Bureau of Land Management

WIND RIVER/BIGHORN BASIN DISTRICT
Worland Field Office

Nowater Allotment
#00105

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

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 Nowater Allotment No. 00105. 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

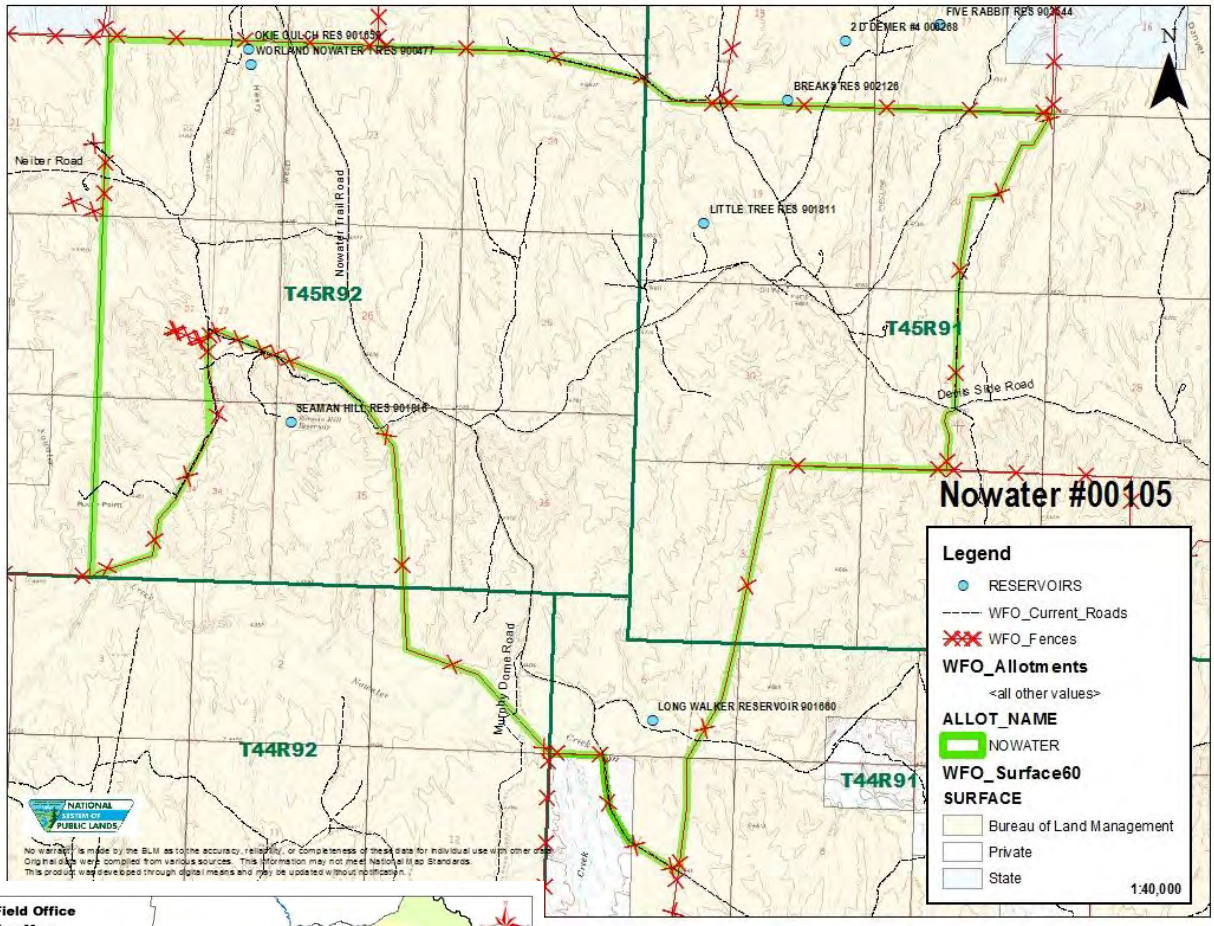
Standard #6: Air quality meets State standards

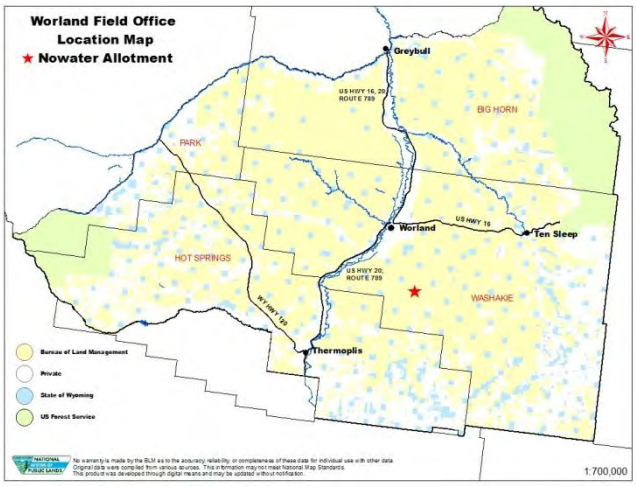
2.0 AFFECTED ENVIRONMENT – ALLOTMENT DESCRIPTION, RESOURCE VALUES, AND USES

2.1 Location and Land Ownership

The Nowater Allotment is located approximately 13 miles southeast of Worland, Wyoming. The average elevation ranges from 4,500 feet to 4,800 feet above sea level. The allotment encompasses approximately 9,733 total acres including 42 private land acres (Washakie Resource Management Plan, September 1988). For management priorities, the allotment is classified in the "I" (Improve) category. The allotment can be accessed via the Nowater Stock Trail and Devil's Slide roads which run through the allotment.

Allotment Map and Location





2.2 Climate/Air Quality

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.

The nearest BLM rain gauge, Demer, is approximately 2 mile northeast of the allotment. The annual average precipitation from 1984 to 2013 at this rain gauge was 7.67 inches and the average growing season precipitation for the same period was 3.85 inches.

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:

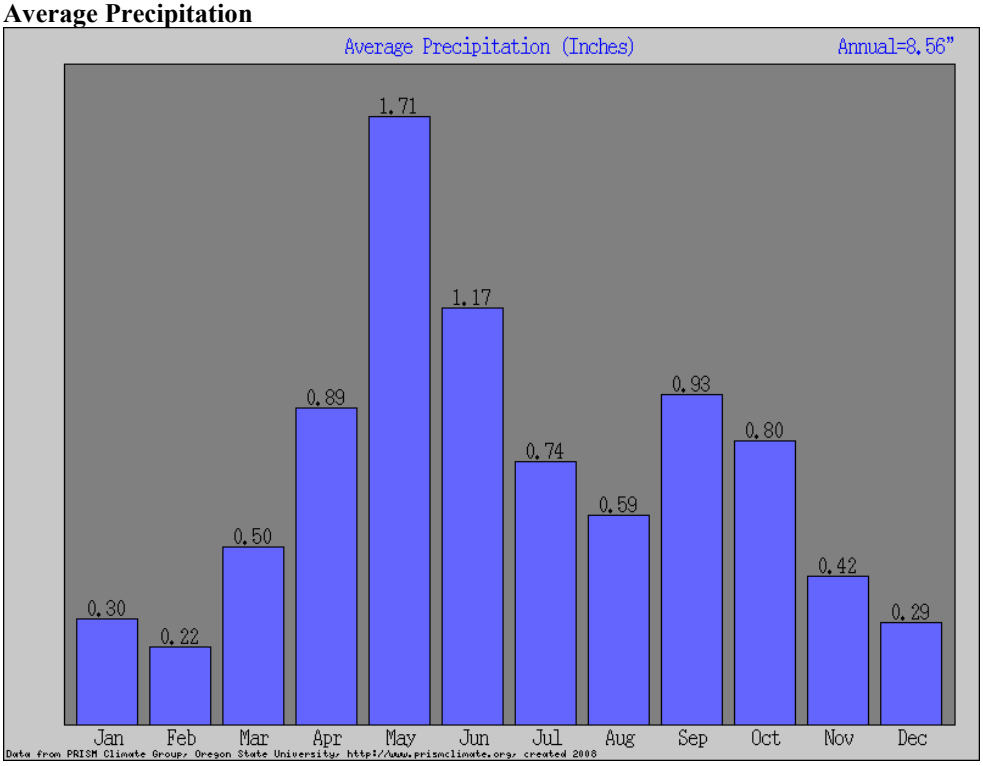
	Minimum	Maximum	5 yrs. Out of 10 between
Frost-free period (days):	98	171	May 13 – September 19
Freeze-free period (days):	120	184	May 1 – October 5
Mean Annual Precipitation (inches):	3.22	10.97	

Mean annual precipitation: 7.42 inches
Mean annual air temperature: 45.01°F (31.2°F Avg. Min. to 58.7°F Avg. Max.)

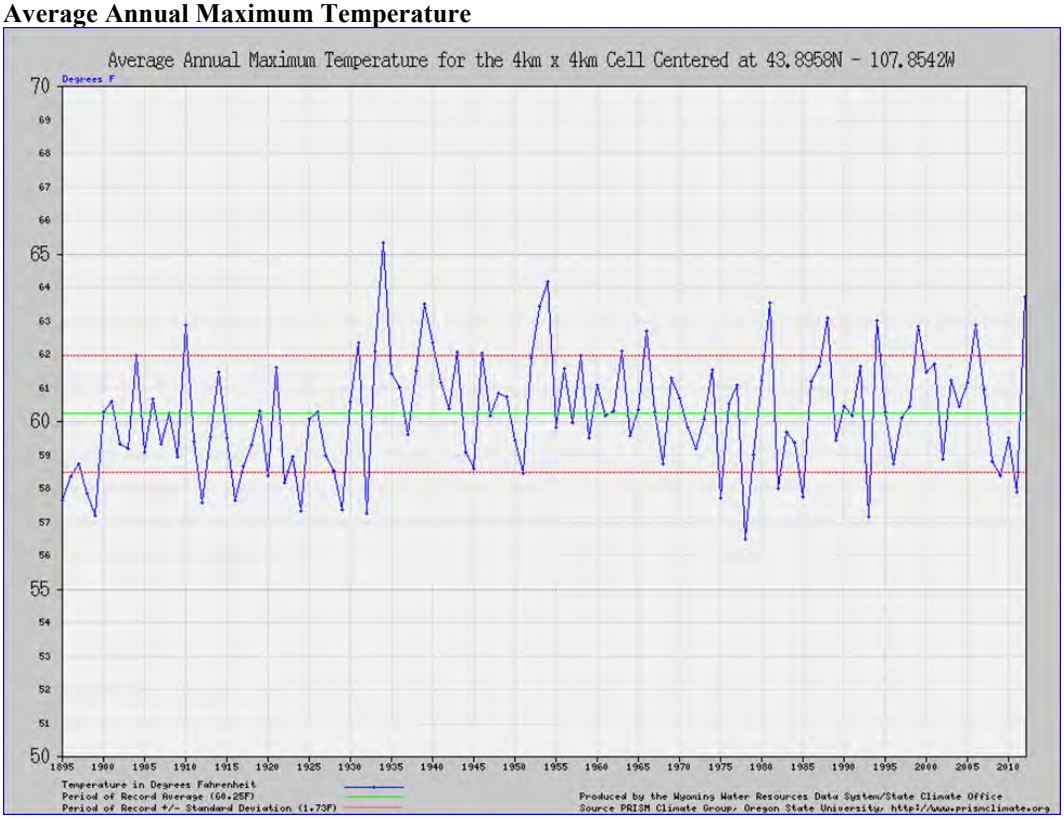
For detailed information visit the Natural Resources Conservation Service (NRCS) National Water and Climate Center at http://www.wcc.nrcs.usda.gov/ website. Other climate station(s) representative of this precipitation zone include "Basin", "Deaver", "Lovell", and "Worland".(United States Department of Agriculture (USDA) NRCS Technical Guide Section IIE Rev. 08/12/05).

An additional climate source is 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 that is centered at 43.8958 N, 107.8542 W, that was approximated to be the average for the watershed (Tables 1-3). In total, 40 percent of the annual precipitation is during the months of April-June. Additionally the 30 year frost free period for 28 and 32 degree days for the watershed is displayed below along with the 30 year average maximum temperature.

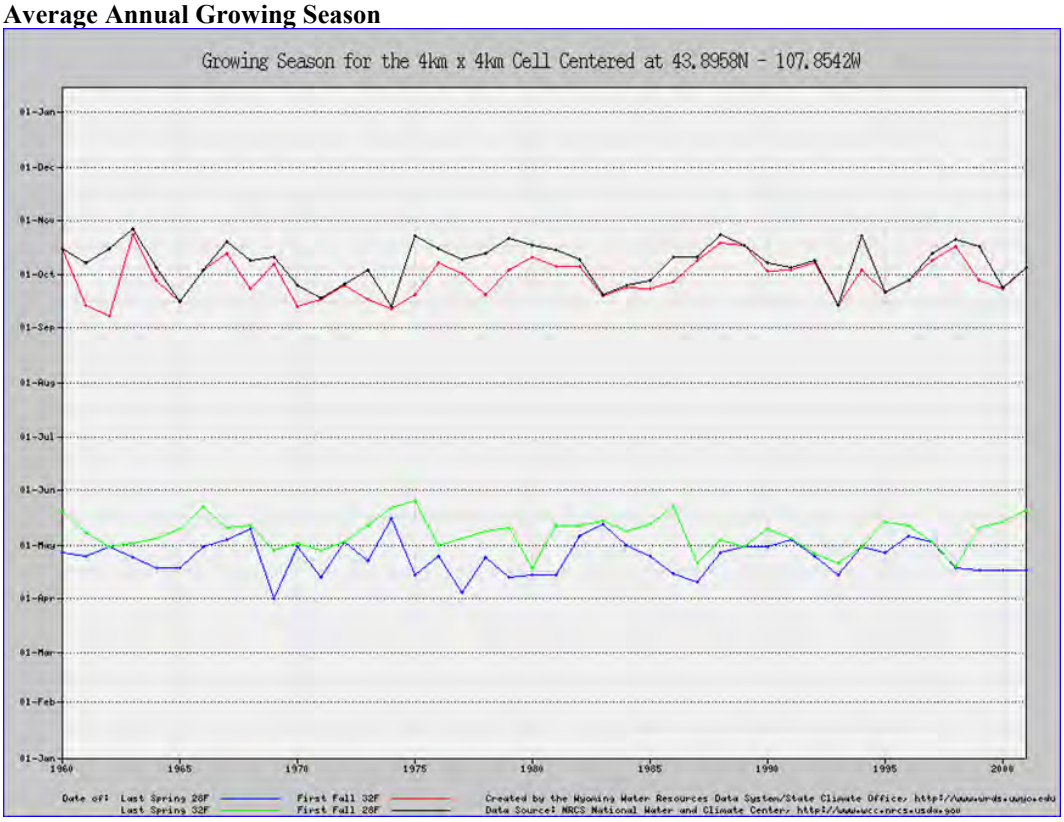
Average Precipitation



Average Annual Maximum Temperature



Average Annual Growing Season



The maximum and minimum elevations for each allotment within the East Fork Nowater Creek watershed and adjacent areas were calculated along with the average slope given in percent rise for each 10 meter digital elevation grid. The Nowater allotment positioned in the center of the watershed and has a maximum elevation of 4849 feet above sea level. The overall average slope was estimated to be 15.2 percent rise.

