

Ecological site R025XY010ID

CLAYPAN 12-16

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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): 025X–Owyhee High Plateau

The Owyhee High Plateau, MLRA 25, lies within the Intermontane Plateaus physiographic province. The southern half is found in the Great Basin while the northern half is located in the Columbia Plateaus. The southern section of the Owyhee High Plateau is characterized by isolated, uplifted fault-block mountain ranges separated by narrow, aggraded desert plains. This geologically older terrain has been dissected by numerous streams draining to the Humboldt River. The northern section forms the southern boundary of the extensive Columbia Plateau basalt flows. Deep, narrow canyons drain to the Snake River across the broad volcanic plain. This MLRA is characteristically cooler and wetter than the neighboring MLRAs of the Great Basin. Elevation ranges from 3,000 to 7,550 feet on rolling plateaus and in gently sloping basins. It is more than 9,840 feet on some steep mountains. The average annual precipitation in most of this area is typically 11 to 22 inches. It increases to as much as 49 inches at the higher elevations. Precipitation occurs mainly as snow in winter. The supply of water from precipitation and streamflow is small and unreliable, except along major rivers. Streamflow depends largely on accumulated snow in the mountains. The dominant soil orders in this MLRA are Aridisols and Mollisols. The soils in the area dominantly have a mesic or frigid temperature regime and an aridic, arid bordering on xeric, or xeric moisture regime. Most of the soils formed in mixed parent material. Volcanic ash and loess mantle the landscape. Surface soil textures are loam and silt loam, and have ashy texture modifiers in some cases. Argillic horizons occur on the more stable landforms.

Classification relationships

Artemisia arbuscula/ Festuca idahoensis ht. in " Hironaka, M., M.A. Fosberg, A. H. Winward. 1983. Sagebrush- Grass Habitat Types of Southern Idaho". University of Idaho. Moscow, Idaho. Bulletin Number 35.

Ecological site concept

This ecological site is found on summits and side-slopes of lava plateaus on slopes less than 30 percent. Soils associated with this site are shallow, well drained, and formed in residuum and colluvium derived from volcanic rock. These soil have greater than 35 percent rock fragments by volume distributed throughout the profile, a horizon of clay accumulation (argillic horizon) within 4 inches (11cm) of the soil surface, and a hard volcanic bedrock at 27 inches (68 cm). Important abiotic factors contributing to the presence of this ecological site include an abrupt boundary to argillic horizon in the upper soil profile that results in wet non-satiated conditions in the spring and early summer and shallow rooting depth. This ecological site is dominated by low sagebrush and bluebunch wheatgrass.

Associated sites

R025XY011ID	LOAMY 13-16
R025XY017ID	SHALLOW BREAKS 14-18
R025XY028ID	LOAMY BOTTOM 12-16

R025XY036ID	SOUTH SLOPE LOAMY 12-16
R025XY048ID	SHALLOW CLAYPAN 11-13
R025XY019ID	LOAMY 10-13
R025XY044ID	VERY SHALLOW STONY LOAM 10-14
R025XY048ID	SHALLOW CLAYPAN 11-13
R025XY043ID	LOAMY 11-13

Similar sites

R025XY014ID	CLAYEY 12-16 early sage dominant shrub
R025XY017NV	CLAYPAN 12-16 P.Z. occurs on mountains and high elevation plateaus
R025XY048ID	SHALLOW CLAYPAN 11-13 soils characterized by a horizon strongly cemented or indurated with silica and calcium carbonate (duripan)

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) <i>Artemisia arbuscula</i>
Herbaceous	(1) <i>Festuca idahoensis</i> (2) <i>Pseudoroegneria spicata</i>

Physiographic features

This ecological site occurs on summits and side slopes of lava plateaus. Slopes are less than 30 percent and runoff ranges from low to medium.

