

Ecological site DX032X01W142

Saline Subirrigated (SS)

Big Horn Basin Wet

Last updated: 10/04/2019
Accessed: 08/17/2026

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

Major land resource area (MLRA): 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 single these two basins out. Further 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

Land Resource Unit (LRU): 32X01W (WY): This LRU is the Big Horn Basin within MLRA 32. This LRU is lower in elevation, slightly warmer and receives slightly less overall precipitation than the Wind River Basin (LRU 02). This LRU was originally divided into two LRU's - LRU A which was the core and LRU B which was the rim. With the most current standards, this LRU is divided into two Subsets. This group is ambiguous of the two official subsets and will be referred to as Subset W, capturing those sites that are a factor of water or other processes outside of the general subset divisions (climate). As the LRU shifts outer edges, aspect and relation to the major bodies of water and taller landforms create minor shifts in soil chemistry influencing the variety of ecological sites and plant interactions. The extent of soils currently correlated to this ecological site does not fit within the digitized boundary. Many of the noted soils are provisional and will be reviewed and corrected in mapping update projects. Other map units are correlated as small inclusions within other MLRA's/LRU's based on elevation, landform, and biological references. Moisture Regime: Aquic, typic aridic, or ustic aridic. Temperature Regime: Mesic Dominant Cover: Rangeland, with Saltbush flats the dominant vegetative cover for this MLRA. Representative Value (RV) Effective Precipitation: 5-14 inches (127 – 355 mm) RV Frost-Free Days: 105-150 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 & Intermountain Tall Sagebrush Shrubland & Steppe Macrogroup G302 Artemisia Tridentata - Artemisia tripartita - Purshia tridentata Big Sagebrush Steppe Group 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

Ecological site concept

- Site influence by a water table below soil surface through the entire growing season (within 40 inches), 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 moderately well drained - Textures usually range from loamy sand to clay loam - Clay content is 60% in mineral soil surface 4". - With an average particle size class 40% clay

Associated sites

R032XY138WY	Saline Lowland (SL) 5-9" Big Horn Basin Precipitation Zone Saline Lowland site occurs in close association as a transition from the wettest (wetland) to the drier (saline lowland) with saline subirrigated being the transition between the two sites.
R032XY178WY	Wetland (WL) 5-9" Big Horn Basin Precipitation Zone Wetland site occurs in close association as a transition from the drier site (saline lowland) to the wettest (wetland) with saline subirrigated being the transition between the two sites.

Similar sites

R032XY342WY	Saline Subirrigated (SS) 10-14" East Precipitation Zone Saline Subirrigated 10-14" Foothills and Basins East P.Z., 032XY342WY has higher production.
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Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) <i>Sarcobatus vermiculatus</i>
Herbaceous	(1) <i>Sporobolus airoides</i> (2) <i>Puccinellia nuttalliana</i>

Legacy ID

R032XA142WY

Physiographic features

This site occurs on gently undulating rolling land.

Table 2. Representative physiographic features

Landforms	(1) Intermontane basin > Alluvial fan (2) Intermontane basin > Stream terrace (3) Intermontane basin > Drainageway (4) Intermontane basin > Flood plain
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	1,130 – 1,830 m
Slope	0 – 10 %
Ponding depth	0 – 10 cm
Water table depth	30 – 100 cm
Aspect	Aspect is not a significant factor

Climatic features

Annual precipitation and modeled relative effective annual precipitation ranges from 5 to 14 inches (127 – 355 mm). The normal precipitation pattern shows peaks in May and June and a secondary peak in September. The noted peaks account for approximately 50% of the mean annual precipitation. Much of the moisture that falls in the latter part of the summer is lost by evaporation and much of the moisture that falls during the winter is lost by sublimation.

Average snowfall is about 20 inches annually. Wide fluctuations may occur in yearly precipitation and result in more dry years than those with more than normal precipitation. Temperatures show a wide range between summer and winter and between daily maximums and minimums, due to the high elevation and dry air, which permits rapid incoming and outgoing radiation. Cold air outbreaks from Canada in winter move rapidly from northwest to southeast and account for extreme minimum temperatures. Chinook winds may occur in winter and bring rapid rises in temperature. Extreme storms may occur during the winter, but most severely affect ranch operations during late winter and spring. High winds are generally blocked from the basin by high mountains but can occur in conjunction with an occasional thunderstorm.