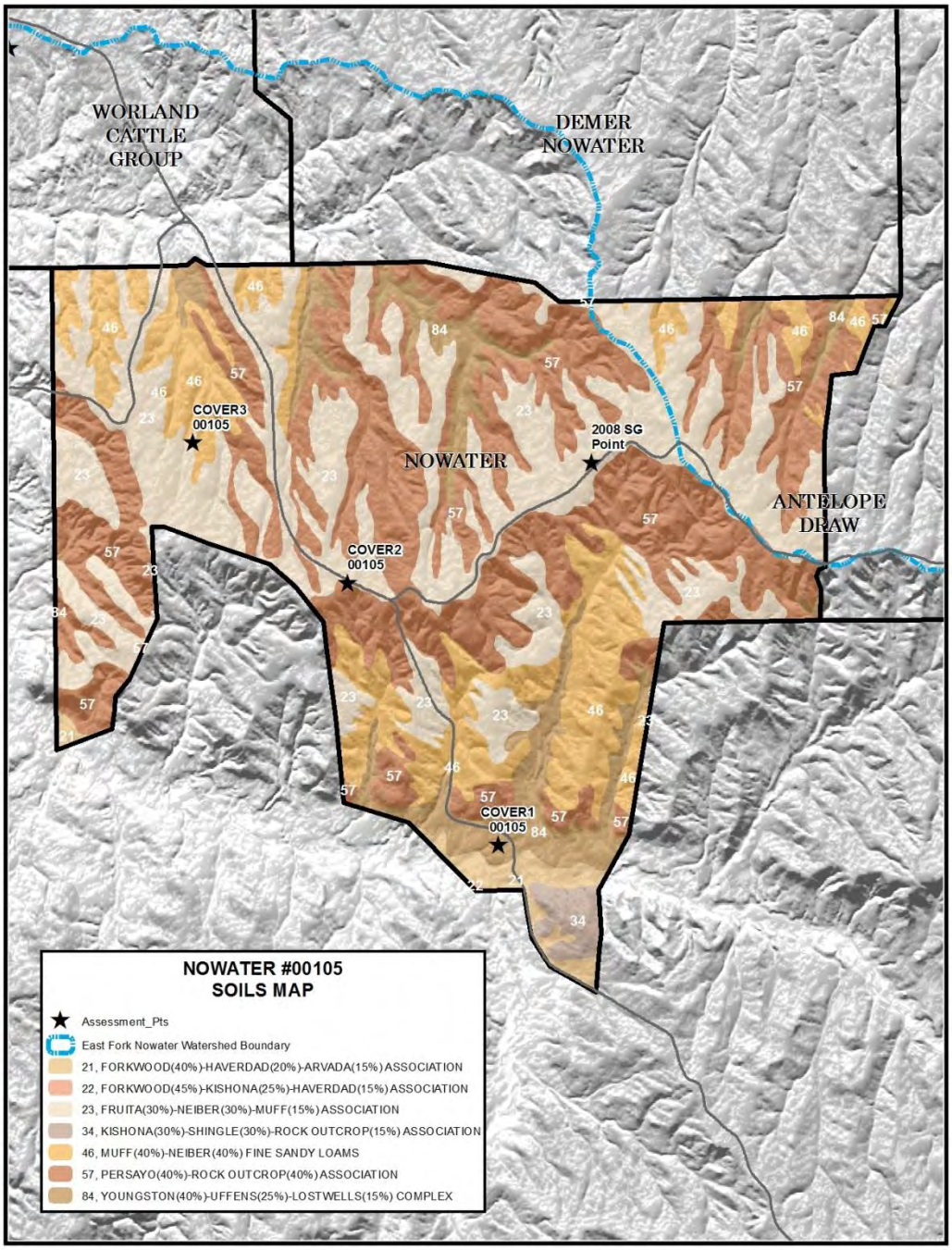
Elevations within East Fork Nowater Creek Watershed

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 (sandstone, shale and/or mixed alluvium), position on the landscape, slope and aspect. Soil depth ranges from a few inches to over 60 inches. These soils typically have a light brown surface layer. Surface textures are fine sandy loams, loams, clay loams and silty clay loams. The subsoil commonly reflects an increase in clay, calcium carbonate and sodium, being expressed argillic, calcic, natric or natriargid horizons. Slopes range from 0 to 40 percent.

Soils



The Nowater Allotment is situated within the 5-9 inch Big Horn Basin Precipitation Zone. Based on the Soil Survey for Washakie County, the dominant ecological sites found in the in the allotment are listed below:

Loamy	5-9 inch precipitation zone	R032XY122WY
Saline Upland	5-9 inch precipitation zone	R032XY144WY
Shale	5-9 inch precipitation zone	R032XY154WY
Sandy	5-9 inch precipitation zone	R032XY150WY

There is also a significant amount of Rock Outcrop (badlands) found within the allotment.

In 2013 an interdisciplinary team of BLM resource specialists evaluated the Nowater Allotment through three assessments using the *"Interpreting Indicators of Rangeland Health",* Technical Reference 1734-6 and other monitoring data. The three assessments were conducted throughout the allotment (Map 3).

Assessment one was located in Map Unit 84, Youngston-Uffen-Lostwell Complex. Slope was less than two percent. The surface texture was loam with moderate depth and the A horizon was three inches in depth. The B horizon was silt loam and was four to twelve inches in depth. A calcareous layer was observed at the seven to eight inch depth and compaction occurred at twelve inches in depth. There was no surface effervescence but the calcareous layer exhibited mild effervescence. The surface pH was 9.0 and subsurface pH was 9.2.

Assessment two was located in Map Unit 23, Fruita-Neiber-Muff Association. Slope was two to four percent. The surface texture was sandy loam with moderate depth and the A horizon was two and half inches in depth. The B horizon was clay loam and twelve inches in depth. There was no surface effervescence. The surface pH was 7.9.

Assessment three was also located in Map Unit 23, Fruita-Neiber-Muff Association. Slope was two to four percent. The surface color was dark brown and texture was loam with moderate depth and the A horizon was three inches in depth. The B horizon was pale gray and the texture was sandy loam. A calcium layer was observed at the six inch depth and structure was blocky. There was a strong surface effervescence and the calcium layer exhibited a violent effervescence. The surface pH was 8.6.

Hydrologic Group B, C and Hydrologic Group D Soils Percentage

The soil hydrologic group (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 Sand Creek and East Fork 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.

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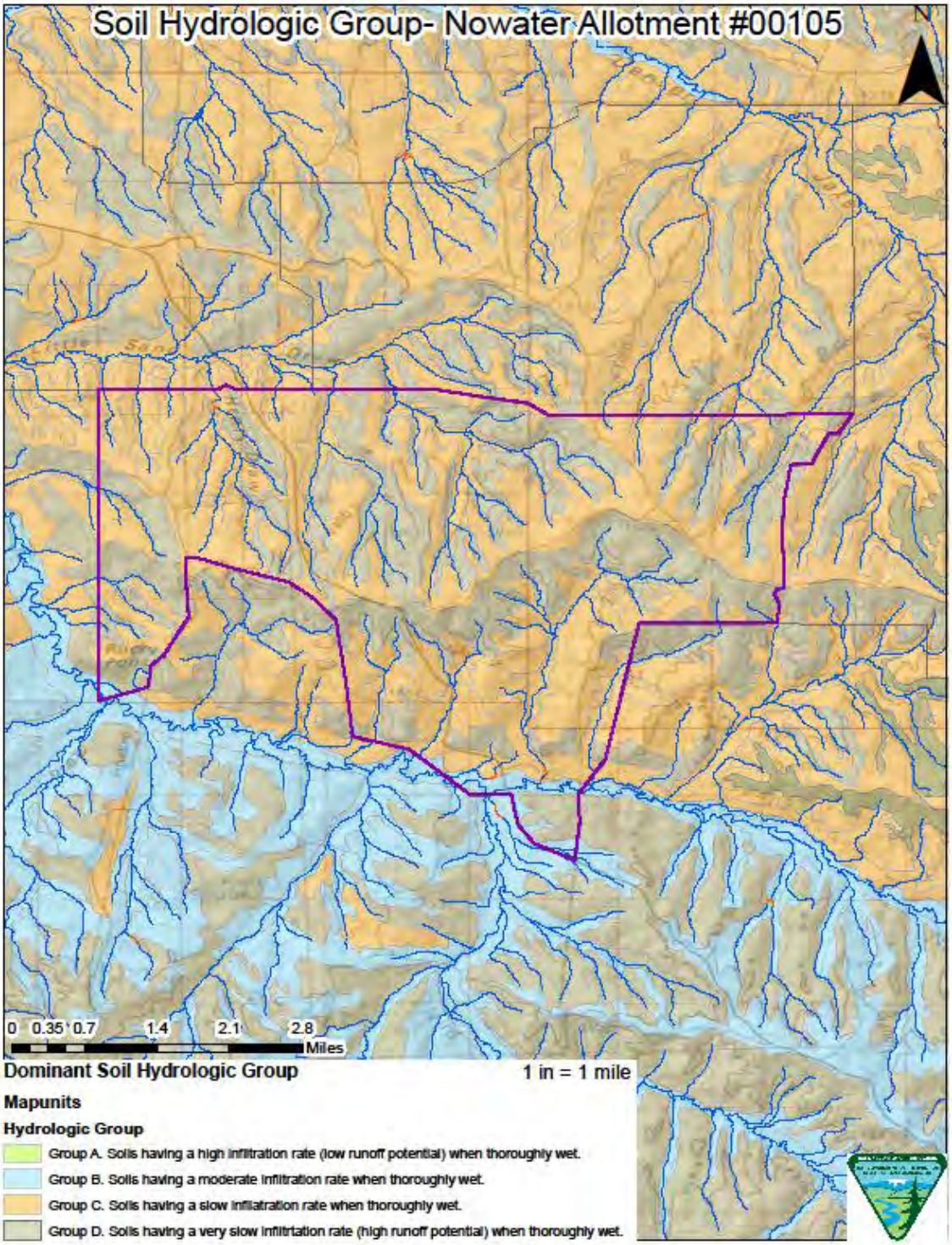
Dominant Soil Hydrologic Group Nowater Allotment #00105



2.4 Hydrology/Riparian

2.4.1 Surface Water/Watershed

The Nowater Allotment is located within the East Fork of Nowater Creek and the Nowater Creek level #5 watersheds.