Table 2. Representative physiographic features

Landforms	(1) Lava plateau > Hillslope (2) Lava plateau > Plateau
Runoff class	Low to medium
Elevation	1,520 – 2,130 m
Slope	0 – 30 %
Aspect	Aspect is not a significant factor

Climatic features

The climate associated with this site is defined by hot dry summers and cold snowy winters. There are an average of 38 frost free-days and 81 day freeze-free days. Mean annual precipitation is 15 inches (38cm), with the highest rainfall occurring in May 2.2 inches (5.5cm) and the lowest in August 0.6 inches (1.5cm). Effective precipitation is lower, between 10 to 12 inches (25 to 30cm). Average snowfall is around 35 inches (88cm) per year. Air temperatures average degrees F 26 in January (coldest) and 66 in July (warmest).

Data was provided by the MTN CITY RS, JACKPOT, and Silver City 5 W climate stations.

Table 3 Representative climatic features

Frost-free period (characteristic range)	70-90 days
Freeze-free period (characteristic range)	100-130 days
Precipitation total (characteristic range)	280-460 mm
Frost-free period (actual range)	70-100 days
Freeze-free period (actual range)	90-140 days
Precipitation total (actual range)	280-510 mm
Frost-free period (average)	80 days
Freeze-free period (average)	110 days
Precipitation total (average)	380 mm

- (1) SILVER CITY 5 W [USC00108412], Murphy, ID

- (2) MTN CITY RS [USC00265392], Mountain City, NV
- (3) JACKPOT [USC00264016], Jackpot, NV

Influencing water features

This site is not influenced by adjacent water features and no water table is present.

Wetland description

N/A

Soil features

These soils are shallow, well drained, and formed in residuum and colluvium derived from volcanic rock. The soil profile is characterized by a gravelly loam surface horizon, an abrupt boundary to accumulation of clay (argillic horizon) within 4 inches (11cm) of the soil surface, and a hard volcanic bedrock at 27 inches (68cm). These soils are characterized by greater than 30 percent clay in the particle size control section.

Representative soil components associated with this ecological site include Wickahoney, Squawcreek, Dougal, Cleavage, Sharesnout, Thacker and Brose.

Table 4. Representative soil features

Parent material	(1) Volcanic ash (2) Colluvium – volcanic rock (3) Residuum – volcanic rock
Surface texture	(1) Very gravelly loam
Drainage class	Well drained
Permeability class	Moderately slow to moderate
Soil depth	30 – 50 cm
Surface fragment cover <=3"	30 – 40 %
Surface fragment cover >3"	10 – 20 %
Available water capacity (Depth not specified)	4.06 – 11.3 cm
Soil reaction (1:1 water) (Depth not specified)	6.1 – 7.3

Subsurface fragment volume <=3" (Depth not specified)	10 – 30 %
Subsurface fragment volume >3" (Depth not specified)	0 – 20 %

Ecological dynamics

The Claypan 12-16 ecological site is dominated by Bluebunch wheatgrass, Idaho fescue and little sagebrush. Subdominant species include Sandberg bluegrass, bottlebrush squirreltail, Nevada bluegrass, thickspike wheatgrass, Thurber's needlegrass, arrowleaf balsamroot, Hooker's balsamroot and longleaf phlox. Total annual production is 650 lbs/acre in a normal year, 950 lbs/acre in a favorable year, and 350 lbs/acre in an unfavorable year. Structurally, cool season deep-rooted perennial bunchgrasses are dominant, followed by medium height shrubs and perennial forbs. This site is visually dominated by bunch grasses and little sagebrush. Composition by weight is approximately 40-60% grasses, 15-25% forbs and 25-35% shrubs.

Herbivory has historically occurred on the site at low levels of utilization. Native herbivores include pronghorn antelope, mule deer, sage grouse, lagomorphs and rodents. Livestock grazing has become prevalent across this site. Overutilization of resources due to grazing (from livestock and wildlife) can degrade the site and decrease forage availability and quality. This will lead to a decrease in perennial bunch grasses and an increase of invasive species (Williamson, 2020). Annual and perennial invasive species compete with desirable plants for moisture and nutrients.

Wildfire frequency across this site has historically been low. Sagebrush evolved with low intensity wildfire that left a mosaic of burned and unburned patches (Baker, 2006). Annual invasive species such as cheatgrass and medusahead can be troublesome invaders on this site after wildfire, preventing perennial grass and shrub re-establishment. Invasive, annual plant communities increase wildfire frequency and intensity (K. Haubensak, 2009). This could cause the dominate shrub population to shift away from little sagebrush to a shrub population with quicker establishment. A complete absence of wildfire could lead this site to become dominated by Utah Juniper.

