

# **Ecological site R025XY040ID VERY SHALLOW STONY 8-12**

Last updated: 4/25/2024  
Accessed: 05/21/2025

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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

### **MLRA Notes 25—Owyhee High Plateau**

This area is in Nevada (56 percent), Idaho (30 percent), Oregon (12 percent), and Utah (2 percent). It makes up about 27,443 square miles. MLRA 25 is characteristically cooler and wetter than the neighboring MLRAs of the Great Basin. The western boundary is marked by a gradual transition to the lower and warmer basins of MLRA 24. The boundary to the south-southeast, with MLRA 28B, is marked by gradual changes in geology marked by an increased dominance of singleleaf pinyon and Utah juniper and a reduced presence of Idaho fescue. The boundary to the north, with MLRA 11, is a rapid transition from the lava plateau topography to the lower elevation Snake River Plain.

### **Physiography:**

All of this area lies within the Intermontane Plateaus. The southern half is in the Great Basin section of the Basin and Range province. This part of the MLRA 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 half of the area lies within the Columbia Plateaus province. This part of the MLRA forms the southern boundary of the extensive Columbia Plateau basalt flows. Most of the northern half is in the Payette section, but the northeast corner is in the Snake River Plain section. Deep, narrow canyons draining into the Snake River have been incised into this broad basalt plain. 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 Humboldt River crosses the southern half of this area

### **Geology:**

The dominant rock types in this MLRA are volcanic. They include andesite, basalt, tuff,

and rhyolite. In the north and west parts of the area, Cretaceous granitic rocks are exposed among Miocene volcanic rocks in mountains. A Mesozoic igneous and metamorphic rock complex dominates the south and east parts of the area. Upper and Lower Paleozoic calcareous sediments, including oceanic deposits, are exposed with limited extent in the mountains. Alluvial fan and basin fill sediments occur in the valleys.

#### Climate:

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. Rainfall occurs in spring and sporadically in summer. Precipitation occurs mainly as snow in winter. The precipitation is distributed fairly evenly throughout fall, winter, and spring. The amount of precipitation is lowest from midsummer to early autumn. The average annual temperature is 33 to 51 degrees F. The freeze-free period averages 130 days and ranges from 65 to 190 days, decreasing in length with elevation. It is typically less than 70 days in the mountains.

#### Water:

The supply of water from precipitation and streamflow is small and unreliable, except along the Owyhee, Bruneau, and Humboldt Rivers. Streamflow depends largely on accumulated snow in the mountains. Surface water from mountain runoff is generally of excellent quality and suitable for all uses. The basin fill sediments in the narrow alluvial valleys between the mountain ranges provide some ground water for irrigation. The alluvial deposits along the large streams have the most ground water. Based on measurements of water quality in similar deposits in adjacent areas, the basin fill deposits probably contain moderately hard water. The water is suitable for almost all uses. The carbonate rocks in this area are considered aquifers, but they are little used. Springs are common along the edges of the limestone outcrops.

#### Soils:

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, aridic bordering on xeric, or xeric moisture regime. Soils with aquic moisture regimes are limited to drainage or spring areas, where moisture originates or runs on and through. These soils are of a very limited extent throughout the MLRA. They generally are well drained, clayey or loamy, and shallow or moderately deep. Most of the soils formed in mixed parent material.

Volcanic ash and loess mantle the landscape. Surface soil textures are loam and silt loam with ashy texture modifiers in some areas. Argillic horizons occur on the more stable landforms. They are exposed nearer the soil surface on convex landforms, where ash and loess deposits are more likely to erode. Soils that formed in carbonatic parent material in areas that receive less than 12 inches of precipitation are characterized by calcic horizons throughout the profile, while soils in areas that receive more than 12 inches of precipitation do not have calcic horizons in the upper part of the profile. Soils that formed on stable landforms at the lower elevations are dominated by ochric horizons. Soils that formed at the middle and upper elevations are characterized by mollic epipedons. Soils in drainage areas at all elevations that receive moisture running on or through them are characterized by thicker mollic epipedons.

