Ecological site DX032X02W142
Saline Subirrigated (SS)
Wind River Basin Wet

Last updated: 3/10/2025
Accessed: 06/08/2026

General information

Provisional. A provisional ecological site description has undergone quality control and quality assurance review. It contains a working state and transition model and enough information to identify the ecological site.

MLRA notes

Major Land Resource Area (MLRA): 032X–Northern Intermountain Desertic Basins

032X – Northern Intermountain Desertic Basins – This MLRA is comprised of two major Basins, the Big Horn and Wind River. These two basins are distinctly different and are split by LRU's to allow individual ESD descriptions. These warm basins are surrounded by uplifts and rimmed by mountains, creating a unique set of plant responses and communities. Unique characteristics of the geology and geomorphology further individualize these two basins. For information regarding MLRAs, refer to: United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land Resource Regions and Major Land Resource Areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296. Available electronically at: http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/ref/? cid=nrcs142p2_053624#handbook.

LRU notes

32X02W (WY): This LRU is the Wind River Basin within MLRA 32X. This LRU tends to be just a fraction higher in elevation, slightly cooler (by 1-degree Celsius), and snowpack tends to persist longer into the spring than the Big Horn Basin (LRU 01). This LRU was originally divided into two LRU's - LRU C which was the core and LRU D which was the rim. With the most current standards, this LRU is divided into three subsets. This subset is the "wet" subset of the Wind River Basin and is comprised of drainages, floodplains, floodplain steps, and stream terraces. This subset is driven by hydrology and the connectivity or disconnection from the water table, and significant periods of surface flow, that affects the soil chemistry, influencing the variety of ecological sites and plant interactions. The wet subset includes all of the core subset and extensions into the rim subset. The hydrology factor is the driving factor over precipitation in this subset. Because of this and historic mapping, the extent of soils currently correlated to this ecological site does not fit within the current subset or LRU boundary. Many of the map unit components are correlated to ecological sites outside of this MLRA, but will be reviewed and corrected during mapping update projects. Moisture Regime: typic aridic or ustic aridic Temperature Regime: Mesic Dominant Cover: Rangeland, with sagebrush steppe intermixed with saltbush flats, is the dominant vegetative cover. Representative Value (RV) Effective Precipitation: 9-12 inches (229 – 305 mm) RV Frost-Free Days: 85-115 days

Classification relationships

Relationship to Other Established Classification Systems: National Vegetation Classification System (NVC): 3 Xeromorphic Woodland, Scrub & Herb Vegetation Class 3.B Cool Semi-Desert Scrub & Grassland Subclass 3.B.1 Cool Semi-Desert Scrub & Grassland formation 3.B.1.NE Western North American Cool Semi-Desert Scrub & Grassland Division M169 Great Basin Saltbush Scrub Macrogroup Ecoregions (EPA): Level I: 10 North American Deserts Level II: 10.1 Cold Deserts Level III: 10.1.18 Wyoming Basin Level IV: 10.1.18.g Big Horn Salt Desert Shrub Basin National Hierarchical Framework of Ecological Units (USFS): 300 Dry Domain 340 Temperate Desert Division 342 Intermountain Semi-Desert Province 342A Bighorn Basin 342Ad Big Horn Basin

Ecological site concept

• Site influenced by a water table within 30 to 100 cm of the soil surface during the growing season, and water may move over the surface from run-in but only for short periods. • Slope is 6% • Soils are: - Saline, sodic, or saline-sodic, gypsic - Moderately deep, deep, or very deep (depth to restrictive layer is greater than 20" (50 cm). - Poorly to somewhat poorly drained - Textures usually range from loamy sand to clay loam, and may be stratified throughout the profile. - Clay content is 60% in mineral soil surface 4". - With an average particle size class 40% clay

Associated sites

R032XY278WY	**Wetland (WL) 5-9” Wind River Basin Precipitation Zone** The wetland ecological site occurs in complex with Saline Subirrigated, with wetland being the most wet/inundated ecological site, becoming drier and gaining woody vegetation as shift outward.
R032XY374WY	**Subirrigated (Sb) 10-14" East Precipitation Zone** The Subirrigated ecological site is very similar in characteristics to the Saline Subirrigated. The major difference is the lack of influencing salt characteristics that cause a significant shift in plant species and minor shifts in production. The two sites will occur in alternating pockets along drainages in response to interbedded sedimentary materials.
R032XY228WY	**Lowland (LL) 5-9” Wind River Basin Precipitation Zone** The Lowland ecological site occurs in complex with Saline Subirrigated and Saline Lowland. Lowland is similar to Saline lowland, but lacking salts and allowing a shift in vegetation away from salt tolerant species.
R032XY238WY	**Saline Lowland (SL) 5-9” Wind River Basin Precipitation Zone** The Saline Lowland ecological site occurs in complex with Saline Subirrigated, with Saline Lowland being drier of the two ecological sites, gaining woody and some upland herbaceous vegetation as shift outward from the main water source.