High annual precipitation will increase the total plant production. Higher wildfire frequency following annual plant production can be expected due to a larger fuel load (Pilliod, 2017). Extended drought reduces the vigor of perennial grasses and shrubs, while extreme drought may cause plant mortality. Runoff potential following large precipitation events is low if plant communities are present on the landscape. Decreased infiltration, increased runoff, and increased erosion often occur when little sagebrush is removed by frequent wildfires (C.J. Williams, 2018).

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				179-525	
	bluebunch wheatgrass	PSSP6	<i>Pseudoroegneria spicata</i>	90-286	–
	Idaho fescue	FEID	<i>Festuca idahoensis</i>	90-286	–
	Sandberg bluegrass	POSE	<i>Poa secunda</i>	9-48	–
	Thurber's needlegrass	ACTH7	<i>Achnatherum thurberianum</i>	4-29	–
	sedge	CAREX	<i>Carex</i>	4-29	–
	basin wildrye	LECI4	<i>Leymus cinereus</i>	0-19	–
Forb					
2				90-286	
	balsamroot	BALSA	<i>Balsamorhiza</i>	13-67	–
	tapertip hawksbeard	CRAC2	<i>Crepis acuminata</i>	4-29	–
	fleabane	ERIGE2	<i>Erigeron</i>	0-19	–
	bluebells	MERTE	<i>Mertensia</i>	0-19	–

	anemone	ANEMO	<i>Anemone</i>	0-19	–
	spiny phlox	PHHO	<i>Phlox hoodii</i>	0-19	–
	longleaf phlox	PHLO2	<i>Phlox longifolia</i>	0-19	–
	aster	ASTER	<i>Aster</i>	0-19	–
	lupine	LUPIN	<i>Lupinus</i>	0-19	–
	buckwheat	ERIOG	<i>Eriogonum</i>	0-19	–
	milkvetch	ASTRA	<i>Astragalus</i>	0-19	–
Shrub/Vine					
3				67-239	
	little sagebrush	ARAR8	<i>Artemisia arbuscula</i>	90-239	–
	green rabbitbrush	ERTE18	<i>Ericameria teretifolia</i>	4-29	–
	antelope bitterbrush	PUTR2	<i>Purshia tridentata</i>	0-10	–

Table 6. Community 1.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 7. Community 1.3 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 8. Community 2.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 9. Community 2.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 10. Community 2.3 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 11. Community 3.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 12. Community 3.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 13. Community 4.1 plant community composition

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

Large herbivore use on the reference plant community includes mule deer, elk and pronghorn antelope. Site (south facing slopes) can provide winter habitat for these large herbivores. The rangeland habitat provides important seasonal habitat for resident and migratory animals including western toad, common sagebrush lizard, shrews, bats, jackrabbits, ground squirrels, mice, coyote, red fox, badger, sage-grouse, Ferruginous hawk, prairie falcon, horned lark and western meadowlark. Sage-grouse is an area sensitive species that may be present on this site. In isolated areas encroachment of noxious and invasive plant species (cheatgrass, medusahead and bulbous bluegrass) have replaced native plant species which provided critical feed, brood-rearing and nesting cover for a variety of native wildlife. Water is limited, being provided only by seasonal runoff, artificial water catchments and spring sites. Livestock grazing should occur in late spring and early fall. Natural water supplies are limited. Initial stocking rates should be determined with the landowner or decision-maker by utilizing forage analysis yearly in their specific allotment.

Inventory data references

Information presented here has been derived from NRCS clipping and other inventory data. Old SS Manuscripts, Range Site Descriptions, etc. Also, field knowledge of range-trained personnel was used. Those involved in developing this site description include:

Dave Franzen, co-owner, Intermountain Rangeland Consultants, LLC Jacy Gibbs, co-owner, Intermountain Rangeland Consultants, LLC Jim Cornwell, Rangeland Management Specialist, IASCD Brendan Brazee, State Rangeland Management Specialist, NRCS, Idaho Leah Juarros, Resource Soil Scientist, NRCS, Idaho Lee Brooks, Range Management Specialist, IASCD