#### Biological Resources:

This MLRA supports shrub-grass vegetation. Lower elevations are characterized by Wyoming big sagebrush associated with bluebunch wheatgrass, western wheatgrass, and

Thurber’s needlegrass. Other important plants include bluegrass, squirreltail, penstemon, phlox, milkvetch, lupine, Indian paintbrush, aster, and rabbitbrush. Black sagebrush occurs but is less extensive. Singleleaf pinyon and Utah juniper occur in limited areas. With increasing elevation and precipitation, vast areas characterized by mountain big sagebrush or low sagebrush/early sagebrush in association with Idaho fescue, bluebunch wheatgrass, needlegrasses, and bluegrass become common. Snowberry, curl-leaf mountain mahogany, ceanothus, and juniper also occur. Mountains at the highest elevations support whitebark pine, Douglas-fir, limber pine, Engelmann spruce, subalpine fir, aspen, and curl-leaf mountain mahogany.

Major wildlife species include mule deer, bighorn sheep, pronghorn, mountain lion, coyote, bobcat, badger, river otter, mink, weasel, golden eagle, red-tailed hawk, ferruginous hawk, Swainson’s hawk, northern harrier, prairie falcon, kestrel, great horned owl, short-eared owl, long-eared owl, burrowing owl, pheasant, sage grouse, chukar, gray partridge, and California quail. Reptiles and amphibians include western racer, gopher snake, western rattlesnake, side-blotched lizard, western toad, and spotted frog. Fish species include bull, red band, and rainbow trout.

**Ecological site concept**

This site occurs on shallow calcareous soils that are nearly level to rolling. Slopes range from 2 to 10 percent on all aspects. Elevations range from 4500-6000 feet.

The soils supporting this site are very shallow to moderately deep, well drained, with impermeable to slow permeability above a duripan. Cottle is above bedrock. Runoff is medium to very high. The erosion hazard is slight to moderate by water and slight to moderate by wind. The available water holding capacity (AWC) is very low.

The plant community is dominated by black sagebrush and Thurber's needlegrass.

**Associated sites**

R025XY020ID	<b>LOAMY 7-10</b>
R025XY044ID	<b>VERY SHALLOW STONY LOAM 10-14</b>
R025XY048ID	<b>SHALLOW CLAYPAN 11-13</b>

**Similar sites**

R025XY048ID	<b>SHALLOW CLAYPAN 11-13</b>
R025XY044ID	<b>VERY SHALLOW STONY LOAM 10-14</b>

Table 1. Dominant plant species

Tree	Not specified
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Shrub	(1) <i>Artemisia nova</i>
Herbaceous	(1) <i>Achnatherum thurberianum</i>

## Physiographic features

This site occurs on shallow calcareous soils that are nearly level to rolling. Slopes range from 2 to 10 percent on all aspects. Elevations range from 4500-6000 feet (1370 to 1830 meters).

**Table 2. Representative physiographic features**

Landforms	(1) Terrace (2) Plain (3) Plateau
Runoff class	Medium to very high
Flooding frequency	None
Ponding frequency	None
Elevation	1,372–1,829 m
Slope	2–10%
Water table depth	152 cm
Aspect	Aspect is not a significant factor

## Climatic features

In MLRA 25 summers are hot, especially at lower elevations, and winters are cold and snowy. Precipitation is usually lighter at lower elevations throughout the year. At higher elevations precipitation is much greater, and snow accumulates to a considerable depth. The average total precipitation is 14.39 inches (based on 6 long term climate stations located throughout the MLRA).

The mean annual temperature is 45.9 degrees F. The average high is 59.7 and the average low temperature is 32.1 degrees. The prevailing wind is from the west. Average wind speed is greatest, at about 10 miles per hour, in March.

The frost-free period ranges from 79 to 103 days and the freeze free period ranges from 114 to 140 days.