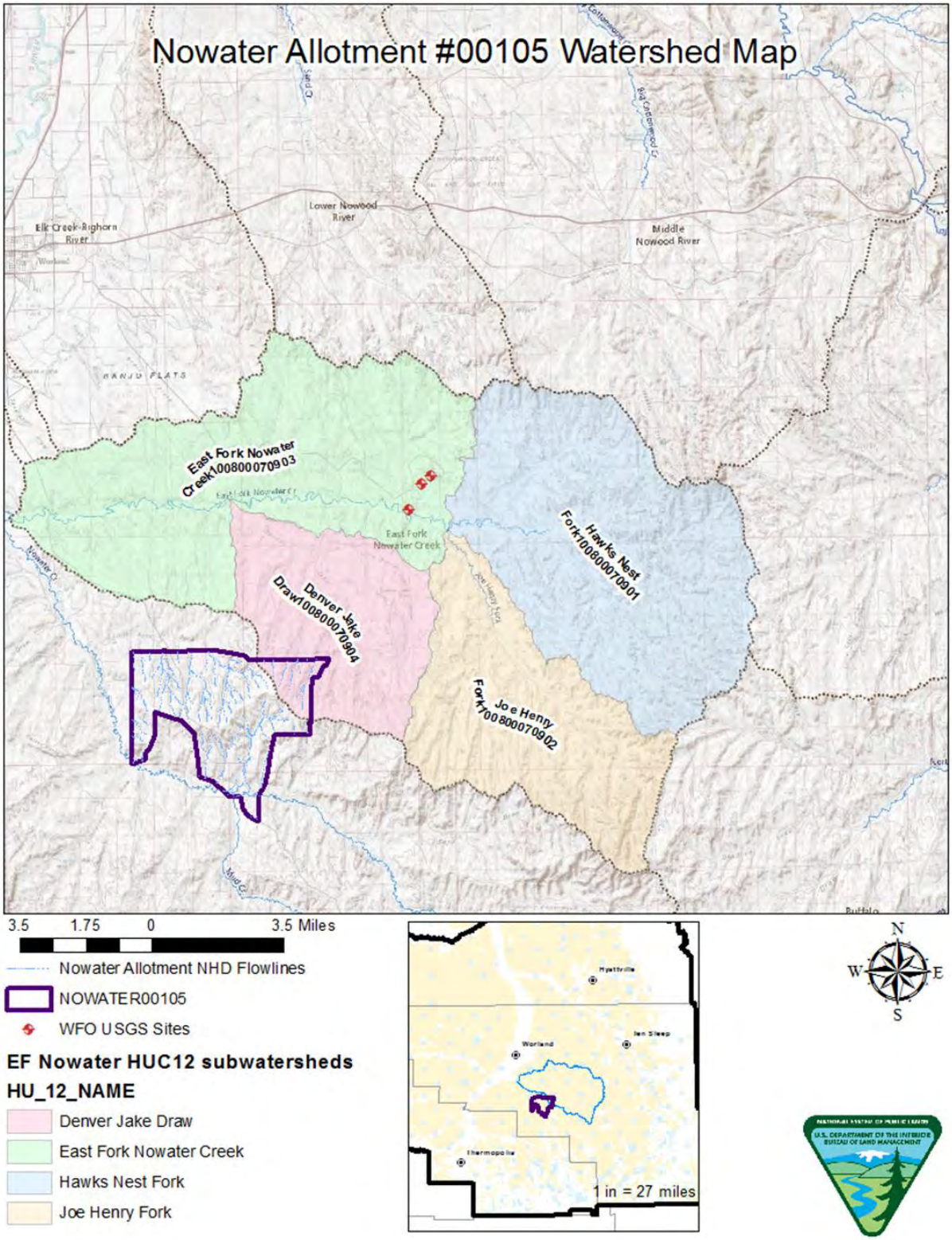
Within the Nowater Allotment there are three different level #6 sub-watersheds that are identified by the United States Geological Survey (USGS) by name and Hydrologic Units Codes or (HUC). The majority (64%) of the allotment is located within the Zimmerman Draw sub-watershed. The amount of area that each allotment contributes to the other sub-watersheds is presented in the watershed table below.

All of the East Fork of Nowater Creek sub-watersheds drain into Nowater Creek 18 miles downstream and west of the allotment boundary. The Nowater watershed portions of the allotment drain directly into Nowater Creek which is a primary tributary to the Bighorn River within the Bighorn Basin.

Watersheds in Nowater Allotment #00105

Watershed (HUC) Level #5	Acres (mi²)	Allotment Acres (mi²)	% of Acres of Watershed in the Allotment	
Nowater Creek	170931 (267)	7461(11.7)	4.3	
East Fork Nowater Creek	98790 (154)	1032(1.6)	1	
Sub-watershed (HUC) Level #6	Acres (mi²)	Acres (mi²) Within Allotment	% of Acres of Sub-watershed in the Allotment	% of Allotment
Nowater Creek-Zimmerman Draw (100800070804)	49448 (77)	5421(8.5)	11.0	64
Nowater Creek-Sand Draw (1008000702)	33250 (52)	2040 (3.2)	6.1	24
Denver Jake Draw (100800070904)	14970(23.4)	1032(1.6)	6.9	12

Watershed Map



The total length of ephemeral/intermittent channels for the Nowater allotment is 60.5 total miles. There are 8.1 miles of the East Fork Nowater Creek and 56.1 miles within Nowater Creek. Rainfall patterns in arid and semi-arid regions influence when stream flow is most likely (EPA, 2008). The high amount of ephemeral channels is indicative of the steep badland topography of the allotment in addition to infrequent storm events.

Intermittent/Ephemeral Channels (miles) in Nowater Allotment #00105

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**
Nowater	60.5	8.6	1	0	0	0	51.9

Rosgen Types

The channels within the watershed are dominantly Rosgen G5 type 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 Nowater Creek is a classified as sand material size. 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, which are also present, 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 and tributaries such as Joe Henry Fork are classified as Rosgen C5 channels, when healthy, where there is still periodic flooding and access to the floodplain from high flow events. The average main channel slope is the lowest of all the surrounding allotment (0.3) percent and represents the lower portions of the watershed where the channel slope is minimal .

Rosgen Types in Nowater Allotment #00105

Allotment	**Main Channel**	**Average Main Channel Slope**	**Rosgen Channel Types**
Nowater	Nowater Creek	0.3	C5, F5,G5
Badlands	East Fork Sand Creek	0.51	G5b, F5b

Drainage Pattern

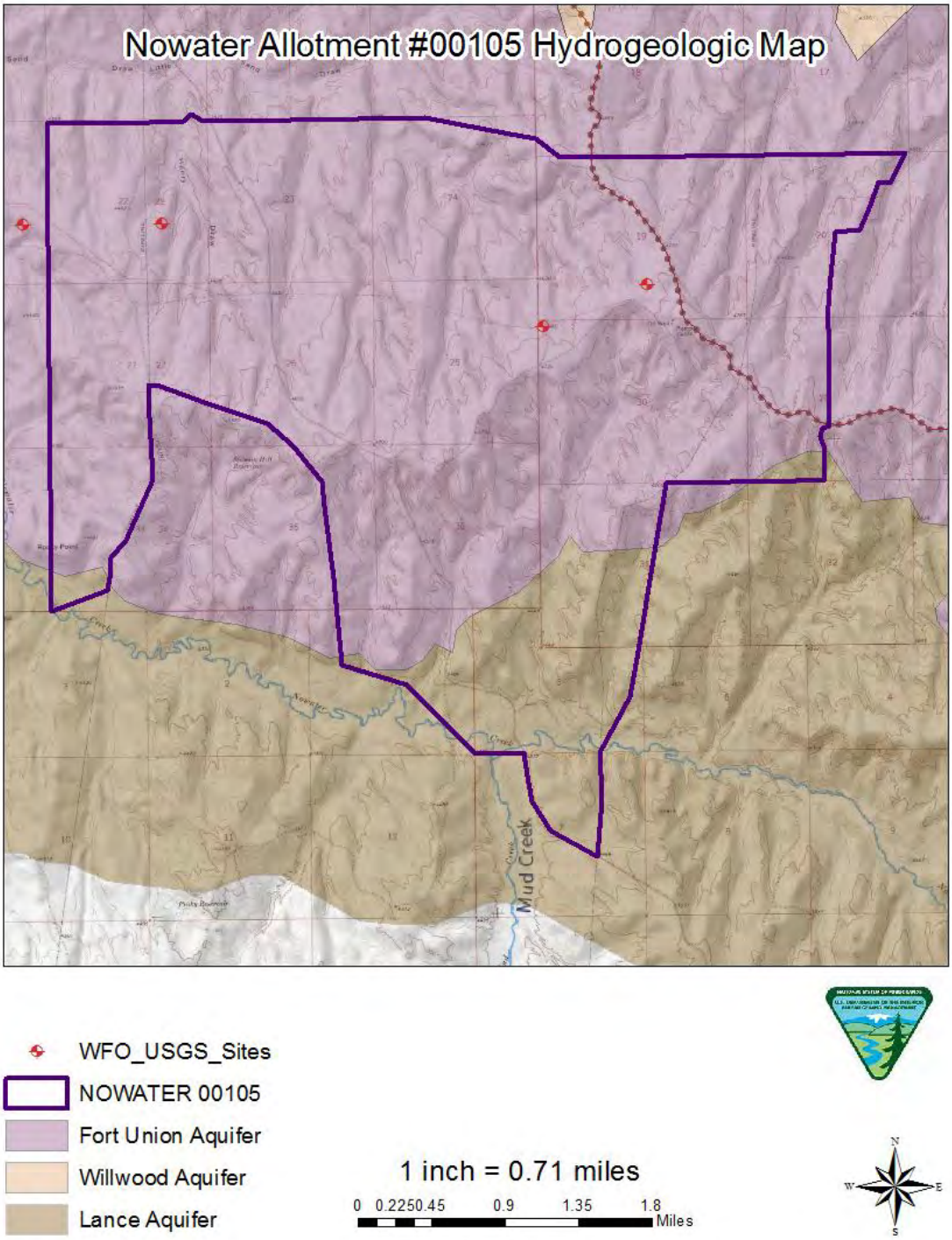
The dominant land forming topographic process is from alluvial forces of erosion. The drainage pattern is a dendritic drainage pattern that reflects horizontal sedimentary bedrock over which it was formed. The drainage density or amount of drainages per square mile is high, and very high along badland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

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 outcrop of the Fort Union Formations. The northern half of the allotment is dominantly mapped as the Fort Union Formation. The southern portions of the allotment are mapped as the Cretaceous Lance Formation. There are minor amount of Quaternary alluvium and colluvium unconsolidated deposits that are not mapped but present along the lower portions

of the main drainages. There 3 ground water wells in the allotment, that are completed in formations at depth, with the depth ranging from 500-600 feet and the static water levels ranging from 150 to 330 feet below surface level.

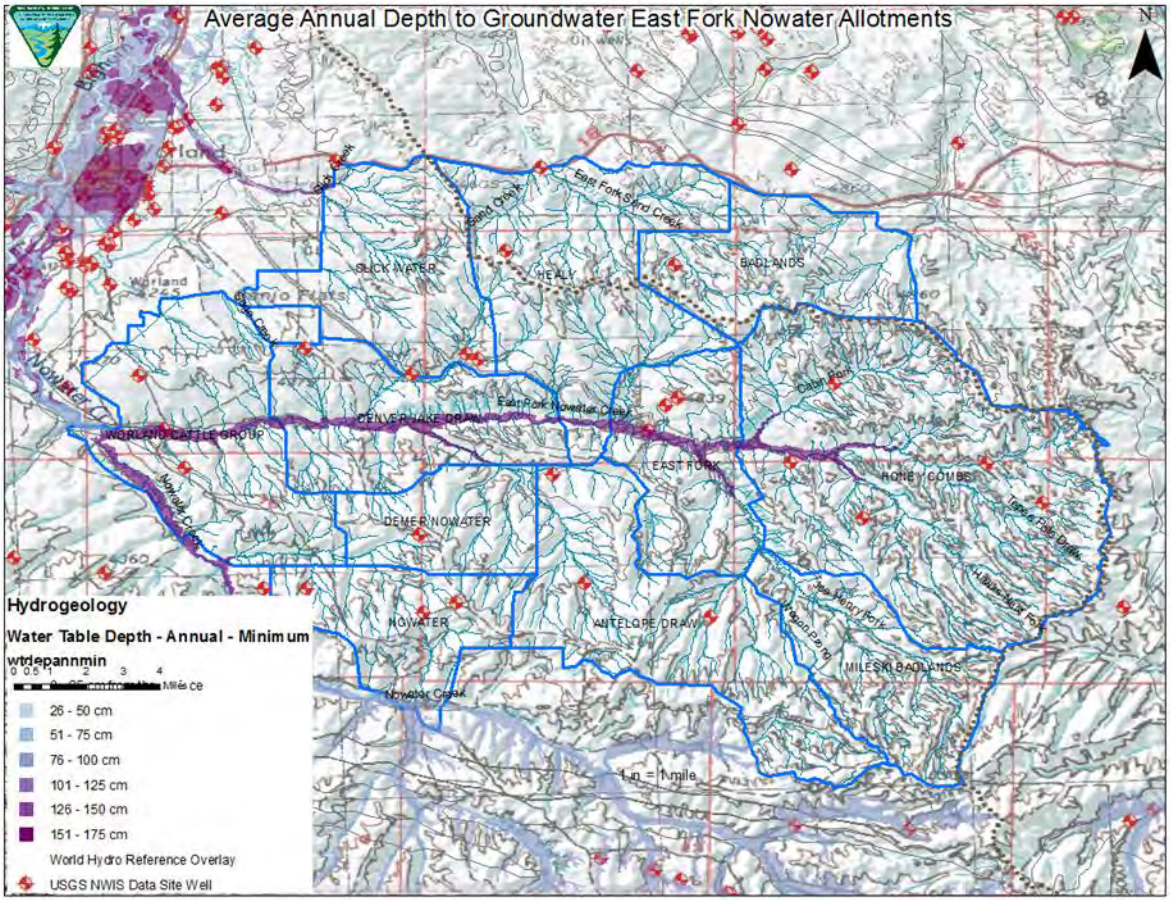
Hydrogeologic Map – Nowater Allotment #00105



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.

Average Annual Depth to Groundwater – East Fork Nowater Allotments



2.4.3 Water Quality (Surface)

The main drainage of Nowater Creek and its tributaries 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 below. These streams support other aquatic life, recreation, wildlife, agriculture, industry, and provide scenic value throughout portions of the year.

WY DEQ Use Designations

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

2.4.4 Riparian

The main segment of the 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

The vegetation in the allotment consists of mid and short cool-season perennial upland grasses, big sagebrush, and a variety of forbs. Vegetation in the allotment is variable and dependent upon the range site. The assessment area at Site 1 was part of 140 acres that burned in East Black Mountain wildfire in August of 1996.

Site 1

The plant species identified during the first 2013 assessment (N43° 48.589' – W107° 50.018') in the south part of the allotment included halogeton *(Halogeton glomeratus)*, annual wheatgrass *(Eremopyrum triticeum)*, Russian thistle *(Salsola kali)*, cheatgrass *(Bromus tectorum)*, plains pricklypear cactus *(Opuntia polyacantha)* , greasewood *(Sarcobatus vermiculatus)*, and less common Wyoming big *sagebrush (Artemisia tridentata ssp. Wyomingensis)*,blue grama ((*Bouteloua gracillis*), and Sandberg bluegrass *(Poa secunda)* and needleand thread (*Hesperostipa comata*).