Growth of native cool-season plants begins approximately on April 1st and continues through to July 1st. Cool weather and moisture in September may produce some green up of cool season plants that will continue to late October. For detailed information visit the Natural Resources Conservation Service National Water and Climate Center at <http://www.wcc.nrcs.usda.gov/>. "Basin", "Clark 3NE", "Cody", "Cody 12SE", "Emblem", "Greybull", "Heart Mtn", "Lovell", "Powell Fld Stn", "Worland FAA AP", and "Worland" are the representative weather stations for LRU A. 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)	90-120 days
Freeze-free period (characteristic range)	120-140 days
Precipitation total (characteristic range)	180-230 mm
Frost-free period (actual range)	90-120 days
Freeze-free period (actual range)	110-150 days
Precipitation total (actual range)	180-250 mm

Frost-free period (average)	110 days
Freeze-free period (average)	130 days
Precipitation total (average)	200 mm

- (1) BASIN [USC00480540], Basin, WY
- (2) EMBLEM [USC00483031], Burlington, WY
- (3) LOVELL [USC00485770], Lovell, WY
- (4) WORLAND [USW00024062], Worland, WY
- (5) WORLAND [USC00489770], Worland, WY
- (6) GREYBULL [USC00484080], Greybull, WY
- (7) CLARK 3NE [USC00481775], Powell, WY
- (8) HEART MTN [USC00484411], Powell, WY
- (9) CODY 12SE [USC00481850], Meeteetse, WY
- (10) CODY [USC00481840], Cody, WY
- (11) POWELL FLD STN [USC00487388], Powell, WY

Influencing water features

The characteristics of these soils have influence from ground water that is within 40 inches of the soil surface and will be just below the surface for all of the growing season. Water over the surface from run-in may occur but only for short periods of time. These soils are moderately deep to deep and poorly to somewhat well drained.

Wetland description

No wetland classification was established for this site.

Stream type: C (Rosgen)

Soil features

The soils of this site are moderately deep to very deep (greater than 20"to bedrock) poorly drained to moderately well drained soils formed in alluvium. These soils have water tables below the surface for all of the growing season. These areas may have water over the surface from run-in but only for short periods of time. 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

Table 4. Representative soil features

Parent material	(1) Alluvium – sandstone and shale
Surface texture	(1) Loam (2) Clay loam (3) Silt loam (4) Loamy sand (5) Clay
Family particle size	(1) Loamy

Drainage class	Poorly drained to well drained
Permeability class	Moderately slow to moderately rapid
Soil depth	50 – 150 cm
Available water capacity (0-101.6cm)	7.11 – 15.75 cm
Calcium carbonate equivalent (0-101.6cm)	0 – 20 %
Electrical conductivity (0-101.6cm)	0 – 20 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	10 – 20
Soil reaction (1:1 water) (0-101.6cm)	7.4 – 10

Ecological dynamics

Plants that can tolerate soils which are saline and/or 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% grasses, 10% forbs and 10% woody plants. The composition and production will vary naturally due to historical use, fluctuating precipitation and fire frequency.

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.

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

The following is a State and Transition Model Diagram that illustrates the common plant communities (states) that can occur on the site and the transitions between these communities. The ecological processes will be discussed in more detail in the plant community narratives following the diagram.