Similar sites

DX032X01W142	**Saline Subirrigated (SS) Big Horn Basin Wet** Saline Subirrigated Big Horn Basin Wet is very similar to this site. However, the differences in storm patterns, and topographical divides shifts timing of green up and maturity, site stability, and how the two basins respond under management.
R032XY342WY	**Saline Subirrigated (SS) 10-14" East Precipitation Zone** Saline Subirrigated 10-14
R032XY278WY	**Wetland (WL) 5-9” Wind River Basin Precipitation Zone** Wetland 5-9
R032XY374WY	**Subirrigated (Sb) 10-14" East Precipitation Zone** Subirrigated 10-14

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified

Herbaceous	(1) *Sporobolus airoides* (2) *Puccinellia nuttalliana*

Legacy ID

R032XW142WY

Physiographic features

This site occurs on gently sloping to level bottoms of drainageways or floodplains of active streams.

Table 2. Representative physiographic features

Landforms	(1) Intermontane basin > Flood plain (2) Intermontane basin > Stream terrace (3) Intermontane basin > Drainageway
Flooding duration	Very brief (4 to 48 hours) to brief (2 to 7 days)
Flooding frequency	Rare to occasional
Ponding duration	Brief (2 to 7 days)
Ponding frequency	None to frequent
Elevation	1,370 – 2,010 m
Slope	0 – 10 %
Ponding depth	0 – 10 cm
Water table depth	30 – 100 cm
Aspect	Aspect is not a significant factor

Climatic features

Although not the primary driver, climate is a factor in the overall ecology of this subset. Annual precipitation and modeled relative effective annual precipitation ranges from 9 to 12 inches (229–305 mm). The normal precipitation pattern shows peaks in May and June and a secondary peak in September. This amounts to about 50 percent 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 totals about 20 inches annually. Wide fluctuations may occur in yearly precipitation and result in more dry years than those with more than normal precipitation.

Average 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 generally are 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 1st and continues until about July 1st. Cool weather and moisture in September may produce some green-up of cool-season plants that will continue through late October.

Review of 30-year trend data for average temperature, indicates there has been a warming trend. The last 12 years graphed, however, show temperatures have swayed high and low, but overall have maintained a steady trajectory, neither increasing nor decreasing. On the moisture side, the trajectory in trend has been a slow decline. The swings of when spring warm-up and first frost hit, combined with the decline in average precipitation, have produced a drought effect where the moisture is not being received when the plants and soils are able to utilize the moisture. In some cases, the late precipitation has encouraged the warm-season or mat-forming species over the cool-season bunchgrasses that are the drivers of the natural system. Early frosts, with dry, open winters have created a more arid or desert effect on plants, resulting in high rates of winter kill, loss of vigor, or overall damage to the plant.

For detailed information visit the Natural Resources Conservation Service National Water and Climate Center at http://www.wcc.nrcs.usda.gov/. Riverton, Shoshoni, Boysen Dam, Pavillion, and Diversion Dam are the representative weather stations within LRU 02W. The following graphs and charts are a collective sample representing the averaged normals and 30-year annual rainfall data for the selected weather stations from 1981 to 2010.

Table 3 Representative climatic features

Frost-free period (characteristic range)	90-110 days
Freeze-free period (characteristic range)	120-140 days
Precipitation total (characteristic range)	200-230 mm
Frost-free period (actual range)	90-110 days
Freeze-free period (actual range)	110-140 days
Precipitation total (actual range)	200-230 mm
Frost-free period (average)	100 days
Freeze-free period (average)	130 days
Precipitation total (average)	230 mm

- (1) SHOSHONI [USC00488209], Shoshoni, WY
- (2) PAVILLION [USC00487115], Pavillion, WY
- (3) BOYSEN DAM [USC00481000], Riverton, WY
- (4) DIVERSION DAM [USC00482595], Kinnear, WY
- (5) RIVERTON [USC00487760], Riverton, WY
- (6) RIVERTON [USW00024061], Riverton, WY

Influencing water features

Saline Subirrigated ecological site occurs within the influence of a fluctuating water table and overland flow from intermittent or perennial waterways that are influenced by salts. The water concentrates the salts, which precipitate and influence the ecological site. A water table

will occur above 100 cm (fluctuating between 30 and 100 cm) of the soil surface, and has the potential to occur above the soil surface for very short periods of time . Woody species rarely persist on the site and encourages a limited number of hydrophytic plants. In some instances the water influence for this ecological site is due to irrigation conveyance seep and irrigation runoff.

Wetland description

Stream Type: C (Rosgen).
These sites would classify as a wetland, and is associated with and a major component to the wetland ecological site. Saline Subirrigated supports wetland vegetation.

Soil features

The soils of this site are moderately deep to very deep (greater than 20 inches to bedrock), poorly drained to moderately well drained soils formed in alluvium. Water table is present within the upper 100 cm of the soil profile throughout the growing season. These areas may experience periodic inundation from flooding or ponding. The soil characteristics having the most influence on the plant community are depth to a water table during the growing season and the amount of soluble salts.