Type locality

Location 1: Twin Falls County, ID	
Township/Range/Section	T15S R16E S20
General legal description	NE 1/4, NW 1/4
Location 2: Owyhee County, ID	
Township/Range/Section	T10S R2W S5
General legal description	NE 1/4, NE 1/4
Location 3: Owyhee County, ID	
Township/Range/Section	T6S R5W S23
General legal description	SE 1/4, SE 1/4
Location 4: Elko County, NV	
General legal description	Taylor Canyon Area
Location 5: Blaine County, ID	

References

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- Pilliod, D.S. and J.L. Welty. 2017. Refining the cheatgrass–fire cycle in the Great Basin: Precipitation timing and fine fuel composition predict wildfire trends. Ecology and Evolution. Wiley.
- Williamson, M.A. and E. Fleishman. 2019. Fire, livestock grazing, topography, and precipitation affect occurrence and prevalence of cheatgrass (*Bromus tectorum*) in the central Great Basin, USA.

Other references

Hironaka, M., M.A. Fosberg, A. H. Winward. 1983. Sagebrush- Grass Habitat Types of Southern Idaho. University of Idaho. Moscow, Idaho. Bulletin Number 35.

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USDA, NRCS.2001. The PLANTS Database, Version 3.1 (<http://plants.usda.gov>). National Plant Data Center, Baton Rouge, LA 70874-4490 USA

USDA, Forest Service, Fire Effects Information Database. 2004. www.fs.fed.us/database.

USDI Bureau of Land Management, U S Geological Survey; USDA Natural Resources Conservation Service, Agricultural Research Service: Interpreting Indicators of Rangeland Health. Technical Reference 1734-6; version 4-2005.

Contributors

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Approval

Kendra Moseley, 4/24/2024

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)	
Contact for lead author	USDA/NRCS 9173 W. Barnes Drive, Suite C Boise, ID 83709 208-378-5722
Date	07/03/2007
Approved by	
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** Rills can occur on this site. If rills are present, they are likely to occur on slopes greater than 10 percent and immediately following a wildfire or high intensity storm. Rills are most likely to occur on soils with silt loam or clay loam surface texture.

2. **Presence of water flow patterns:** Water-flow patterns occur on this site. They are not extensive except on slopes greater than 15 percent. When they do occur, they are short and disrupted by cool season grasses, shrubs and surface stones.

3. **Number and height of erosional pedestals or terracettes:** Pedestals and/or terracettes are common on the site especially where flow patterns are present and the surface soils have a high clay content.

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Ranges from 40-50 percent.

5. **Number of gullies and erosion associated with gullies:** None.

6. **Extent of wind scoured, blowouts and/or depositional areas:** Wind-scoured, blowouts and/or deposition areas are usually not present in the HCPC.

7. **Amount of litter movement (describe size and distance expected to travel):** Fine litter in the interspaces may move up to 3 feet following a significant run-off event. Coarse litter generally does not move.

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** Values should range from 3 to 5.

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):**

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Bunchgrasses, especially deep-rooted perennial species, slow runoff and increase infiltration. Medium height shrubs accumulate some snow in the interspaces.

11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):** Compaction layer is not present. Do not mistake an increase in clay for a compaction layer. The site can develop a compaction layer due to the clay in the subsoil as a result of severe livestock use when the soils are wet.

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: Cool season deep-rooted perennial bunchgrasses>> medium shrubs

Sub-dominant: Perennial forbs>shallow rooted bunchgrasses

Other:

Additional:

13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):**
Very little mortality or decadence is expected on this site. Mortality of shallow-rooted grasses may occur due to extended periods of drought.
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14. **Average percent litter cover (%) and depth (in):** Additional data is needed but is expected to be low and at a shallow depth.
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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):**
Annual production is 650 pounds per acre (728 Kg/ha) in a year with normal precipitation and temperatures. Perennial grasses produce 40-60 percent of the total production, forbs 15-25 percent and shrubs 25-35 percent.
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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:** Invasive plants include cheatgrass, medusahead, Vulpia species, bulbous bluegrass, annual mustards and rush skeletonweed.
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17. **Perennial plant reproductive capability:** All functional groups have the potential to reproduce in most years.
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