Site 2

The plant species identified during the second 2013 assessment (N43° 50.008' – W107° 51.118') in the middle of the allotment adjacent to the Nowater Trail Road included bluebunch wheatgrass (*Pseudoroegneria spicata*), Sandberg bluegrass (*Poa secunda)*, cheatgrass (*Bromus tectorum)*, phlox (*Phlox spp.*), field pennycress *(Thlaspi arvense)*, Wyoming big sagebrush *(Artemisia tridentata* spp. *Wyomingensis)*, greasewood *(Sarcobatus vermiculatus)*, Plains pricklypear cactus (*Opuntia polyacantha*), biological crusts and lichens.

Site 3

The plant species identified during the third 2013 assessment (N43° 50.772' – W107° 52.256') in the north and west part of the allotment included bluebunch wheatgrass (*Pseudoroegneria spicata*), needle and thread (*Hesperostipa comata*), bottlebrush squirreltail (*Elymus elymoides)*, Indian ricegrass *(Achnatherum hymenoides)*, Sandberg bluegrass (*Poa secunda)*, cheatgrass (*Bromus tectorum)*, phlox (*Phlox spp.*), Woody Aster (*Xylorhiza glabriuscula*), Sego lily (*Calochortus nuttallii*), Wyoming big

sagebrush *(Artemisia tridentata* spp. *Wyomingensis)*, Plains pricklypear cactus (*Opuntia polyacantha*), and biological crusts.

2008 Site

The plant species identified during the 2008 assessment (N43° 50' 38.7" – W107° 49' 15.183") in the north and east part of the allotment included included bluebunch wheatgrass (*Pseudoroegneria spicata*), needle and thread (*Hesperostipa comata*), Sandberg bluegrass (*Poa secunda)*, cheatgrass (*Bromus tectorum)*, Woody Aster (*Xylorhiza glabriuscula*), Wyoming big sagebrush *(Artemisia tridentata* spp. *Wyomingensis)*, Plains pricklypear cactus (*Opuntia polyacantha*), halogeton *(Halogeton glomeratus)*, lichens and biological crusts.

2.6 Invasive Species

Noxious weed species inventoried within the allotment include saltcedar (*Tamarix chinensis*) whitetop (*Cardaria draba)* 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

There is one grazing permit that authorizes livestock use in the Nowater Allotment.

Grazing permit GR4901095 authorizes the following use:

Nowater #00105

800 Sheep	03/01 to 04/30	100% Public Land	321AUMs
1250 Sheep	05/01 to 05/31	100% Public Land	255 AUMs
148 Sheep	10/01 to 02/28	100% Public Land	147 AUMs

Permitted Use (AUMs) 732 Active 393 Suspended 1125 Total

Terms and Conditions: In the Nowater Allotment #00105 livestock numbers may be adjusted during the winter use dates (10/01-02/28) and 147 AUMs may be utilized, as approved by the authorized officer. In addition, any AUMs not utilized during the critical growing season (03/01-05/31) may be used during the winter use period (10/01-02/28) with prior approval of the authorized officer. Utilization throughout the critical growing season (03/01-05/31) shall not exceed 576 AUMs, or no more than 50% utilization on key forage species, as stated in the Washakie RMP.

The calculated livestock grazing use since 1995, the year in which the current permittee acquired the grazing preference in this allotment is as shown in the table below.

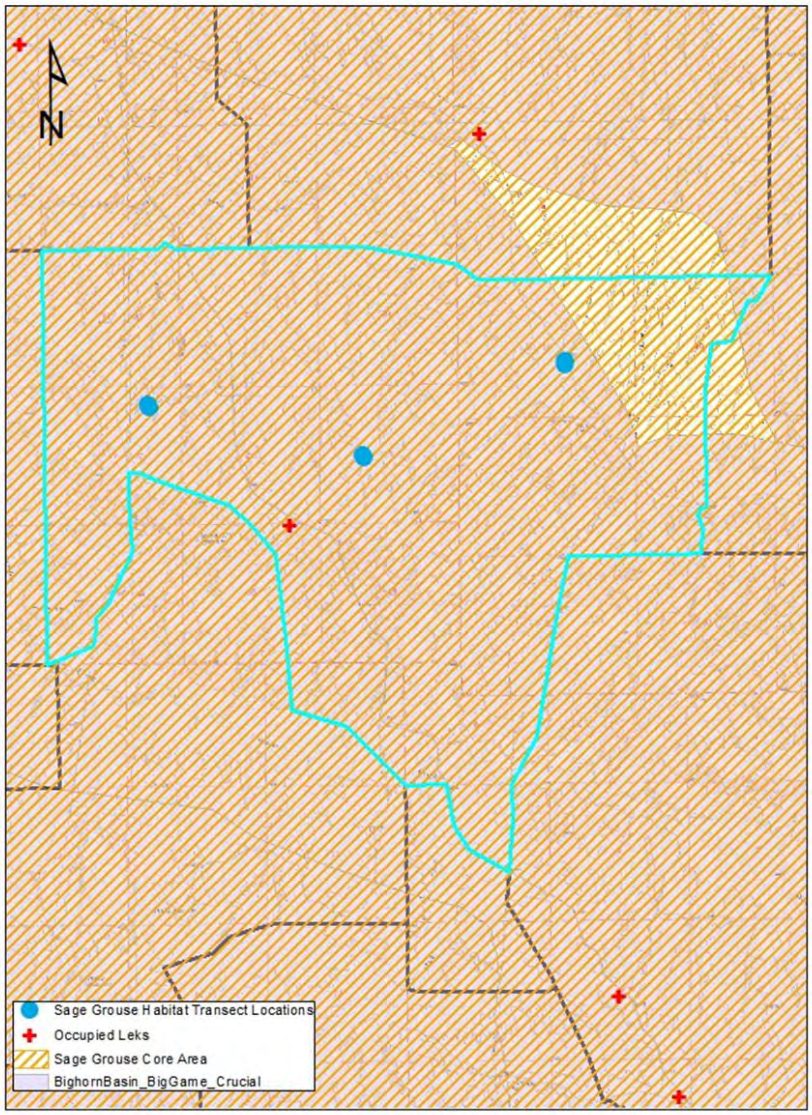
Livestock Grazing Use			
Year	**Estimated Actual Use (AUMs)**		
	Spring	**Fall**	**TOTAL**
1995	597	369	966
1996	345	245	590
1997	293	0	293
1998	230	0	230
1999	312	0	312
2000	412	0	412
2001	174	0	174
2002	296	372	668
2003	0	224	224
2004	194	426	620
2005	393	0	393
2006	342	0	342
2007	669	0	669
2008	671	0	671
2009	489	0	489
2010	620	0	620
2011	388	0	388
2012	573	0	573
2013	345	0	345
TOTAL	**7343**	**1636**	**8949**
19 Year Average	**386**	**86**	**473**

The overall stocking rate on the grazing permit is 13.3 acres per AUM. The average stocking rate during the time period shown above was 25 acres per AUM from March 1 to May 31. The average fall/winter stocking rate for the same period shown above was 113 acres per AUM. The grazing permit allows AUMs not used during the spring use period to be carried forward and used during the fall/winter use period.

2.8 Wildlife

Wildlife habitat on the Nowater allotment is suitable for a wide variety wildlife species including big game, non-game, and sensitive wildlife species. The allotment is characterized by rolling hills with incised ephemeral drainages flowing generally into Nowater Creek to the west. The vegetative community is characterized by a mix of Wyoming Big sage brush, perennial grasses, prickly pear cactus, annual grasses, and cheatgrass. Mule deer use the allotment year-round with higher concentrations utilizing it during late fall and winter. Antelope may be observed in the higher elevations of the allotment year-round. The entire allotment is within a sage grouse core breeding area and almost the entire allotment is designated as crucial big game winter habitat for mule deer and antelope. One transient or unestablished sage grouse lek has been identified near the Nowater trail near the center of the allotment. In addition to mule deer, antelope, and sage grouse, the allotment provides habitat for a wide range of wildlife species such as small mammals and predators, numerous grassland passerines, and numerous raptors.

Nowater Allotment Wildlife Habitat Map



2.9 Threatened, Endangered, Candidate, or Sensitive Species – Wildlife

No known threatened or endangered species have been identified on the allotment, however Greater sage grouse, a BLM senstive species, 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. In addition a vegetative monitoring site was selected in 2008 as part of the Rangeland Health Assessment process.

Line Intercept Canopy Cover transects (100 points per transect) were completed at each monitoring site in 2013. A Line Intercept Canopy Cover transect (50 points per transect) was completed in 2008. A summary of the cover data collected from each monitoring site is shown below:

Vegetation Monitoring Data						
Monitoring Site	**Ecological Site**	**Basal Vegetative Cover**	**Litter**	**Bare Ground**	**Sagebrush Canopy Cover**	**Brte presence ((hits/transect pts)*100)**
Site 1	Saline Upland 5-9”	17%	57%	5%	-	21%
Site 2	Loamy 5-9”	17%	41%	26%	12%	-
Site 3	Loamy 5-9”	18%	52%	14%	18%	4%
2008 Site	Loamy 5-9”	18%	12%	24%	24%	20%

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.

Rangeland Health Assessments were conducted at the monitoring sites by an interdisciplinary team on September 12, 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 Saline Upland 5-9” Precip Zone (R032XY144WY) at Transect 1 in the south part of the allotment, and the Reference Sheet for the Loamy 5-9” Precip Zone (R032XY122WY) for Transects 2 and 3 in the middle and northern part of the allotment, to determine departures from normal. The 2008 assessment was completed on September 10, 2008 by an interdisciplinary team using the 17 Indicators of Rangeland Health as described in BLM Technical Reference 1734-6. Individual ratings for the *Rangeland Health Indicators* are displayed for each monitoring site below.

Rangeland Health Indicators				
Indicator	**Departure from Reference Sheet**			
	Site 1	**Site 2**	**Site 3**	**2008 Site**
1. Rills	*N-S*	*S-M*	*N-S*	*N-S*
2. Water Flow Patterns	*N-S*	*S-M*	*S-M*	*M-E*
3. Pedestals and/or Terracettes	*N-S*	*S-M*	*S-M*	*M*
4. Bare Ground	*N-S*	*N-S*	*N-S*	*S-M*
5. Gullies	*S-M*	*S-M*	*S-M*	*N-S*
6. Wind- Scoured, Blowouts, and /or Deposition Areas	*N-S*	*N-S*	*S-M*	*N-S*
7. Litter Movement	*N-S*	*S-M*	*S-M*	*N-S*
8. Soil Surface Resistance to Erosion	*N-S*	*S-M*	*N-S*	*N-S*
9. Soil Surface Loss or Degradation	*M*	*S-M*	*S-M*	*S-M*
10.Plant Community Composition and Distribution Relative to Infiltration	*M*	*S-M*	*S-M*	*S-M*
11. Compaction Layer	*S-M*	*N-S*	*N-S*	*N-S*
12. Functional/Structural Groups	*E-T*	*M*	*S-M*	*S-M*
13. Plant Mortality/Decadence	*N-S*	*S-M*	*N-S*	*N-S*
14. Litter Amount	*E-T*	*S-M*	*S-M*	*N-S*
15. Annual Production	*S-M*	*N-S*	*N-S*	*N-S*
16. Invasive Plants	*E-T*	*S-M*	*S-M*	*M*
17. Reproductive Capability of Perennial Plants	*E-T*	*N-S*	*N-S*	*N-S*
Indicator Summary				
Soil / Site Stability (*Indicators 1-9, 11*)	***S-M***	***S-M***	***S-M***	***M***
Hydrologic Function (*Indicators 1-5, 8-11, 14*)	***S-M***	***S-M***	***S-M***	***M***
Biotic Integrity (*Indicators 8-9, 11-17*)	***E-T***	***M***	***S-M***	***S-M***
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.

Site 1

The rangeland health assessments conducted in the south part of the allotment was compared to the Reference Sheet for Saline Upland RO32XY144WY ecological site dated 5/2/2008 to determine departures from normal.

No rills were observed. Waterflow patterns were not observed on slopes 0-2%. A few pedestals were observed on the rare blue grama plant but no terracettes. According to cover transect data, bare ground was determined to be 5% which was less than expected for the Saline Upland range site (30-40%

described in reference sheet) but was attributed to the high amount of litter cover at 57% (10-15% described in the reference sheet) derived from the amount of cheatgrass on site. No litter movement was observed. Gullies were historic and rounded which indicated stabilization. There was no wind–scour observed. The soil stability index (SSI), an indicator of soil surface resistance to erosion was 5; the reference sheet places the average SSI at 4.0 or greater. This was attributed to cheatgrass litter. Based on the transect data, cheatgrass accounted for 30 percent of the total cover or 5% of the basal cover; the presence of which adds additional protection to the soil surface. The small soil pit that was dug as part of the investigation revealed 1 inch A horizon which indicates soil loss. Soil compaction was observed at a 12 inches depth with root penetration restricted to the upper layer.

Based on the observations discussed above for a Saline Upland 5-9 pz range site the attribute rating for *Soil and Site Stability* was ***"Slight to Moderate"*** and *Hydrologic-Function* were rated as ***"Slight to Moderate"***.

Site 2

The rangeland health assessments conducted in the middle of the allotment was compared to the Reference Sheet for Loamy RO32XY122WY ecological site dated 5/2/2008 to determine departures from normal.

Small rills in the interspaces and short connected waterflow patterns were observed on slopes 2 to 4%. Active pedestalling 3-4" was observed on sagebrush but no terracettes. According to cover transect data, bare ground was determined to be 26% which was less expected (25-35% described in reference sheet). Litter cover was determined to be 41% while the reference sheet range was 20-30%; this was attributed to sagebrush leaves loss because of drought conditions this year. Litter movement was observed with litter accumulated in small depressions. Gullies were historic and rounded which indicated stabilization. There was no wind–scour observed. The soil stability index (SSI), an indicator of soil surface resistance to erosion was 3.8; the reference sheet places the average SSI at 5.0 or greater. Based on the transect data, biological soil crusts account for 12 percent of the total cover or 2% of the basal cover; the presence of which adds additional protection to the soil surface. The small soil pit that was dug as part of the investigation revealed 2 ½ inch A horizon which could be indicative of soil loss. No soil compaction was observed.