Major Soil Series correlated to this site include: Fluvaquents

Figure 7. Soils profile of the Saline Subirrigated ecological site demonstrating the water table during the typical "high water table" period.

Table 4. Representative soil features

Parent material	(1) Alluvium – interbedded sedimentary rock (2) Igneous, metamorphic and sedimentary rock
Surface texture	(1) Loam (2) Clay loam (3) Silt loam (4) Fine sandy loam (5) Clay (6) Loamy sand (7) Silty clay loam (8) Sandy clay loam (9) Sandy loam
Family particle size	(1) Fine-loamy (2) Fine (3) Coarse-loamy (4) Sandy or sandy-skeletal
Drainage class	Poorly drained to somewhat poorly drained

Permeability class	Moderately slow to moderately rapid
Soil depth	50 – 150 cm
Surface fragment cover <=3"	0 – 20 %
Surface fragment cover >3"	0 – 20 %
Available water capacity (0-101.6cm)	7.11 – 15.75 cm
Calcium carbonate equivalent (0-101.6cm)	0 – 40 %
Electrical conductivity (0-101.6cm)	0 – 20 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0 – 40
Soil reaction (1:1 water) (0-101.6cm)	7.4 – 10
Subsurface fragment volume <=3" (0-101.6cm)	0 – 10 %
Subsurface fragment volume >3" (0-101.6cm)	0 – 20 %

Ecological dynamics

Plants that can tolerate soils which are saline and alkaline and have a water table near the surface for most of the growing season, dominate the potential vegetation on this site. The expected potential composition for this site is about 80 percent grasses, 10 percent forbs and 10 percent woody plants. The composition and production will vary naturally due to historical use and fluctuating precipitation, or more specifically fluctuating water tables.

As this site deteriorates, species such as inland saltgrass and greasewood increase and species such as Russian olive, saltcedar, foxtail barley, and a host of weedy forbs invade the site. Grasses such as alkali sacaton, Nuttall's alkaligrass, and basin wildrye will decrease in frequency and production.

There are instances where the ecological site may shift due to a shift in the hydrology. Vegetation will transition slower than hydrologic

changes, so use sound scientific reasoning in these instances. When channel morphological process complete a cycle, there will be saline subirrigated sites that transition to saline lowland sites or may transition to upland sites, thus becoming the Saline Lowland Drained ecological site. Initially after loss of hydrology, the ecological site may appear very similar. However, with time the difference will become very obvious with shifts in species dominance, bare ground, and production.

The reference community (description follows the state and transition diagram) has been determined by study of rangeland relic areas, or areas protected from excessive disturbance. Trends in plant communities going from heavily grazed to lightly grazed areas, seasonal use pastures, and historical accounts have also been used.

The following is a State and Transition Model (STM) diagram for this ecological site. An STM has five fundamental components: states, transitions, restoration pathways, community phases and community pathways. The state, is a single community phase or suite of community phases. The reference state is recognized as State 1. It describes the ecological potential and natural range of variability resulting from the natural disturbance regime of the site. The designation of alternative states (State 2, etc) in STMs denotes changes in ecosystem properties that cross a certain threshold.

Transitions are represented by the arrows between states moving from a higher state to a lower state (State 1 - State 2) and are denoted in the legend as a “T” (T1-2). They describe the variables or events that contribute directly to loss of state resilience and result in shifts between states. Restoration pathways are represented by the arrows between states returning back from a lower state to a higher state (State 2 - State 1) or better illustrated by State 1.

State and transition model

Additional community tables

Table 5. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
Grass/Grasslike					
1	**Tall-stature, Cool-season Bunchgrass**			135-392	
	basin wildrye	LECI4	*Leymus cinereus*	135-392	5-15
	Canada wildrye	ELCA4	*Elymus canadensis*	0-135	0-5
2	**Mid-stature, Cool-season Bunchgrass**			0-135	
	tufted hairgrass	DECE	*Deschampsia cespitosa*	0-135	0-5
3	**Rhizomatous, Cool-season Grasses**			392-807	
	Nuttall's alkaligrass	PUNU2	*Puccinellia nuttalliana*	392-673	15-25
	alkali cordgrass	SPGR	*Spartina gracilis*	0-135	0-5
	western wheatgrass	PASM	*Pascopyrum smithii*	0-135	0-5
	slender wheatgrass	ELTR7	*Elymus trachycaulus*	0-135	0-5
4	**Short-stature, Cool-season Bunchgrass**			0-135	
	Sandberg bluegrass	POSE	*Poa secunda*	0-135	0-5
5	**Mid-stature, Warm-season Bunchgrass**			1065-1345	
	alkali sacaton	SPAI	*Sporobolus airoides*	1065-1345	40-50
	saltgrass	DISP	*Distichlis spicata*	0-135	0-5
6	**Miscellaneous Grass/Grass-likes**			0-135	
	chairmaker's bulrush	SCAM6	*Schoenoplectus americanus*	0-135	0-5
	Grass, perennial	2GP	*Grass, perennial*	0-135	0-5
Forb					
7	**Perennial Forbs**			140-392	
	American licorice	GLLE3	*Glycyrrhiza lepidota*	0-135	0-5
	common plantain	PLMA2	*Plantago major*	0-135	0-5
	curly dock	RUCR	*Rumex crispus*	0-135	0-5
	Pursh seepweed	SUCA2	*Suaeda calceoliformis*	0-135	0-5
	povertyweed	IVAX	*Iva axillaris*	0-135	0-5
	smooth horsetail	EQLA	*Equisetum laevigatum*	0-135	0-5