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 (%)
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Grass/Grasslike					
1				1076-1345	
	alkali sacaton	SPAI	<i>Sporobolus airoides</i>	1076-1345	–
2				404-673	
	Nuttall's alkaligrass	PUNU2	<i>Puccinellia nuttalliana</i>	404-673	–
3				135-404	
	basin wildrye	LECI4	<i>Leymus cinereus</i>	135-404	–
4				0-269	
	alkali cordgrass	SPGR	<i>Spartina gracilis</i>	0-269	–
5				0-269	
	Grass, perennial	2GP	<i>Grass, perennial</i>	0-135	–
	saltgrass	DISP	<i>Distichlis spicata</i>	0-135	–
	mountain rush	JUARL	<i>Juncus arcticus ssp. littoralis</i>	0-135	–
	western wheatgrass	PASM	<i>Pascopyrum smithii</i>	0-135	–
Forb					
6				0-269	
	Forb, perennial	2FP	<i>Forb, perennial</i>	0-135	–
	dock	RUMEX	<i>Rumex</i>	0-135	–
	seepweed	SUAED	<i>Suaeda</i>	0-135	–
	arrowgrass	TRIGL	<i>Triglochin</i>	0-135	–
Shrub/Vine					
7				0-269	
	Shrub (>.5m)	2SHRUB	<i>Shrub (>.5m)</i>	0-135	–
	rubber rabbitbrush	ERNA10	<i>Ericameria nauseosa</i>	0-135	–
	Woods' rose	ROWOW	<i>Rosa woodsii var. woodsii</i>	0-135	–
	greasewood	SAVE4	<i>Sarcobatus vermiculatus</i>	0-135	–
	silver buffaloberry	SHAR	<i>Shepherdia argentea</i>	0-135	–

Table 6. Community 2.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 7. Community 3.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 8. Community 4.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 9. Community 5.1 plant community composition

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

Animal Community – Wildlife Interpretations Historic Climax Plant Community: 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 Historic Climax Plant Community. 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. Inland Saltgrass Sod/Mixed Shrub: This plant community

may be useful for the same large grazers that would use the Historic Climax Plant Community. 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. Alkali Sacaton/Saltcedar and/or Russian Olive: This plant community may be useful for the same large grazers that would use the Historic Climax Plant Community. 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. 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 provides little diversity, and is 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. Animal Community – Grazing Interpretations The following table lists suggested stocking rates for cattle under continuous season-long grazing under 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* (lb. /ac) (AUM/ac) Historic Climax Plant Community 1800-2600 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 * - Continuous, season-long grazing by cattle under average growing conditions. 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 needs to be supplemented with protein because the quality does not meet minimum livestock requirements.

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% 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% 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 1-2% of the soil surface.

Recreational uses

This site provides hunting opportunities for upland game species. The wide varieties of plants which bloom from spring until fall have an esthetic value that appeals to visitors.

Wood products

No appreciable wood products are present on the site.

Other products

None noted.

Inventory data references

Information presented here has been derived from NRCS inventory data. Field observations from range trained personnel were also used. Other sources used as references include: USDA NRCS Water and Climate Center, USDA NRCS National Range and Pasture Handbook, and USDA NRCS Soil Surveys from various counties. Inventory Data References Data Source Number of Records Sample Period State County SCS-RANGE-417 19 1965-1986 WY Park & others

Approval

Scott Woodall, 10/04/2019

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)	Ray Gullion
Contact for lead author	ray.gullion@wy.usda.gov
Date	02/19/2008
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

2. **Presence of water flow patterns:** Barely observable

3. **Number and height of erosional pedestals or terracettes:** 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 10-20% occurring in small areas throughout site

5. **Number of gullies and erosion associated with gullies:** Active gullies should not be present

6. **Extent of wind scoured, blowouts and/or depositional areas:** None

7. **Amount of litter movement (describe size and distance expected to travel):** Little to no plant litter movement. Plant litter remains in place and is not moved by erosional forces.

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% or greater of soil surface and maintains soil surface integrity. Soil Stability class is anticipated to be 4 or greater.
-
9. Soil surface structure and SOM content (include type of structure and A-horizon color and thickness): Use Soil Series description for depth and color of A-horizon
-
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.
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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 is present. Some surface crusting of salts due to fluctuation of water table.
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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 Bunch Grasses
- Sub-dominant: Mid stature rhizomatous Grasses Shrubs
- Other: Forbs Short Grasses/Grasslikes
- Additional:
-
13. Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):
Very Low
-
14. Average percent litter cover (%) and depth (in):
-
15. Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):
2400 lbs/ac
-
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: Inland saltgrass, Greasewood, Russian olive, Saltcedar, Annuals, Foxtail barley, other exotics, and Species found on Noxious Weed List
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17. **Perennial plant reproductive capability:** All species are capable of reproducing