No climate stations exist nearby site.

**Table 3. Representative climatic features**

Frost-free period (average)	127 days
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Freeze-free period (average)	91 days
Precipitation total (average)	356 mm

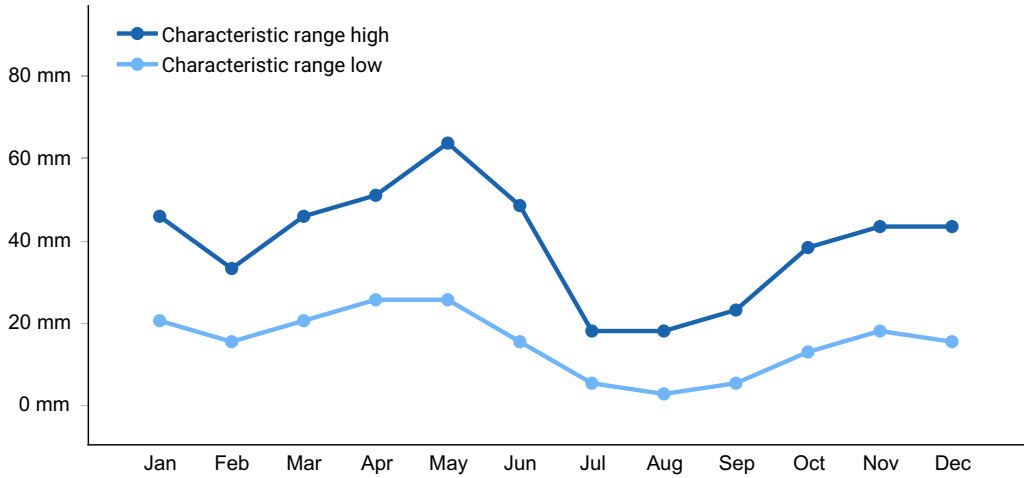


Figure 1. Monthly precipitation range

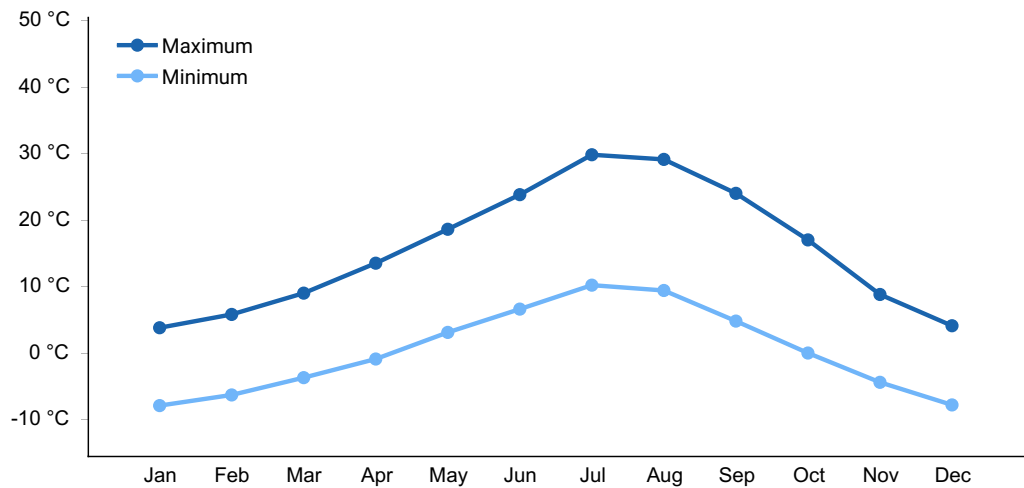


Figure 2. Monthly average minimum and maximum temperature

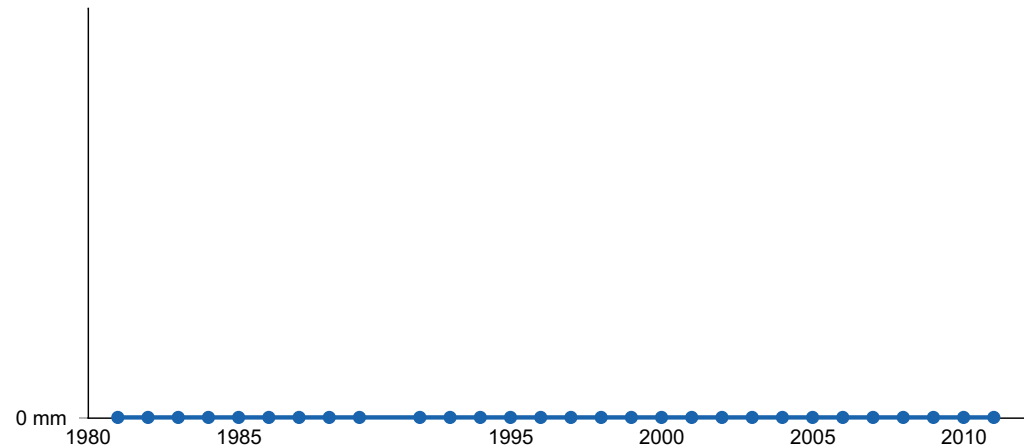


Figure 3. Annual precipitation pattern

Influencing water features

No water features are associated with this site.

## Soil features

The soils supporting this site are very shallow to moderately deep, well drained, with impermeable to slow permeability above a duripan. Cottle is above bedrock. Runoff is medium to very high. The erosion hazard is slight to moderate by water and slight to moderate by wind. The available water holding capacity (AWC) is very low. These soils are usually 6 to 20 inches deep to either bedrock or a duripan. The surface texture is generally loamy and extremely cobbly to very stony. These soils are characterized by shallow depth to duripan, limited AWC, and an aridic soil moisture regime that borders on xeric. Soil temperature regime is mesic.

Soil series correlated with this site are: Ackett, Bruncan, Cottle, Hotcreek, Midraw and Troughs

**Table 4. Representative soil features**

Parent material	(1) Volcanic ash (2) Alluvium (3) Residuum
Surface texture	(1) Very stony loam (2) Stony loamy sand (3) Extremely gravelly silt loam
Family particle size	(1) Clayey (2) Clayey-skeletal (3) Loamy (4) Loamy-skeletal