	silverweed cinquefoil	ARAN7	*Argentina anserina*	0-135	0-5
	Forb, perennial	2FP	*Forb, perennial*	0-135	0-5
Shrub/Vine					
8	**Dominant Shrubs**			28-280	
	greasewood	SAVE4	*Sarcobatus vermiculatus*	0-140	0-5
	rubber rabbitbrush	ERNA10	*Ericameria nauseosa*	0-140	0-5
9	**Miscellaneous Shrubs**			0-135	
	narrowleaf cottonwood	POAN3	*Populus angustifolia*	0-135	0-5
	silver buffaloberry	SHAR	*Shepherdia argentea*	0-135	0-5
	Woods' rose	ROWO	*Rosa woodsii*	0-135	0-5

Table 6. Community 1.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
Grass/Grasslike					
1	**Tall-stature, Cool-season Bunchgrass**			0-135	
	Canada wildrye	ELCA4	*Elymus canadensis*	0-135	0-5
2	**Mid-stature, Cool-season Bunchgrass**			0-135	
	tufted hairgrass	DECE	*Deschampsia cespitosa*	0-135	0-5
3	**Rhizomatous, Cool-season Grasses**			112-729	
	slender wheatgrass	ELTR7	*Elymus trachycaulus*	56-280	5-10
	Nuttall's alkaligrass	PUNU2	*Puccinellia nuttalliana*	56-280	5-10
	alkali cordgrass	SPGR	*Spartina gracilis*	0-135	0-5
	western wheatgrass	PASM	*Pascopyrum smithii*	0-135	0-5
4	**Short-stature, Cool-season Bunchgrass**			0-135	
	Sandberg bluegrass	POSE	*Poa secunda*	0-135	0-5
5	**Mid-stature, Warm-season Bunchgrass**			448-1289	
	alkali sacaton	SPAI	*Sporobolus airoides*	392-1009	15-40
	saltgrass	DISP	*Distichlis spicata*	56-280	5-15
6	**Miscellaneous Grass/Grass-likes**			0-280	
	chairmaker's bulrush	SCAM6	*Schoenoplectus americanus*	0-135	0-5
	Grass, perennial	2GP	*Grass, perennial*	0-135	0-5
Forb					
7	**Perennial Forbs**			112-280	
	American licorice	GLLE3	*Glycyrrhiza lepidota*	0-135	0-5
	common plantain	PLMA2	*Plantago major*	0-135	0-5
	curly dock	RUCR	*Rumex crispus*	0-135	0-5
	Pursh seepweed	SUCA2	*Suaeda calceoliformis*	0-135	0-5
	povertyweed	IVAX	*Iva axillaris*	0-135	0-5
	smooth horsetail	EQLA	*Equisetum laevigatum*	0-135	0-5
	silverweed cinquefoil	ARAN7	*Argentina anserina*	0-135	0-5
	Forb, perennial	2FP	*Forb, perennial*	0-135	0-5
8	**Annual Forbs**			0-135	
	bog rosemary	ANDRO	*Andromeda*	0-135	0-5
	Forb, annual	2FA	*Forb, annual*	0-135	0-5
Shrub/Vine					
9	**Dominant Shrubs**			112-392	

	greasewood	SAVE4	*Sarcobatus vermiculatus*	112-280	5-10
	rubber rabbitbrush	ERNA10	*Ericameria nauseosa*	0-135	0-5
10	**Miscellaneous Shrubs/Short Trees**			0-280	
	narrowleaf cottonwood	POAN3	*Populus angustifolia*	0-135	0-5
	silver buffaloberry	SHAR	*Shepherdia argentea*	0-135	0-5
	Woods' rose	ROWO	*Rosa woodsii*	0-135	0-5

Table 7. Community 2.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 8. Community 3.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 9. Community 3.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 10. Community 4.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Animal community