Based on the observations discussed above for a Loamy 5-9 pz the attribute rating for *Soil and Site Stability* was ***"Slight to Moderate"*** and *Hydrologic-Function* was rated as ***"Slight to Moderate"***.

Site 3

The rangeland health assessments conducted in the north and west part of the allotment was compared to the Reference Sheet for Loamy RO32XY122WY ecological site dated 5/2/2008 to determine departures from normal.

No rills observed. Waterflow patterns were short and unconnected. Historic pedestalling of 2" observed on sagebrush, no terracettes. According to cover transect data, bare ground was determined to be 14% which was less expected (25-35% described in reference sheet). Litter cover was determined to be 51% while the reference sheet range was 20-30%; this was attributed to sagebrush leaves loss because of drought conditions this year. Small litter movement was observed but litter still close to plants. Gullies were historic and rounded which indicated stabilization. There was no wind–scour observed. The soil stability index (SSI), an indicator of soil surface resistance to erosion was 4.2; the reference sheet places the average SSI at 5.0 or greater. Based on the transect data, biological soil crusts account for 50 percent of the total cover or 9% of the basal cover; the presence of which adds additional protection to the soil surface. The small soil pit that was dug as part of the investigation revealed 3 inch A horizon which could be indicative of historic, minor soil loss. No soil compaction was observed.

Based on the observations discussed above for a Loamy 5-9 pz the attribute rating for *Soil and Site Stability* was ***"Slight to Moderate"*** and *Hydrologic-Function* was rated as ***"Slight to Moderate"***.

2008 Site
The rangeland health assessments conducted in the north and east part of the allotment was compared to the Reference Sheet for Loamy RO32XY122WY ecological site dated 5/2/2008 to determine departures from normal.

No rills were observed. Waterflow patterns were present on 6% slopes and were long and interconnected with lengths up to 10 feet but no litter movement was observed. Pedestals of 3" were observed on sagebrush and grass clumps but no terracettes were observed. According to cover transect data, bare ground was determined to be 24% which is expected (25-35% described in reference sheet) and the bare areas should be small areas throughout, but large and interconnected bare areas were observed. Litter cover was determined to be 12% while the reference sheet range was 20-30%. No gullies or wind scoured areas, blowouts, and/or depositional areas were observed. The soil stability index (SSI), an indicator of soil surface resistance to erosion was 5; the reference sheet places the average SSI at 5.0 or greater. Based on the transect data, biological soil crusts (lichens) account for 45 percent of the total cover or 4% of the basal cover; the presence of which adds additional protection to the soil surface. There appeared to be soil loss on bare areas. No soil compaction was observed.

Based on the observations discussed above for a Loamy 5-9 pz the attribute rating for *Soil and Site Stability* and *Hydrologic-Function* were rated as ***"Moderate"***.

3.3 Hydrology

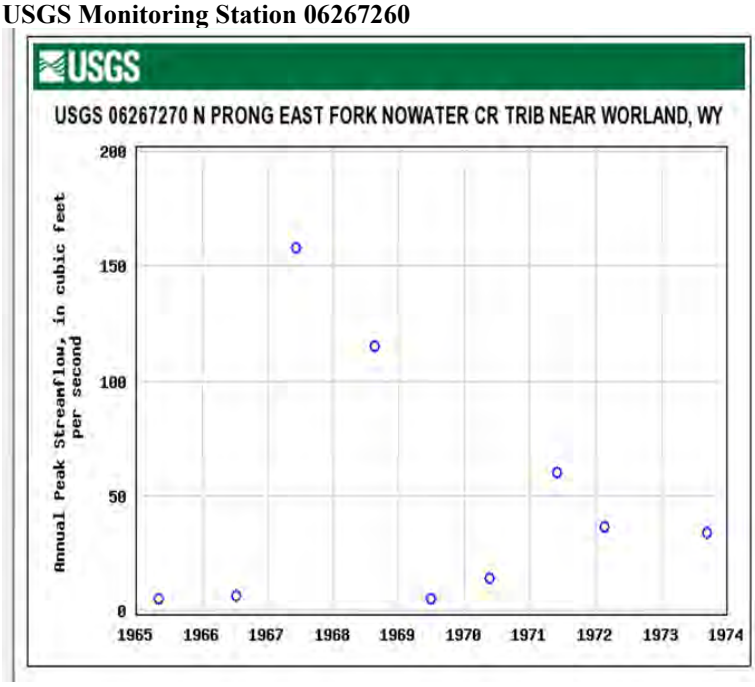
3.3.1 Surface Water
The nearest data is extrapolated from adjacent allotments that are within the same watershed. The flow data presented is to represent the overall conditions of the watershed.

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 were 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.

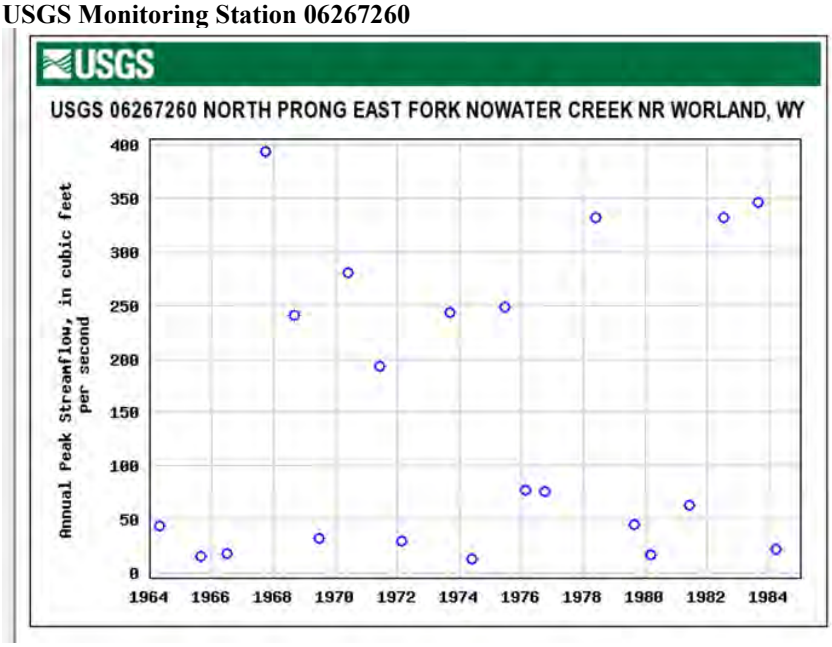
The average peak flows ranged from 160 cfs in 1980 to 3,040 in 1978. The annual discharge average for this period of record ranged from 1.19 cfs in 1974 to 13.2 cfs in 1978. This includes flow for the East Fork of Nowater and Denver Jake level 6 watersheds.

USGS Monitoring Station 06267260

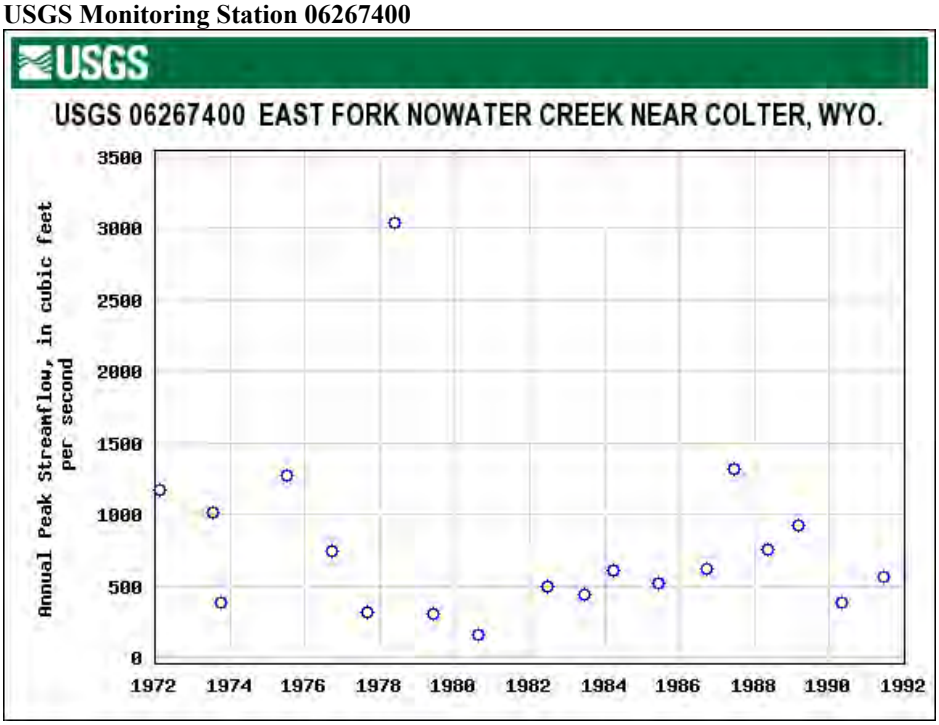


Description: USGS Site 06267260
Washakie County, Wyoming
Hydrologic Unit Code 10080007
Latitude 43°56'45", Longitude 107°48'37" NAD27
Drainage area 3.77 square miles
Gage datum 4,420 feet above NGVD29

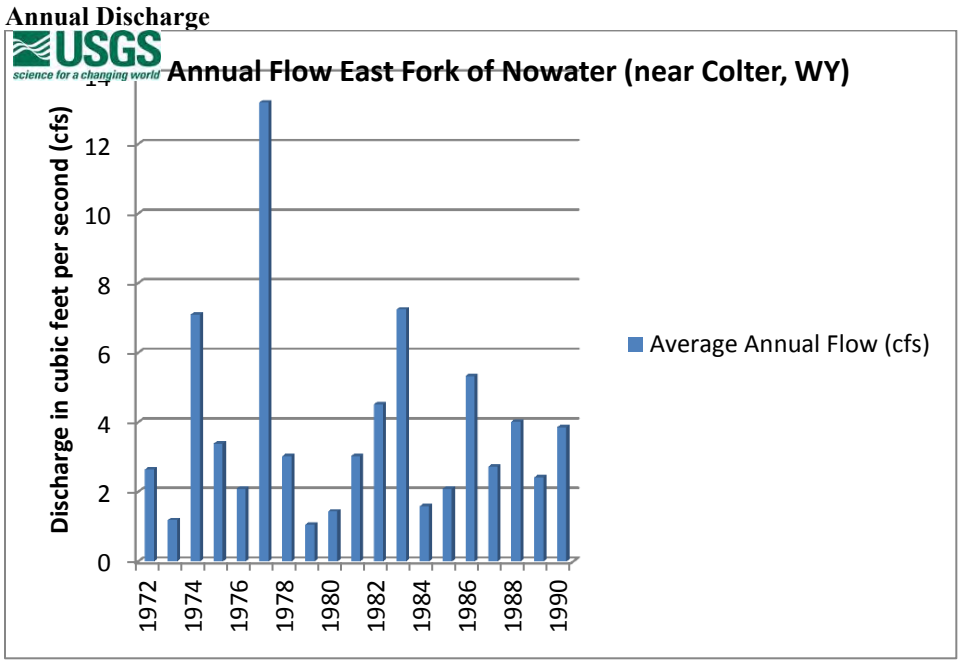
USGS Monitoring Station 06267260



USGS Monitoring Station 06267400



Annual Discharge



<u>BLM- Range Hydrologic Condition</u>

The current conditions of runoff specific to the allotment are tied to the upland health hydrologic indicators. The overall hydrologic indicators measured for these 3 monitoring sites and the 2008 site are discussed in detail the soil/site stability section above. These conditions are associated with upland rangeland health and are indirectly related to runoff peaks and volumes as recorded by the USGS. As the

upland conditions improve in the allotment, the peak flow runoff is reduced and the time to runoff is reduced as well.

Human Influence

Anthropogenic uses and activities on the landscape can have significant impacts – both adverse and beneficial– 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 15 miles to the north of the allotment. 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), active, 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 are13.6 miles of two track and 13.1 miles of BLM improved roads. From the miles of road, the total disturbance was 72.5 acres. This was derived from digitized roads using a 30 foot width for improved roads and 15 foot width for primitive roads.

3.3.2 Groundwater

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 7-9 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 Sand Creek. The sand material in the channel and hydrologic B type soils provide for increased groundwater recharge in floodplain areas. This depth supports Cottonwoods (*Populus spp.)*, Rabbitbrush *Chrysothamnus nauseosus)*, and sporadic Sandbar (*salix exigua*) Willow species.

There are 3 ground water wells and only one available with a log for information.

WELL NAME	RNG	SECTION	USES	YLD (gpm)	WELL_(ft)	Static Depth (ft)
STOCK DRIVEWAY WELL #101	92	22	STO	7	600	-1

3.3.3 Water Quality (Surface)

BLM Observations

The tributaries 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.

Wyoming DEQ

The drainages are classified by the WYDEQ as class 3B streams by default. The Nowater Creek is on the WYDEQ 2012 305b as impaired. The most recent TMDL performed by the WYDEQ has Nowater Creek impaired E. Coli for Primary Contact recreation from the confluence upstream 6.6 miles and is outside and downstream of the allotment.

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

There are no naturally occurring riparian areas or wetlands within the allotment that have been documented, verified, and monitored.

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.

Site 1

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 for the Saline Upland RO32XY144WY ecological site dated 5/2/2008.