Drainage class	Well drained
Permeability class	Slow
Depth to restrictive layer	15–51 cm
Soil depth	15–51 cm
Surface fragment cover ≤3"	0–15%
Surface fragment cover >3"	0–70%
Available water capacity (0-101.6cm)	1.02–6.1 cm
Calcium carbonate equivalent (0-101.6cm)	0–3%
Electrical conductivity (0-101.6cm)	0–8 mmhos/cm

Sodium adsorption ratio (0-101.6cm)	0–10
Soil reaction (1:1 water) (0-101.6cm)	6.6–8.4
Subsurface fragment volume <=3" (Depth not specified)	0–30%
Subsurface fragment volume >3" (Depth not specified)	0–85%

## Ecological dynamics

During the last few thousand years, this site has evolved in an arid climate characterized by warm, dry summers and cold, wet winters. Herbivory has historically occurred on the site at low levels of utilization. Herbivores include pronghorn antelope, Mule deer, sage grouse, lagomorphs and small rodents. Fire has historically occurred on this site every 80 to 100 years. Fire occurs only in years with above normal precipitation. The Reference Plant Community Phase of this site is dominated by Thurber's needlegrass, bluebunch wheatgrass, bottlebrush squirreltail and black sagebrush. Subdominant species include Hoods phlox, plains pricklypear and longleaf phlox. Total annual production is 360 pounds per acre (392 Kg/ha) in a normal year. Production in a favorable year is 700 pounds per acre (784 Kg/ha). Production in an unfavorable year is 200 pounds per acre (224 Kg/ha). Structurally, cool season, deep-rooted perennial bunchgrasses are very dominant, followed by medium height shrubs being more dominant than perennial forbs while shallow rooted bunchgrasses are subdominant.