Reference - Alkali Sacaton/Nuttall's Alkaligrass: The predominance of grasses in this plant community favors grazers and mixed-feeders, such as bison, elk, and antelope. Suitable thermal and escape cover for deer may be limited due to the low quantities of woody plants. However, topographical variations could provide some escape cover. This plant community may provide brood rearing/foraging areas for sage grouse. Other birds that would frequent this plant community include western meadowlarks, horned larks, and golden eagles. Many grassland obligate small mammals would occur here. Alkali Sacaton/Inland Saltgrass/Mixed Shrub: This plant community may be useful for the same large grazers that would use the Reference Community Phase. However, the plant community composition is less diverse, and thus, less apt to meet the seasonal needs of these animals. It may provide some foraging opportunities for sage grouse when it occurs proximal to woody cover. Good grasshopper habitat equals good foraging for birds. Inland Saltgrass Sod/Mixed Shrub: This plant community may be useful for the same large grazers that would use the Reference Community Phase. However, the plant community composition is less diverse, and thus, less apt to meet the seasonal needs of these animals. It may provide some foraging opportunities for sage grouse when it occurs proximal to woody cover. Good grasshopper habitat equals good foraging for birds. Alkali Sacaton/Saltcedar and/or Russian Olive: This plant community may be useful for the same large grazers that would use the Reference Community Phase. However, the plant community is less productive, and thus, less apt to meet the seasonal needs of these animals. The shrub cover does provide good thermal and escape cover for both large animals and upland birds. Russian olive may provide a good source of food for some upland game birds and large animals. Many grassland obligate small mammals would occur here. Dense Saltcedar and/or Russian Olive Stand Plant Community: This plant community can provide important winter cover for mule deer and antelope during that time but little foraging value. The plant community composition is less diverse, and thus less apt to meet the seasonal needs of large grazers. The dense shrub cover does provide good thermal and escape cover for both large animals and upland birds. Russian olive may provide a good source of food for some upland game birds and large animals. Many grassland obligate small mammals would occur here. Grazing Interpretations: The following table lists suggested stocking rates for cattle under continuous, season-long grazing with normal growing conditions. These are conservative estimates that should be used only as guidelines in the initial stages of the conservation planning process. Often, the current plant composition does not entirely match any particular plant community (as described in this ecological site description). Because of this, a field visit is recommended in all cases, to document plant composition and production. More precise carrying capacity estimates should eventually be calculated using this information along with animal preference data, particularly when grazers other than cattle are involved. Under more intensive grazing management, improved harvest efficiencies can result in an increased carrying capacity. If distribution problems occur, stocking rates must be reduced to maintain plant health and vigor. Plant Community Production Carrying Capacity* The carrying capacity is calculated as the production (normal year) X .25 efficiency factor / 912.5 lbs. /AUM (Animal Unit Month, the amount of forage required by one mature cow of approximately 1,000 pounds weight, with or without a calf, for 1 month) to calculate the AUMs/Acre. Plant Community Description/Title lbs./Acre; AUM/Acre*; Acres/AUM* Below Ave.-Normal-Above Ave. Reference: Alkali Sacaton/Nuttall's Alkaligrass 1800-2800 1.2 Alkali Sacaton/Inland Saltgrass/Mixed Shrub 1500-2500 1.0 Inland Saltgrass/Mixed Shrub 800-1600 0.6 Alkali Sacaton/Saltcedar and/or Russian Olive 800-1800 0.8 Dense Saltcedar and/or Russian Olive Stand 800-1600 0.2 * - Carrying capacity is figured for continuous, season-long grazing by cattle under average growing conditions. ** - Sufficient data for invaded and reclaimed communities has not yet been collected or evaluated, so no projection of a stocking rate recommendation or production range will be established at this time. Grazing by domestic livestock is one of the major income-producing industries in the area. Rangeland in this area may provide yearlong forage for cattle, sheep, or horses. During the dormant period, the forage for livestock use must be supplemented with protein because the forage quality does not meet minimum livestock requirements. Distance to water, shrub density, and slope can affect carrying capacity (grazing capacity) within a management unit. Adjustments should be made for the area that is considered necessary for

reduction of animal numbers. For example, 30 percent of a management unit may have 25 percent slopes and distances of greater than one mile from water; therefore, the adjustment is only calculated for 30 percent of the unit (i.e. 50 percent reduction on 30 percent of the management unit). Fencing, slope length, management, access, terrain, kind and class of livestock, and breeds are all factors that can increase or decrease the percent of grazeable acres within a management unit. Adjustments should be made that incorporate these factors when calculating stocking rates.

Hydrological functions

Climate is the principal factor limiting forage production on this site. This site is dominated by soils in hydrologic group B and C, with localized areas in hydrologic group D. Infiltration ranges from moderately slow to moderately rapid. Runoff potential for this site varies from moderate to high depending on soil hydrologic group and ground cover. In many cases, areas with greater than 75 percent ground cover have the greatest potential for high infiltration and lower runoff. An example of an exception would be where short-grasses form a strong sod and dominate the site. Areas where ground cover is less than 50 percent have the greatest potential to have reduced infiltration and higher runoff (refer to Part 630, NRCS National Engineering Handbook for detailed hydrology information). Rills and gullies should not typically be present. Water flow patterns should be barely distinguishable if at all present. Pedestals are only slightly present in association with bunchgrasses. Litter typically falls in place, and signs of movement are not common. Chemical and physical crusts are rare to non-existent. Cryptogamic crusts are present, but only cover 1 to 2 percent of the soil surface.

