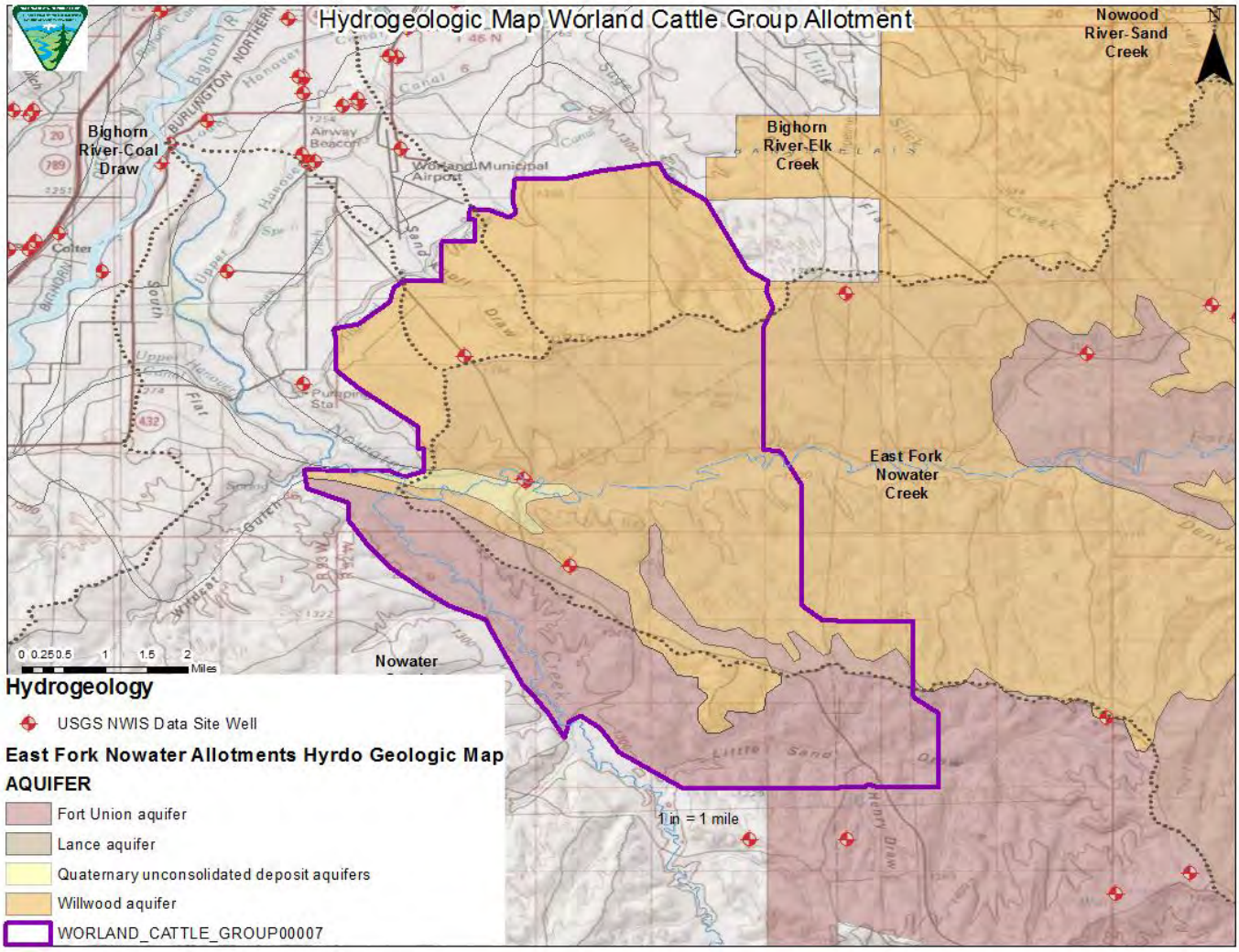
Map 4: Watershed Map (Not to Scale)



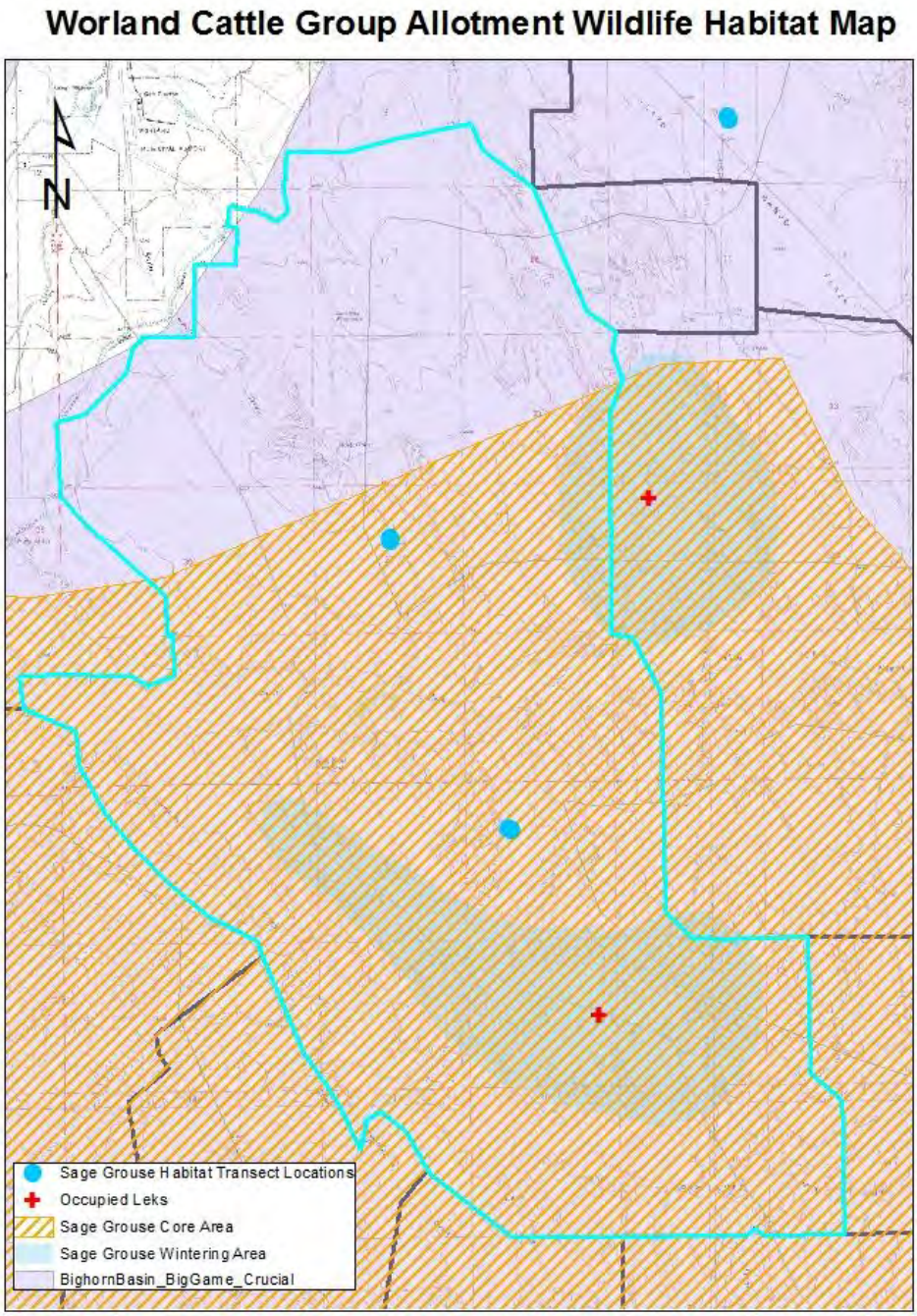