The Historic Climax Plant Community for this site is *Gardner's Saltbush/Indian Ricegrass/Bottlebrush Squirreltail Plant Community*. Gardner's saltbush dominates this state. Other salt tolerant shrubs include greasewood and birdfoot sage. The major grasses include Indian ricegrass, bottlebrush squirreltail, Sandberg bluegrass, and rhizomatous wheatgrass. A variety of forbs also occurs in this state and plant diversity is high. This state is fragile, but well adapted to the Northern Intermountain Desertic Basins climate conditions. The diversity in plant species allows for high drought tolerance. This is a sustainable plant community, but is difficult to reestablish when damaged. Moderate, continuous season-long grazing will convert this plant community to the *Gardner's Saltbush/Bottlebrush Squirreltail Plant Community*. Frequent and severe grazing can transition this community to a *Gardner's Saltbush/Bare Ground Plant Community* while severe ground disturbance will convert this plant community to the *Halogeton Plant Community*.

According to the ecological site descriptions developed by the Natural Resources Conservation Service and the data collected at this assessment area, this site has the vegetative components expected for the ***Halogeton Plant Community***. The attribute rating justification for the *Biotic Integrity* at this site was Extreme to Total. The dominant functional / structural groups at this monitoring site are annual grasses (cheatgrass, annual wheatgrass), followed by shrubs (greasewood), and then short stature grasses (blue grama). The percent litter (57%) was more than expected (10-15%) and bare ground (5%) was less than expected (30-40%) due to the dominance of cheatgrass on the site. Total coverage of cheatgrass at this site was 21 percent. None of the expected native, cool season perennial grasses were found on the transect and the majority of vegetation was composed of annual wheatgrass, cheatgrass, Russian thistle, and halogeton. Mortality and decadence was what was expected for the site. Annual production was somewhat reduced but reproductive capability was severely reduced due to the lack of perennial grasses.

The biotic integrity of this plant community is at risk depending on how far a shift has occurred in plant composition toward halogeton and annual forbs. The watershed is at risk as bare ground increases. However on this site the percentage of bare ground was reduced to 5% due to the excessive amount of cheatgrass litter.

Transitional pathways leading to other plant communities are as follows:

- Re-seeding followed by deferment for 1 to 2 years as part of a Prescribed Grazing plan will return this plant community to near *Historic Plant Community (Gardner's saltbush/Bunchgrass State)* although halogeton will remain part of the plant community. Additional deferment may be necessary and should be prescribed on an individual site basis.

Photo 1. General View of Cover Transect #1 from Beginning

Photo 2. General View of Cover Transect#1 from End

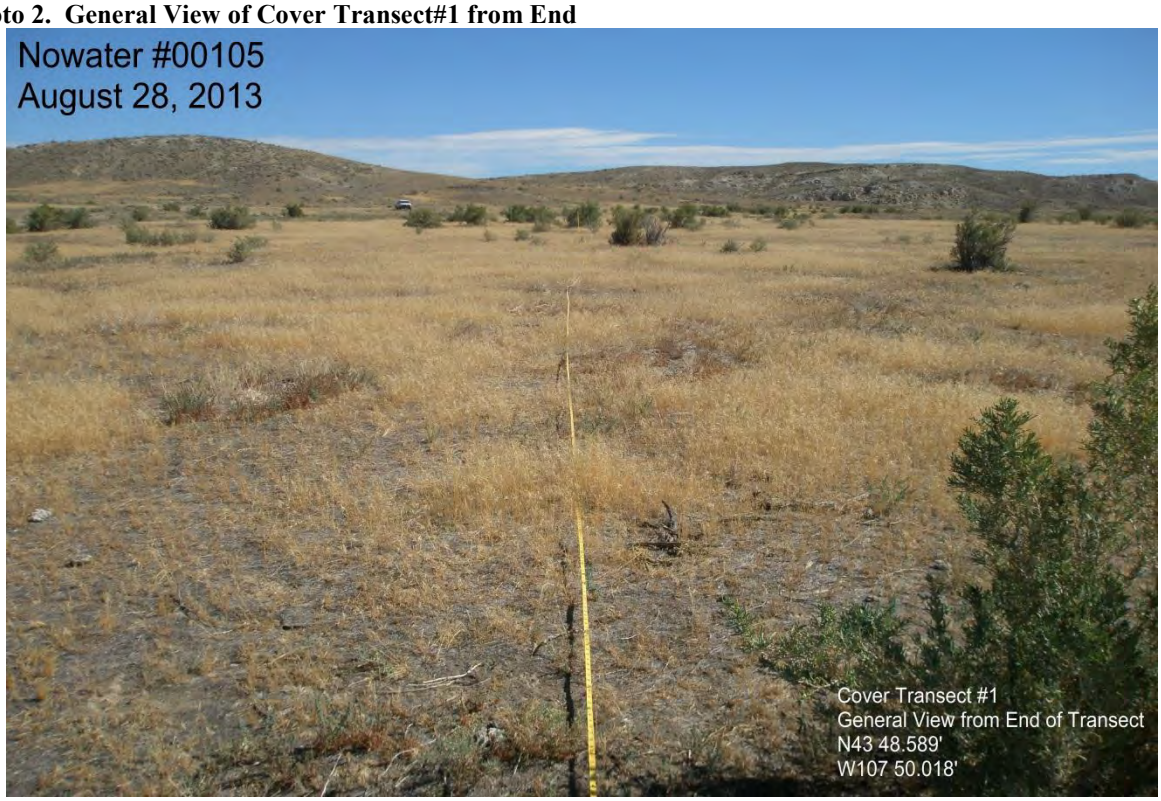


Photo 3. Cover Transect #1 @ 150' Mark

Site 2

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 for the Loamy RO32XY122WY ecological site dated 5/2/2008.

The Historic Climax Plant Community for this site is the *Bluebunch Wheatgrass/Rhizomatous Wheatgrass/NeedleandThread Plant Community*. This site is dominated by cool season mid-grasses. The major grasses include bluebunch wheatgrass, western wheatgrass, needleandthread, and Indian ricegrass. Other grasses occurring in this state include thickspike wheatgrass and bottlebrush squirreltail. A variety of forbs and half-shrubs also occur. Big sagebrush is a conspicuous element of this state, occurs in a mosaic pattern, and makes up 5 to 15% of the annual production. Winterfat is a common component on this site. This plant community is extremely stable and well adapted to the Northern Intermountain Desertic Basins climate conditions. The diversity in plant species allows for high drought tolerance. This is a sustainable plant community but moderate, continuous season-long grazing and/or drought will convert the plant community to the *Perennial Grass/Big Sagebrush Plant Community*. Frequent and severe grazing and/or lack of fire can transition this community to a *Big Sagebrush/Bare Ground Plant Community*.

According to the ecological site descriptions developed by the Natural Resources Conservation Service and the data collected at this assessment area, this site has the vegetative components expected for the ***Big Sagebrush/Bare Ground Community***. The attribute rating justification for the *Biotic Integrity* at this site was Moderate. The dominant functional / structural groups at this monitoring site are shrubs (sagebrush), followed by short stature grasses (Sandberg bluegrass), and then mid-stature grasses (bluebunch wheatgrass) and perennial forbs (phlox). The percent litter (41%) was more than expected (20-30%) but was attributed to the large amount of sagebrush leaves. Bare ground (26%) was within the expected (25-35%) range. Cheatgrass was found in patches on disturbed areas and none was encountered on the transect. The vegetation at this site is made up of primarily big sagebrush, Sandberg bluegrass, bluebunch wheatgrass, cheatgrass, cactus, phox, field pennycress, and occasional greasewood. Biological crusts and lichens were present in the area making up 2 percent of the basal cover on the transect. Plant mortality/decadence was somewhat reduced based on the decadence observed on sagebrush. Annual production and reproductive capability for grasses and shrubs was what was expected for the site.

This plant community is resistant to change as the stand becomes more decadent. Continued frequent and severe grazing or the removal of grazing does not seem to effect the composition or structure of the plant community. Plant diversity is moderate to poor. The plant vigor is diminished and replacement capabilities are limited due to the reduced number of cool-season grasses. Plant litter is noticeably less when compared to the HCPC. Soil erosion is accelerated because of increase bare ground. Water flow patterns and pedestalling are obvious. Infiltration is reduced and runoff is increased. Rill channels may be noticeable in the interspaces and gullies may be establishing where rills have concentrated down slope. Although the cover transect did not show an increase in bare ground, it was noted that this was because of the amount of sagebrush leaves shed presumably from the recent drought impacts in 2012.

Transitions or pathways leading to other plant communities are as follows:

- Brush management, followed by prescribed grazing, will return this plant community at or near the *HCPC*. If prescribed fire is used as a means to reduce or remove the shrubs, sufficient fine fuels will need to be present. This may require deferment from grazing prior to treatment. Post management is critical to ensure success. This can range from two or more years of rest to partial growing season deferment, depending on the condition of the understory at the time of the treatment and growing conditions following treatment. In the case of an intensive wildfire that

occurs when desirable plants are not completely dormant, the length of time required to reach the *HCPC* may be increased and seeding of natives is recommended.

•Brush management, followed by frequent and severe grazing, will convert the plant community to the *Blue Grama Sod Plant Community*.

Photo 4. General View of Cover Transect #2 from Beginning

Photo 5. General View of Cover Transect#2 from End

Photo 6. Cover Transect #2 @ 150' Mark

Site 3

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 for the Loamy RO32XY122WY ecological site dated 5/2/2008.

The Historic Climax Plant Community for this site is the *Bluebunch Wheatgrass/Rhizomatous Wheatgrass/NeedleandThread Plant Community*. This site is dominated by cool season mid-grasses. The major grasses include bluebunch wheatgrass, western wheatgrass, needleandthread, and Indian ricegrass. Other grasses occurring in this state include thickspike wheatgrass and bottlebrush squirreltail. A variety of forbs and half-shrubs also occur. Big sagebrush is a conspicuous element of this state, occurs in a mosaic pattern, and makes up 5 to 15% of the annual production. Winterfat is a common component on this site. This plant community is extremely stable and well adapted to the Northern Intermountain Desertic Basins climate conditions. The diversity in plant species allows for high drought tolerance. This is a sustainable plant community but moderate, continuous season-long grazing and/or prolonged drought will convert the plant community to the *Perennial Grass/Big Sagebrush Plant Community*.

According to the ecological site descriptions developed by the Natural Resources Conservation Service and the data collected at this assessment area, this site has the vegetative components expected for the ***Perennial Grass/Big Sagebrush Plant Community***. The attribute rating justification for the *Biotic Integrity* at this site was Slight to Moderate. The dominant functional / structural groups at this monitoring site are shrubs (sagebrush), followed by mid- stature grasses (bluebunch wheatgrass/needle and thread/bottlebrush squirreltail/Indian ricegrass), and then short stature grasses and perennial forbs (Sandberg bluegrass/phlox). The percent litter (14%) was more than expected (20-30%) and bare ground (14%) was less than expected (25-35%), but this was attributed to the large amount of sagebrush leaves. Cheatgrass and halogeton was found in patches on disturbed areas and total coverage of cheatgrass at this site was 4 percent. The vegetation at this site is made up of primarily big sagebrush, bluebunch

wheatgrass, needle and thread, bottlebrush squirreltail, Indian ricegrass, Sandberg bluegrass, cheatgrass, cactus, phox, woody aster, sego lily, field pennycress, cactus and biological crusts. Biological crusts were present in the area making up 9 percent of the basal cover on the transect. Plant mortality/decadence, annual production and reproductive capability for grasses and shrubs were what were expected for the site.

This plant community is resistant to change. The herbaceous species present are well adapted to grazing; however, species composition can be altered through long-term overgrazing. The herbaceous component is mostly intact and plant vigor and replacement capabilities are sufficient. Water flow patterns and litter movement may be occurring but only on steeper slopes. Incidence of pedestalling is minimal. Soils are mostly stable and surface shows minimum soil loss. The watershed is functioning and the biotic community is intact.

Transitions or pathways leading to other plant communities are as follows:

- Prescribed grazing or possibly long-term prescribed grazing, will convert this plant community to the *HCPC*. The probability of this occurring is high especially if rotational grazing along with short deferred grazing is implemented as part of the prescribed method of use. In addition, the removal of fire suppression will allow a somewhat natural fire regime to reoccur to more easily transition between this plant community and the HCPC. A prescribed fire treatment can be useful to hasten this transition, if desired.

- Frequent and severe grazing plus no fire will convert the plant community to the *Big Sagebrush/Bare Ground Plant Community*. The probability of this occurring is high. This is especially evident on areas with historically higher precipitation and the sagebrush stand is not adversely impacted by drought or heavy browsing.