Recreational uses

This site provides hunting opportunities for upland game species. The wide variety of plants which bloom from spring until fall have an aesthetic value that appeals to visitors. The wet soils are limiting for access and vehicle and foot traffic for most of the growing season.

Wood products

No appreciable wood products are present on the site.

Other products

None noted.

Inventory data references

Information presented in the original site description was derived from NRCS inventory data. Field observations from range trained personnel were also used. Those involved in developing the original site include: Chris Krassin, Range Management Specialist, NRCS and Everet Bainter, Range Management Specialist. Other sources used as references include USDA NRCS Water and Climate Center, USDA NRCS National Range and Pasture Handbook, USDI and USDA Interpreting Indicators of Rangeland Health Version 3 and 5, and USDA NRCS Soil Surveys from various counties. Those involved in the development of the new concept for Saline Lowland ecological site include: Jim Haverkamp, Area Range Management Specialist, NRCS; John Likins, Range Management Specialist, Retired USDI-BLM; Jeremy Artery, Rangeland Management Specialist, USDI-BLM; Leah Yandow, Wildlife Biologist, USDI-BLM; Daniel Wood, MLRA Soil Survey Leader, NRCS; Jane Karinen, Soil Data Quality Specialist, NRCS; and Marji Patz, Ecological Site Specialist, NRCS. Quality control and quality assurance completed by: John Hartung, State Rangeland Management Specialist, NRCS; Brian Jensen, State Wildlife Biologist, NRCS; Kirt Walstad, Regional Ecological Data Quality Specialist, NRCS. Inventory Data References: Ocular field estimations observed by trained personnel were completed at each site. Then sites were selected where a 100 foot tape was stretched and the following sample procedures were completed by inventory staff. For full sampling protocol and guidelines with forms please refer to the Wyoming ESI Operating Procedures, compiled in 2012 for the Powell and Rock Springs Soil Survey Office, USDA NRCS. • Double Sampling Production Data (9.6 hoop used to estimate 10 points, clipped a minimum of 3 of these estimated points, with two 21 foot X 21 foot square extended shrub plots). • Line Point Intercept (over story and understory captured with soil cover). Height of herbaceous and woody cover is collected every three feet along established transect.) • Continuous Line Intercept (Woody Canopy Cover, with minimum gap of 0.2 of a foot for all woody species and succulents. Intercept height collected at each measurement.), • Gap Intercept (Basal Gap measured with a minimum gap requirement of 0.7 foot.), • Sample Point (10 – 1 meter square point photographs taken at set distances on transect. Read using the sample point computer program established by the High Plains Agricultural Research Center, WY). • Soil Stability (Slake Test – surface and subsurface samples collected and processed according to the soil stability guidelines provided by the Jornada Research Center, NM.)

Other references

Bestelmeyer, B., and J. R. Brown. 2005. State-and-transition models 101: a fresh look at vegetation change. The Quivira Coalition Newsletter, Vol. 7, No. 3.

Bestelmeyer, B., J. R. Brown, K. M. Havstad, B. Alexander, G. Chavez, J. E. Herrick. 2003. Development and use of state and transition models for rangelands. Journal of Range Management 56(2):114-126.

Bestelmeyer, B., J. E. Herrick, J. R. Brown, D. A. Trujillo, and K. M. Havstad. 2004. Land management in the American Southwest: a state and-transition approach to ecosystem complexity. Environmental Management 34(1):38-51.

Blaisdell, J.P. and R.C. Holmgren. 1984. Managing intermountain rangelands: salt desert shrub ranges. USDA, Forest Service, General Technical Report INT-163.

FIsser, H.G., D.C. Trueblood, and D.D. Samuelson. 1979. "Soil-Vegetation Relationships on Rangeland Exclosures in the Grass Creek Planning Unit of North Central Wyoming". University of Wyoming Cooperative Research Report to the Bureau of Land Management. 280pp.

Fisser, H.G. and L.A. Joyce. 1984. Atriplex/grass and forb relationships under no grazing and shifting precipitation patterns in northcentral Wyoming. Pages 87-96 in A.R. Tiedemann, E.D. McArthur, H.C. Stutz, R. Stevens, and K.L. Johnson, Compilers. Proceedings: Symposium
on the biology of Atriplex and related Chenopods. USDA, Forest Service, General Technical Report INT-172.

Fisser, H.G. 1964. Range survey in Wyoming's Big Horn Basin. Wyoming Agricultural Experiment Station Bulletin 424R.

Fisser, H.G., Mackey M.H. and J.T. Nichols. 1974. Contour-Furrowing and Seeding on Nuttall Saltbush Rangeland of Wyoming. Journal of Range Management 27: 459-462.

Gates, D.H., L.A. Stoddart, and C. W. Cook. 1956. Soil as a factor in influencing plant distribution on salt deserts of Utah. Ecological Monographs 26:155-175.