### FUNCTION:

This site is well suited for big game spring, fall and winter use. It is best suited for livestock use in the spring and recreational use in the summer and fall.

Due to the low rainfall, surface stones and gentle topography on this site, it is fairly resistant to disturbances that can potentially degrade the site. For the same reasons, runoff is low and natural erosion hazard is slight.

### Impacts on the Plant Community:

#### Influence of fire:

This site historically had a very low fire frequency, approximately every 80 to 100 years. Most of the shrubs evolved in the absence of fire, therefore they can be severely damaged when burned. Thurber's needlegrass is also susceptible to mortality after fire. Cheatgrass can be a troublesome invader on this site after fire, preventing perennial grass and shrub re-establishment and increasing the fire frequency.

#### Influence of improper grazing management:

Black sagebrush, shadscale and spiny hopsage can all be impacted by improper grazing management. Relatively low levels of utilization by cattle and sheep are needed to maintain the shrub component.

Continued improper grazing management influences fire frequency by increasing fine fuels. If cheatgrass increases due to improper grazing management and becomes co-dominant with Sandberg bluegrass and other annuals, fires become more frequent.

Proper grazing management that addresses frequency, duration and intensity of grazing can maintain the plant community and can also keep fine fuels from developing, thereby reducing fire frequency.

Weather influences:

Extended periods of drought significantly impact this site due to the low available water holding capacity (AWC) and shallow soil. Extended drought reduces vigor of the perennial grasses and palatable shrubs. Extreme drought may cause plant mortality.

Influence of Insects and disease:

Outbreaks can affect vegetation health. An outbreak of a particular insect is usually influenced by weather but no specific data is available for this site.

Influence of noxious and invasive plants:

Cheatgrass can be a very invasive plant on this site, especially after fire. Once it becomes established the fire frequency increases. As a result, the shrub component can be lost.

Influence of wildlife:

Relatively low numbers of wildlife use this site and impact it little. Pronghorn antelope is the dominant large herbivore that uses the site. They use the site yearlong but prefer it in the spring, fall and early winter. Sage grouse use the site for strutting grounds. Winter and spring use by mule deer occasionally occurs.

Watershed:

When hydrologic condition of the vegetative cover is good, natural erosion hazard is slight.