Photo 7. General View of Cover Transect #3 from Beginning

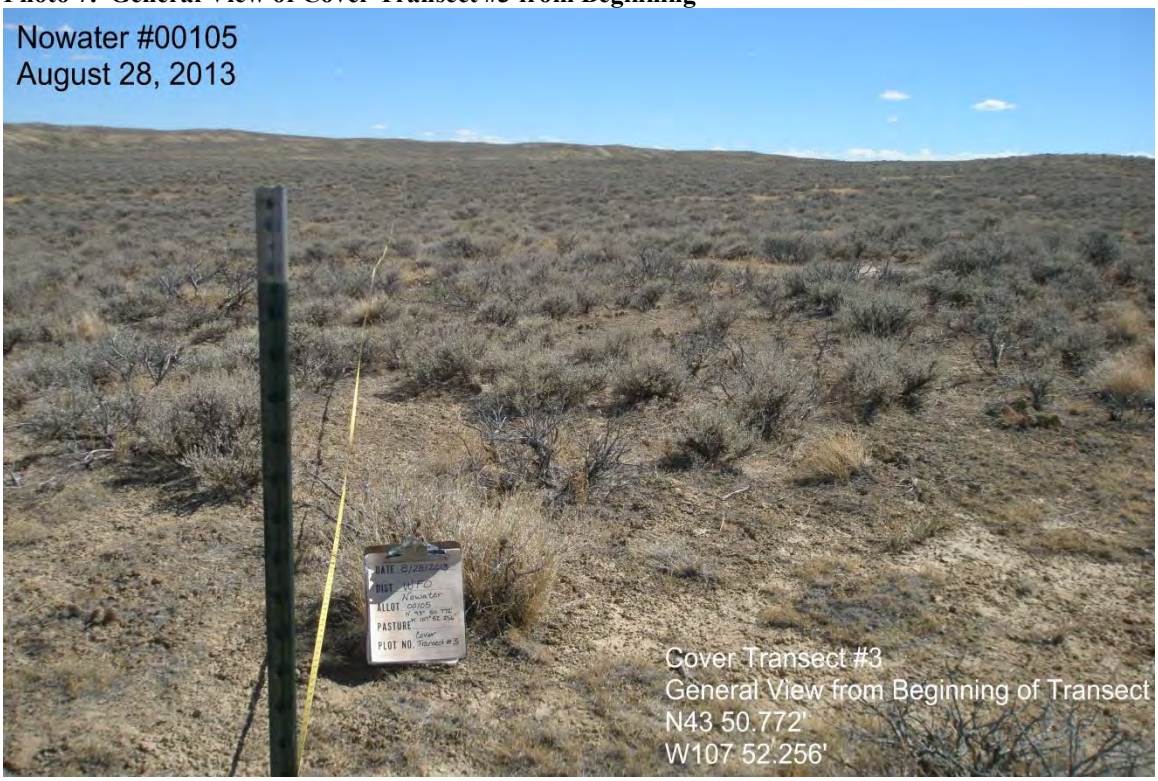


Photo 8. General View of Cover Transect#3 from End

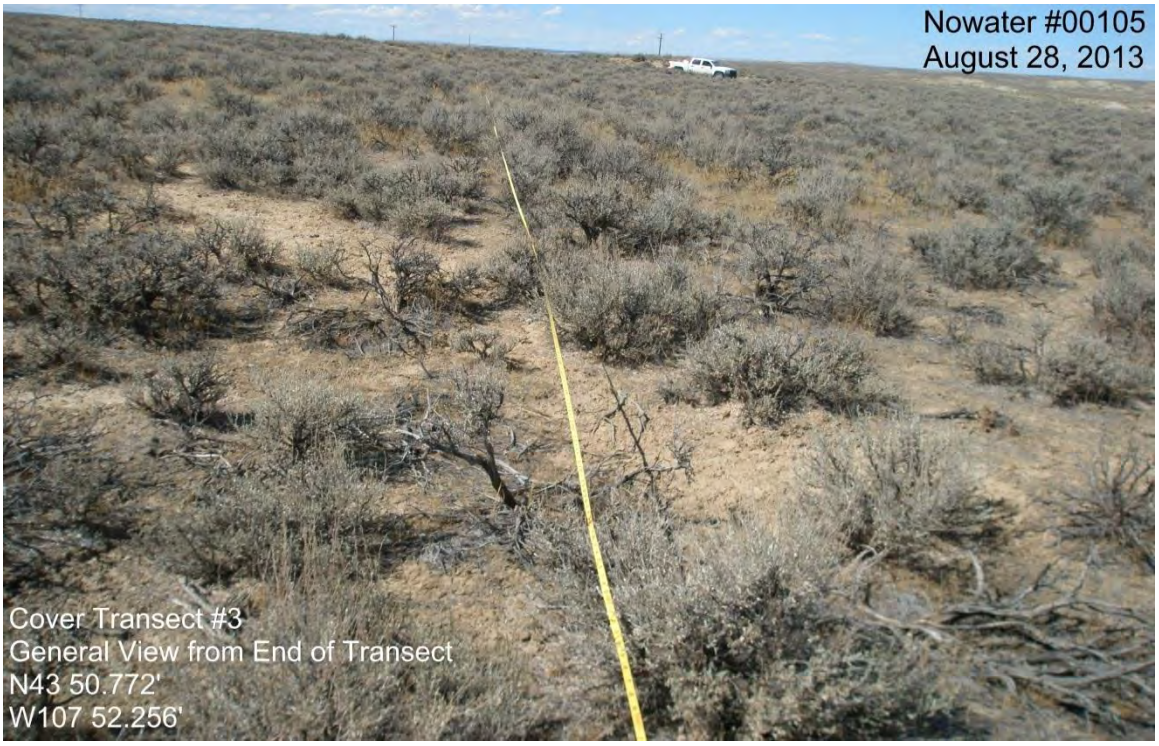


Photo 9. Cover Transect #3 @ 150' Mark

2008 Site

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 for the Loamy RO32XY122WY ecological site dated 5/2/2008.

The Historic Climax Plant Community for this site is the *Bluebunch Wheatgrass/Rhizomatous Wheatgrass/NeedleandThread Plant Community*. This site is dominated by cool season mid-grasses. The major grasses include bluebunch wheatgrass, western wheatgrass, needleandthread, and Indian ricegrass. Other grasses occurring in this state include thickspike wheatgrass and bottlebrush squirreltail. A variety of forbs and half-shrubs also occur. Big sagebrush is a conspicuous element of this state, occurs in a mosaic pattern, and makes up 5 to 15% of the annual production. Winterfat is a common component on this site. This plant community is extremely stable and well adapted to the Northern Intermountain Desertic Basins climate conditions. The diversity in plant species allows for high drought tolerance. This is a sustainable plant community but moderate, continuous season-long grazing and/or prolonged drought will convert the plant community to the *Perennial Grass/Big Sagebrush Plant Community*.

According to the ecological site descriptions developed by the Natural Resources Conservation Service and the data collected at this assessment area, this site has the vegetative components expected for the ***Perennial Grass/Big Sagebrush Plant Community***. The attribute rating justification for the *Biotic Integrity* at this site was Slight to Moderate. The dominant functional / structural groups at this monitoring site are shrubs (sagebrush), followed by short- stature grasses (Sandberg bluegrass), and then mid- stature grasses (bluebunch wheatgrass). A Gap Intercept Transect (200') on sagebrush was completed and showed 47% canopy cover at this site. The percent litter (12%) was less than expected (20-30%) and bare ground (24%) was less than expected (25-35%), but this was attributed to cheatgrass that was scattered throughout the understory and total coverage of cheatgrass at this site was 20%. The vegetation at this site is made up of primarily big sagebrush, bluebunch wheatgrass, Sandberg bluegrass, needle and thread, cheatgrass, cactus, woody aster, cactus and lichens. Lichens in the area made up 8 percent of the basal cover on the transect. Plant mortality/decadence, annual production and reproductive capability for grasses and shrubs were what were expected for the site.

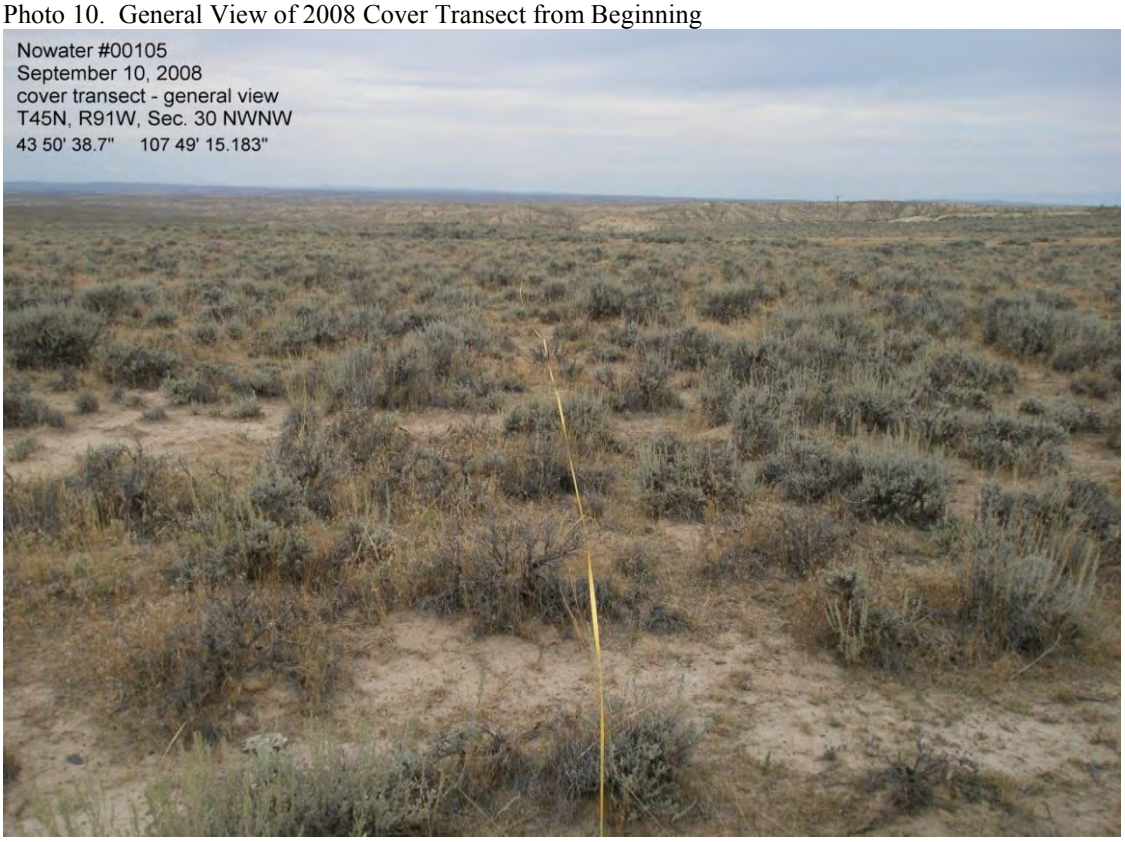
This plant community is resistant to change. The herbaceous species present are well adapted to grazing; however, species composition can be altered through long-term overgrazing. The herbaceous component is mostly intact and plant vigor and replacement capabilities are sufficient. Water flow patterns and litter movement may be occurring but only on steeper slopes. Incidence of pedestalling is minimal. Soils are mostly stable and surface shows minimum soil loss. The watershed is functioning and the biotic community is intact.

Transitions or pathways leading to other plant communities are as follows:

- Prescribed grazing or possibly long-term prescribed grazing, will convert this plant community to the *HCPC*. The probability of this occurring is high especially if rotational grazing along with short deferred grazing is implemented as part of the prescribed method of use. In addition, the removal of fire suppression will allow a somewhat natural fire regime to reoccur to more easily transition between this plant community and the HCPC. A prescribed fire treatment can be useful to hasten this transition, if desired.

- Frequent and severe grazing plus no fire will convert the plant community to the *Big Sagebrush/Bare Ground Plant Community*. The probability of this occurring is high. This is especially evident on areas with historically higher precipitation and the sagebrush stand is not adversely impacted by drought or heavy browsing.

Photo 10. General View of 2008 Cover Transect from Beginning



3.5 Wildlife Habitat

Three 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 determined to range from 17 to 27 percent at the three transect points, and sage brush height averaged approximately 11.5 inches. Belt transect surveys determined the mature sage brush component to range from 59 to 72 percent over all transects, indicating vigorous sage brush growth appropriate for this habitat and annual precipitation zone. No records of the numbers of sage grouse visiting the one identified lek have been kept, most likely owing to the transient characteristics of this particular lek.

Sage-grouse Habitat Transect #1					
Date: 5/20/2013 Observers: Ken Stinson, Jim Andersen Allotment Name & #: Nowater Allotment Location: LAT/LONG N. 43*50.990W. 107*48.771					
Line Intercept Canopy Cover					
Species	**% Cover**				
Live Big Sagebrush	17%				
Dead Big Sagebrush	7%				
Other SPP: (Phlox)	Trace				
Other SPP: (Rabbit Brush)					
Shrub Species	**Average Height in inches**				
Live Big Sagebrush	11.1”				
Other SPP: (Phlox)	2.0”				
Other SPP: (Bud Sage)					
Belt Transect					
Species	**%Young**	**%Mature**	**%Decadent**	**%Dead**	
Big Sagebrush		59%	23%	19%	
Gardner Saltbush					
Bud Sage					
Daubenmire Cover Class & Vegetation Height Data					
Summary of Vegetation Height	New Herbaceous Mean Ht: 4.4”		Residual Herbaceous Mean Ht: ”		
Summary of Cover Class (%)	New Perennial Grasses: %	New Annual Grass: 4.1%	Perennial Forb: .1 %	Residual Herbaceous: 12.2%	Other: %
Browse Utilization					
ATTR				Low	

Sage-grouse Habitat Transect #2

Date: 5/20/2013 Observers: Ken Stinson, Jim Andersen
Allotment Name & #: Nowater Allotment
Location: LAT/LONG N. 43*50.732 W. 107*52.374

Line Intercept Canopy Cover

Species	% Cover
Live Big Sagebrush	27%
Dead Big Sagebrush	4%
Other SPP: (Fringed)	
Other SPP: (Rabbit Brush)	

Shrub Species	Average Height in inches
Live Big Sagebrush	10.3”
Other SPP: (Gardner Saltbush)	
Other SPP: (Bud Sage)	

Belt Transect

Species	%Young	%Mature	%Decadent	%Dead
Big Sagebrush		72%	18%	12%
Gardner Saltbush				
Bud Sage				

Daubenmire Cover Class & Vegetation Height Data

Summary of Vegetation Height	New Herbaceous Mean Ht: 4.7”		Residual Herbaceous Mean Ht: 2.5”		
Summary of Cover Class (%)	New Perennial Grasses: 10.2%	New Annual Grass: .75%	Perennial Forb: 0%	Residual Herbaceous: 9.45%	Other: %

Browse Utilization

ATTR	Low

Sage-grouse Habitat Transect #3

Date: 5/20/2013 Observers: Ken Stinson, Jim Andersen
Allotment Name & #: Nowater Allotment
Location: LAT/LONG N. 43*50.416 W. 107*50.529

Line Intercept Canopy Cover

Species	% Cover
Live Big Sagebrush	21%
Dead Big Sagebrush	6%
Other SPP: (Fringed)	
Other SPP: (Rabbit Brush)	