Herrick, J. E., J. W. Van Zee, K. M. Havstad, L. M. Burkett, and W. G. Whitford. 2005. Monitoring manual for grassland, shrubland and savanna Ecosystems. Volume I Quick Start. USDA - ARS Jornada Experimental Range, Las Cruces, New Mexico.

Herrick, J. E., J. W. Van Zee, K. M. Havstad, L. M. Burkett, and W. G. Whitford. 2005. Monitoring manual for grassland, shrubland and savanna Ecosystems. Volume II: Design, supplementary methods and interpretation. USDA - ARS Jornada Experimental Range, Las Cruces, New Mexico.

Knight, D.H., Jones G.P, Akashi Y., and R.W. Myers. 1987. Vegetation Ecology in the Bighorn Canyon National Recreation Area. A final report submitted to the U.S. National Park Service and the University of Wyoming – National Park Service Research Center.114 pp.

Nichols, J.T. 1964. Cover, Composition and Production of Contour-furrowed and seeded Range as Compared to Native Saltsage Range. Wyoming Range Management 187: 27-38.

Noy-Meir, I. 1973. Desert ecosystems: environment and producers. Annual Review of Ecology and Systematics 4:25-51.

NRCS. 2014. (electronic) National Water and Climate Center. Available online at http://www.wcc.nrcs.usda.gov/

NRCS. 2014. (electronic) Field Office Technical Guide. Available online at http://efotg.nrcs.usda.gov/efotg_locator.aspx?map=WY

NRCS. 2009. Plant Guide: Cheatgrass. Prepared by Skinner et al., National Plant Data Center.

Pellant, M., P. Shaver, D. A. Pyke, and J. E. Herrick. 2005. Interpreting indicators of rangeland health. Version 4. Technical Reference 1734-6. USDI-BLM.

Schoeneberger, P. J., D. A. Wysocki, E. C. Benham, and Soil Survey Staff. 2012. Field book for describing and sampling soils, Version 3.0. Natural Resources Conservation Service, National Soil Survey Center, Lincoln, NE. (http://soils.usda.gov/technical/fieldbook/)

Stringham, T. K. and W. C. Krueger. 2001. States, transitions, and thresholds: Further refinement for rangeland applications. Agricultural Experiment Station, Oregon State University. Special Report 1024.

Stringham, T. K., W. C. Kreuger, and P. L Shaver. 2003. State and transition modeling: an ecological process approach. Journal of Range Management 56(2):106-113.

United States Department of Agriculture. Soil Survey Division Staff. 1993. Soil Survey Manual, United States Department of Agriculture Handbook No. 18, Chapter 3: Examination and Description of Soils. Pg.192-196.

USDA, NRCS. 1997. National Range and Pasture Handbook (http://www.glti.nrcs.usda.gov/technical/publications/nrph.html)

Trlica, M. J. 1999. Grass growth and response to grazing. Colorado State University. Cooperative Extension. Range. Natural Resource Series. No. 6.108.

U.S. Department of Agriculture, Natural Resources Conservation Service (USDA/NRCS). 2007. The PLANTS Database

(http://plants.usda.gov). National Plant Data Center, Baton Rouge, LA 70874-4490 USA.

U.S. Department of Agriculture, Natural Resources Conservation Service (USDA/NRCS), Soil Survey Staff. 2010. Keys to Soil Taxonomy, Eleventh Edition, 2010.

USDA/NRCS Soil survey manuals for appropriate counties within MLRA 32X.
4/9/2020 Ecological site DX032X02W138 https://edit.jornada.nmsu.edu/admin/esd/032X/DX032X02W138/preview 36/38

Western Regional Climate Center. (2014) (electronic) Station Metadata. Available online at:
http://www.wrcc.dri.edu/summary/climsmwy.html.

Contributors

Marji Patz

Approval

Kirt Walstad, 3/10/2025

Acknowledgments

John Likins, Retired BLM Rangeland Management Specialist - Lander, WY and Steve Renner BLM Hydrologist - Lander, WY assisted with data collection for this ecological site development.

Rangeland health reference sheet

Interpreting Indicators of Rangeland Health is a qualitative assessment protocol used to determine ecosystem condition based on benchmark characteristics described in the Reference Sheet. A suite of 17 (or more) indicators are typically considered in an assessment. The ecological site(s) representative of an assessment location must be known prior to applying the protocol and must be verified based on soils and climate. Current plant community cannot be used to identify the ecological site.