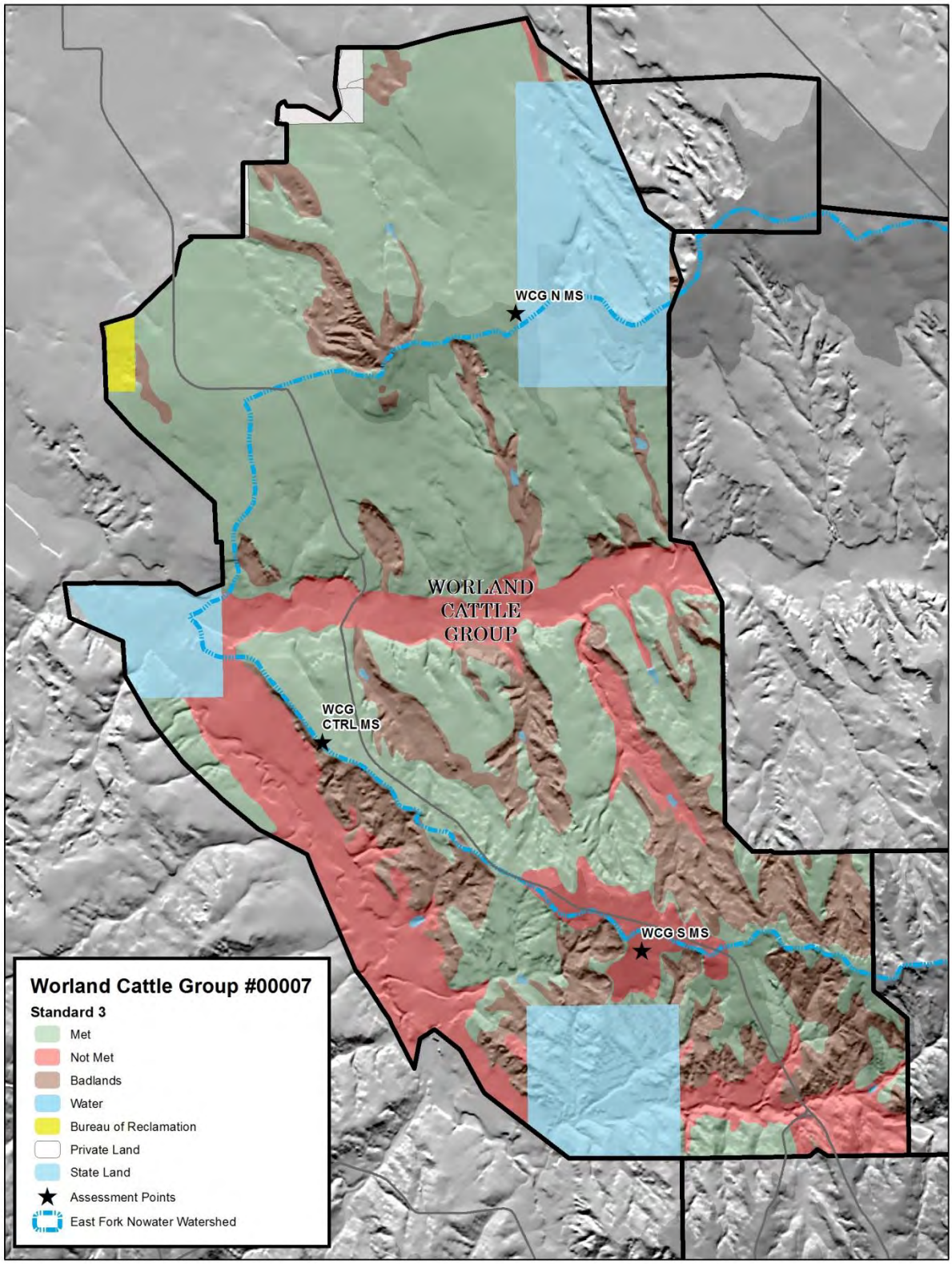
Map 5: Average Annual Minimum Depth to Water Table



Map 6: Hydrogeologic Map



Map 7: Wildlife Habitat



Map 8: Upland Vegetation Standard Conformance (Standard 3)