Shrub Species	Average Height in inches
Live Big Sagebrush	13”
Other SPP: (Gardner Saltbush)	
Other SPP: (Bud Sage)	

Belt Transect

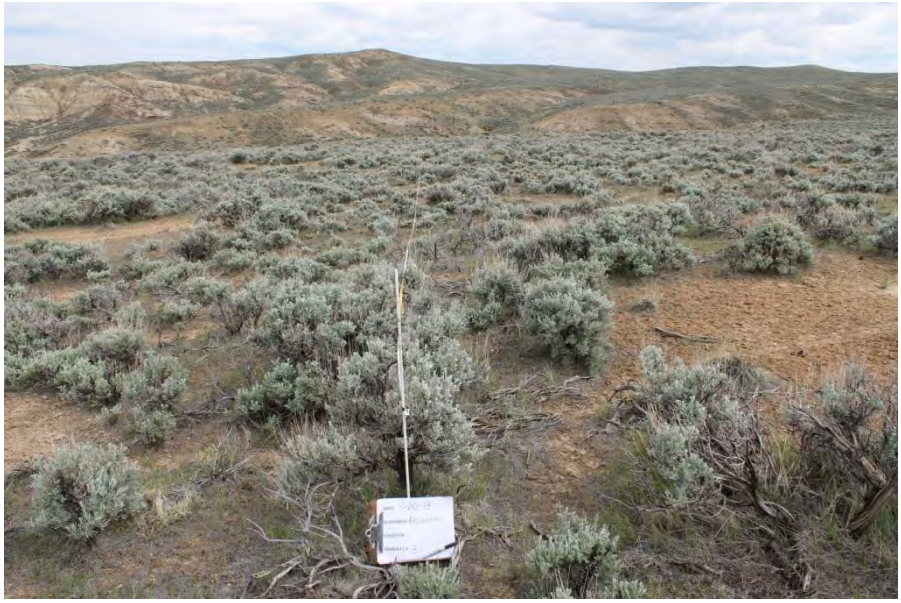
Species	%Young	%Mature	%Decadent	%Dead
Big Sagebrush		70%	.07%	24%
Gardner Saltbush				
Bud Sage				

Daubenmire Cover Class & Vegetation Height Data

Summary of Vegetation Height	New Herbaceous Mean Ht: 2.9”		Residual Herbaceous Mean Ht: 2.1”		
Summary of Cover Class (%)	New Perennial Grasses: 9.55%	New Annual Grass: 1.75%	Perennial Forb: 0%	Residual Herbaceous: 9.55%	Other: %

Browse Utilization

ATTR	Low



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 Nowater Allotment. Ratings for the *Soil Stability* and *Hydrologic-Function* for the three assessment sites in 2013 were rated as ***Slight to Moderate***.

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. No rills were observed on Sites 1 and 3 and only small rills were observed in the interspaces at Site 2. Site 1 had little pedestalling, Site 2 had active pedestalling on sagebrush plants on slopes 2-4%, while Site 3 had no active pedestalling but historic pedestalling on sagebrush. Waterflow patterns were not observed at Site 1, Site 2 had short, connected waterflow patterns on slopes 2-4%, and Site 3had short, unconnected waterflow patterns. Any gullies observed were historic and rounded indicating stabilization.

The amount of bare ground and amount of litter cover expected for a Saline 5-9 inch ecological site at Site 1 varied from that expected – bare ground was less and litter cover was more than expected due to the amount of cheatgrass and annual wheatgrass litter at the site. In this area where the plant community is lacking in desirable perennial grasses to aid infiltration and reduce runoff, cheatgrass and annual wheatgrass litter appear to provide largely the same function. The bare ground at Site 2 was what was expected for a Loamy 5-9 inch ecological site, but the litter cover was higher than expected due to the amount of sagebrush leaves. The amount of bare ground and litter cover expected for a Loamy 5-9 inch ecological site at Site 3 varied from that expected – bare ground was less than what was expected and litter cover was more than expected due to amount of sagebrush leaves.

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. ***Not Applicable***

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.

Based on the assessment of the data collected as well as observations throughout the allotment, the following table summarizes the number of acres that were determined to meet Standards, the number of acres that were determined to not meet Standard, and the number of acres that no determination was made.

Nowater Allotment #00105

Ecological Site	Ecological State	Standard_3	Acres
Saline Upland 5-9",	Gardner's Saltbush/Bottlebrush Squirreltail	Met	1181
Saline Upland 5-9",	Halogeton Plant Community	Not Met	999
Loamy/Shallow Loamy 5-9"	Perennial Grass/Big Sagebrush	Met	2494
Loamy/Shallow Loamy 5-9"	Big Sagebrush/Bare Ground	Not Met	636
Shale/Rock Outcrop 5-9bh	Badlands	Not Applicable	3134
WATER	Reservoir	Not Applicable	13
	TOTAL ACRES		8,457

GIS mapping calculates total public acreage for this allotment as 8,457 acres[1]. State and/or private lands were not included in this acreage. Of that acreage, 3,147 public acres of badlands and reservoirs were not assessed for Standard and Guidelines and were not suitable for grazing. Of the 5310 acres suitable for grazing, 1,635 public acres were determined to ***not meet*** Standard and Guidelines, and 3,675 public acres were determined to ***meet*** Standard and Guidelines. This table is also visually represented by Map 8 on the following pages.

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

RATIONALE-MET: As it pertains to the acres that ***MET*** 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. These acres are generally in the middle portion of the allotment. They occur on the broad benches/flats above the drainages and draws or the steep ridges of the allotment.

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

[1] The Washakie Resource Management Plan, Record of Decision – September 2, 1988, Appendix C, Table C-1 on page 49 lists the public land acreage within this allotment as 9,691.

without mechanical treatments, seedings, intensive grazing management, etc. These sites have little capability or probability of returning to a more desirable state.

These acres generally follow the Nowater Trail Road through the allotment, which is an historic and current trail route for livestock and include adjacent, historic sheep bedgrounds, and areas disturbed by wildfire. 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.

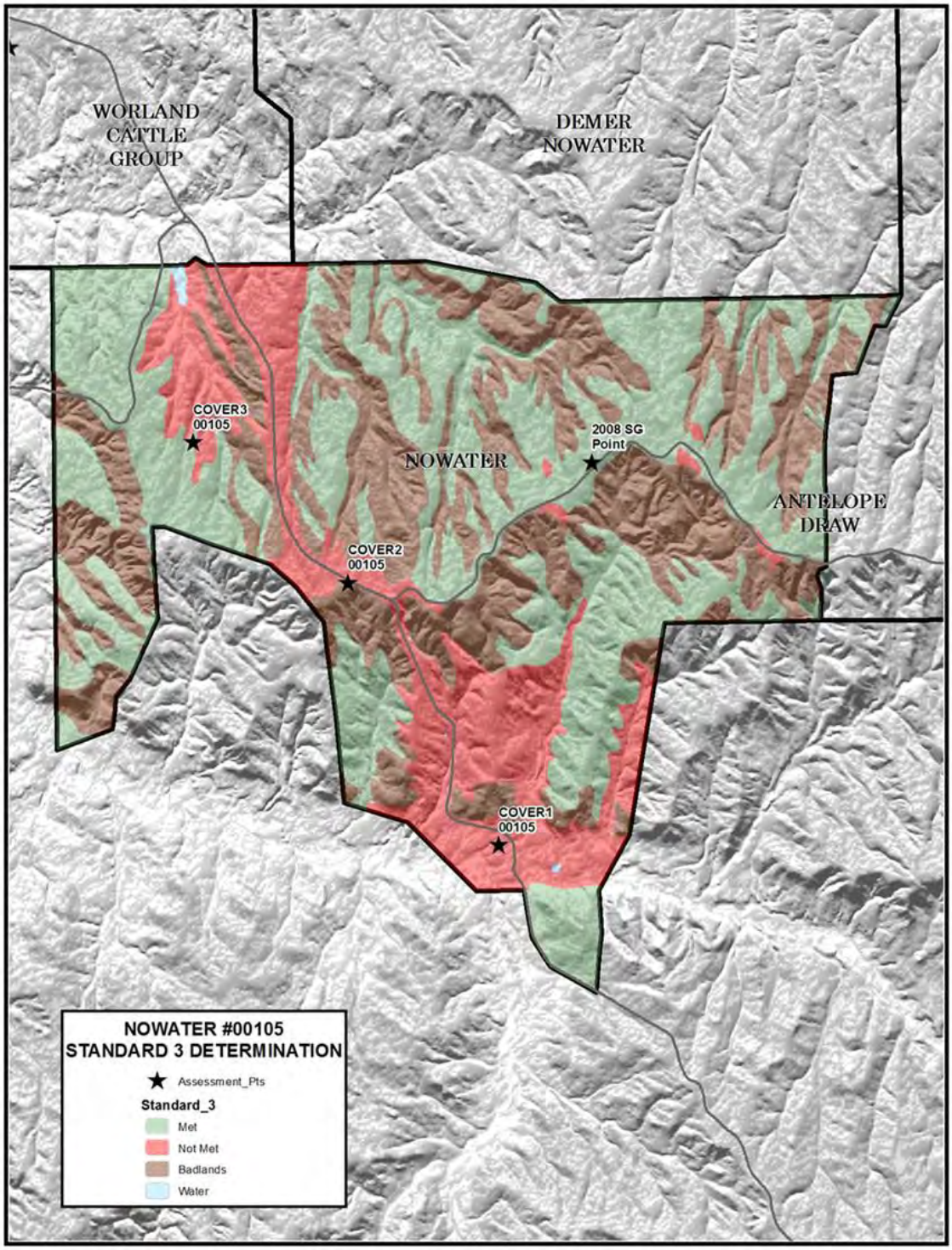
The allotment used to be part of a use area allocated to the Worland Sheep Group. Individual allotments began to be created in the 1940's but information as to the exact date the Nowater Allotment was created is lacking. However the historic grazing use allocated to Coutis Land & Livestock Company in the use area and then the allotment prior to adjudication in 1965 was 1150 AUMs from approximately 1937 to 1964, which equates to a stocking rate of 8.5 acres/AUM (36% higher than the current permit).

In contrast, the allotment now has 732 active AUMs which provides for a stocking rate of 13.3 acres/AUM overall. The 19 year average on the allotment has been 386 AUMs, which equates to a stocking rate of 25 acres/AUM during the growing season and 86 AUMs, which equates to a stocking rate of 113 acres/AUM during the non-growing season. The NRCS tech guides utilized throughout this document indicate that a continuous season-long stocking rate appropriate for the defined range sites is 6.25 to 10 acres/AUM.

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. 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.

Standard 3 Determination



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:

Three 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 Site 3monitoring site (and those acres represented by these areas as described in Standard 3) was 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 Site 2 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. 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 Site 1 monitoring site (and those acres represented by these areas as described in Standard 3) was found to be in a Halogeton community. This community is much reduced in plant spcies diversity. It is not a desirable plant community and as such would not meet the definition of Standard 4.

The Gardner's Saltbush/Bottlebrush Squirreltail community (and those acres represented by these areas as described in Standard 3) does provide for a combination of grasses shrubs and forbs as feed and cover sources for smaller animals. It can provide some cover especially when complimented by areas of sagebrush. As such, this community type would meet the definition of Standard 4.

4.5 Standard 5

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

Rationale:
No information is 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 2012 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 _____

Teryl A Shryack
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 <u>all of the standards ARE NOT being met</u> but that <u>livestock grazing IS in conformance</u> with the guidelines. .***

X_____ X_____

Rebecca Good
Worland Field Office Manager

DATE:

7.0 Factors related to nonconformance with standards: Historic livestock use has likely resulted in the existing range conditions.

7.0 REFERENCES

72. Friedman, Jonathan M.; Scott, Michael L.; Auble, Gregor T. 1997. Water management and cottonwood forest dynamics along prairie streams. In: Knopf, Fritz L.; Samson, Fred B., eds. Ecology and conservation of Great Plains vertebrates. Ecological Studies, Vol. 125. New York: Springer-Verlag: 49-71. [28993]

179. Scott, Michael L.; Auble, Gregor T.; Friedman, Jonathan M. 1997. Flood dependancy of cottonwood establishment along the Missouri River, Montana, USA. Ecological Applications. 7(2): 677-690. [28708]

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.

BLM 1998. Riparian Area Management. A User Guide to Assessing Proper Functioning Condition and the Supporting Science for Lotic Areas. Technical Reference 1737-15.

Hamerlinck, J.D. and C.S. Arneson, editors. 1998. Wyoming Ground Water Vulnerability Assessment Handbook. Spatial Data and Visualization Center Publication Report SDVC 98-01. University of Wyoming. Laramie, Wyoming. 2 Volumes

Craig and Rankl, 1978. Analysis of Runoff from Small Drainage Basins in Wyoming. United States Geological Survey, Water Supply Paper 2056.Craig and Rankl 1978

EPA,2008. The Ecological and Hydrological Significance of Ephemeral and Intermittent Streams in the Arid and Semi-arid American Southwest. U.S. Environmental Protection Agency and USDA/ARS Southwest Watershed Research Center, EPA/600/R-08/134, ARS/233046, 116 pp. http://www.epa.gov/esd/land-sci/pdf/EPHEMERAL_STREAMS_REPORT_Final_508-Kepner.pdf

Hamerlinck, J.D. and C.S. Arneson, editors. 1998. Wyoming Ground Water Vulnerability Assessment Handbook. Spatial Data and Visualization Center Publication Report SDVC 98-01. University of Wyoming. Laramie, Wyoming. Volume 1.

Hedman, E.R. Osterkamp, W.R. 1982. Streamflow Characteristics Related to Channel Geometry of Streams in Western United States. U.S Geological Survey Water Supply Paper 2193, pp12-13.

Rosgen, D.L. 1996. A classification of natural rivers. Catena, Vol. 22, pp 169-199.

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