Author(s)/participant(s)	Marji Patz Everet Bainter - original reference sheet
Contact for lead author	marji.patz@usda.gov; 307-271-3130
Date	04/08/2021
Approved by	
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills: Rills should not be present on this site.**

2. **Presence of water flow patterns:** **Water flow patterns are barely observable on the soil. Vegetation may lay over (lodging) following a high flow/overflow event, but soil flow patterns should not be visible.**

---

3. **Number and height of erosional pedestals or terracettes:** **Extreme flow events tend to create very minor pedestals on the bases of herbaceous cover, even in reference condition. However, these do not persist as vegetation recovers, are very slight or are essentially non-existent.**

---

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** **Bare ground is typically 10 to 20 percent occurring in very small areas throughout site. Patch dynamics of bare ground is minimal in this ecological site, with bare ground patches occurring as less than 6 inches in diameter across the extent.**

---

5. **Number of gullies and erosion associated with gullies:** **Active gullies should not be present. Evidence of pre-existing head-cutting may be present, but active or new head-cutting should not be present.**

---

6. **Extent of wind scoured, blowouts and/or depositional areas:** **No evidence of wind scour or blowouts should be present. Minor areas of sediment deposition from spring flooding may be present, but should not bury the current community or persist through a growing season.**

---

7. **Amount of litter movement (describe size and distance expected to travel):** **Little to no plant litter movement is seen with general precipitation events. Following spring flood events, small debris deposits or dams may be present from off sight locations, but on site litter should show little movement.**

---

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** **Plant cover and litter is at 80 percent or greater of soil surface and maintains soil surface integrity. Soil aggregate stability ratings should typically be is anticipated to be 4 ranging from 2 to 5. Surface organic matter adheres to the soil surface. Soil surfaces peds will typically retain structure indefinitely when dipped in distilled water. Salt burden of soils will reduce the overall aggregate stability of the soil.**

---

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** **A-horizon should be 1 to 8 inches; pale brown (10YR 6/3) light clay loam dry, dark brown (10YR 4/3) moist; moderate fine granular structure; soft, very friable, slightly sticky and slightly plastic; strongly effervescent; very strongly alkaline (pH 9.2); clear smooth boundary. In some instances, the A horizon may not be present or will be very thin, generally on active floodplains of perennial systems.**

---

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** **Grass canopy and basal cover should reduce raindrop impact and slow overland flow providing increased time for infiltration to occur. Healthy deep rooted native grasses enhance infiltration and reduce runoff. Infiltration is moderately slow to moderate. The potential vegetation is 80 percent grasses, 10 percent forbs, and 10 percent shrubs. Grass canopy and basal cover should reduce raindrop impact.**

---

11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):** No compaction layer or physical soil surface crusting should be present. Minor chemical crusting will be evident in barren interspaces as soils dry following extended wet periods.

---

12. **Functional/Structural Groups (list in order of descending dominance by above-ground annual-production or live foliar cover using symbols: >>, >, = to indicate much greater than, greater than, and equal to):**

    Dominant: Mid-stature Warm-season Bunchgrasses are the Dominant group, is comprised of 2 species, and accounts for 51% of the composition by production.

    Sub-dominant: Rhizomatous Grasses are the Subdominant group, is comprised of 4 species, and accounts for 24% of the composition by production.

    Other: Perennial Forbs is greater than or equal to Tall-stature Cool-season Bunchgrasses, is greater than Shrubs. Groups are comprised of 2 and then 1 species each respectively, and account for 25% of the composition by production.

    Additional: There are a total of 8 Functional/Structural Groups. (3 are trace). There are 6 dominant and sub-dominant species. Functional/Structural Groups not expected are Introduced annual grasses, perennial introduced and naturalized grasses and annual forbs.

---

13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** Very little evidence of decadence or mortality should be visible. Bunchgrasses have strong, healthy centers and shrubs have few dead stems.

---

14. **Average percent litter cover (%) and depth (in):** Average plant litter cover is expected to be 25 to 35 percent with depths of 0.2 to 0.5 inches.

---

15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** Reference Plant Community (CP 1.1) - Annual production ranges from a low of 1800 to a high of 2600 pounds per acre (air dry basis). Normal annual production is 2400 pounds per acre in a year with normal precipitation and weather conditions. Community Phase 1.2 - Annual production ranges from 1500 to 2500 pounds per acre with average annual production of 2000 pounds per acre.

---

16. **Potential invasive (including noxious) species (native and non-native). List species which BOTH characterize degraded states and have the potential to become a dominant or co-dominant species on the ecological site if their future establishment and growth is not actively controlled by management interventions. Species that become dominant for only one to several years (e.g., short-term response to drought or wildfire) are not invasive plants. Note that unlike other indicators, we are describing what is NOT expected in the reference state for the ecological site:** Greasewood and inland saltgrass are natives that can be aggressive on this ecological site. Canada thistle, salt cedar, and Russian olive are known invaders. For other possible invaders or new species identified follow the Wyoming Weed and Pest Council website: https://wyoweed.org/

---

17. **Perennial plant reproductive capability:** Salt-dependent species (inland saltgrass, alkali sacaton) express high vigor relative to recent weather conditions. Adapted or tolerant species will exhibit moderate vigor. All perennial grasses will have vigorous rhizomes or tillers; vegetative and reproductive structures may be slightly stunted in response to high salt content in soils. All perennial species should be capable of reproducing annually.