Practice Limitations

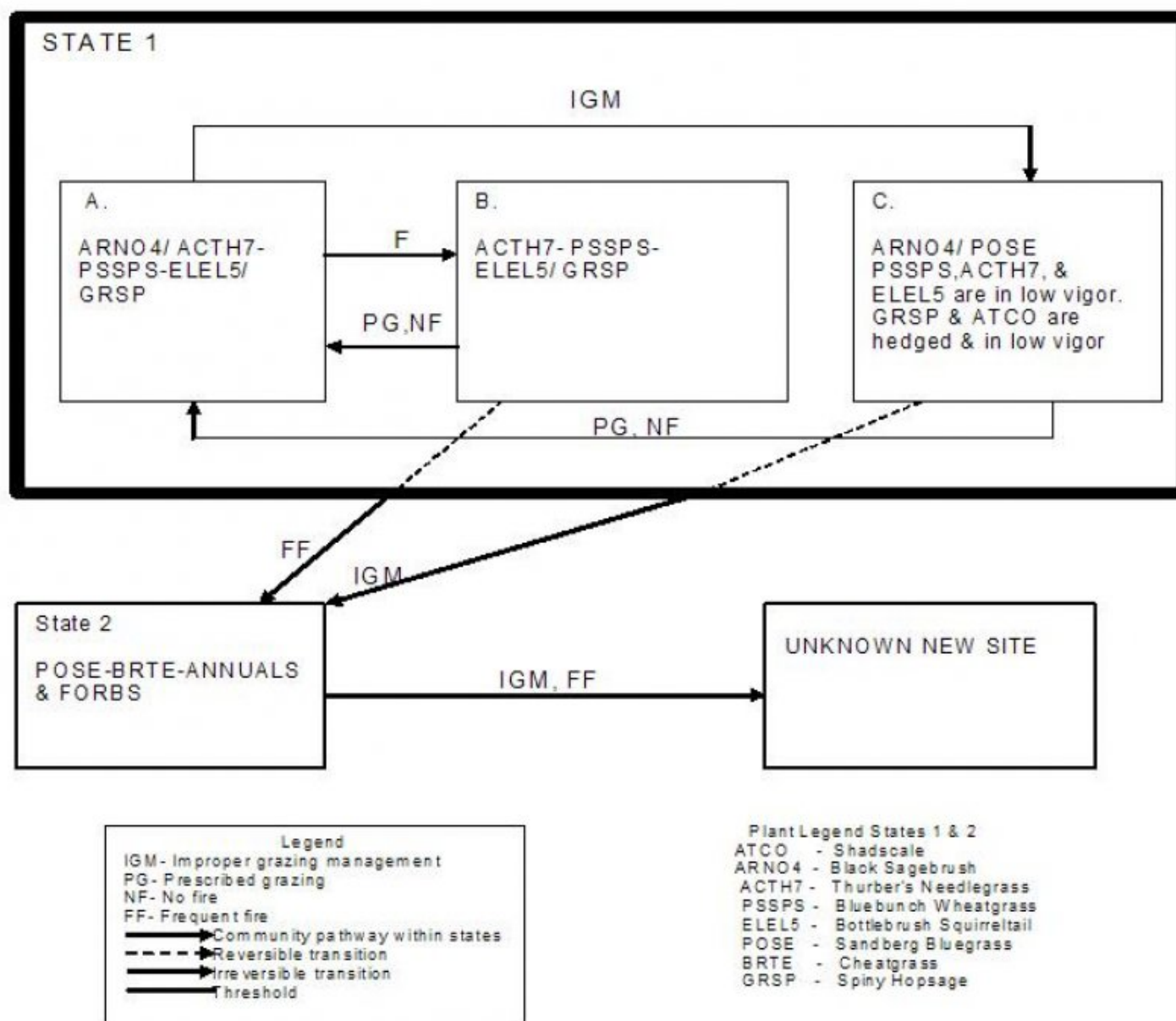
Due to the shallow soils and low available water holding capacity (AWC) of the soils, severe limitations exist for range seeding on this site. Severe limitations exist for brush



management with ground moving equipment due to stoniness. Low potential production must be considered if planning brush management.

## State and transition model

The Reference State (State 1), the Historic Climax Plant Community (HCPC), moves through many phases depending on the natural and man-made forces that impact the community over time. The Reference Plant Community Phase is Phase A, State 1. The plant species composition of Phase A is listed later under "Reference Plant Community Phase Plant Species Composition".



## State 1

### State 1. Phase A, Reference Plant Community Phase

The Reference State (State 1), moves through many phases depending on the natural and man-made forces that impact the community over time. State 1, described later, indicates some of these phases. The Reference Plant Community Phase is Phase 1.1. The plant species composition of Phase 1.1 is listed later under "Reference Plant Community Phase

Community 1.1  
Black sagebrush-Thurber's needlegrass

This plant community is dominated by black sagebrush with Thurber’s needlegrass in the understory. Bluebunch wheatgrass and bottlebrush squirreltail are also common in the understory. Other significant species include Sandberg bluegrass and spiny hopsage. Natural fire frequency is approximately 80 to 100 years. Fire only occurs in favorable years. The dominant visual aspect of this site is Thurber’s needlegrass and Black sagebrush. Composition by weight is approximately 40 to 50 percent grasses, 10 to 20 percent forbs and 25 to 35 percent shrubs.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	112	202	392
Shrub/Vine	73	123	252
Forb	39	78	140
Total	224	403	784

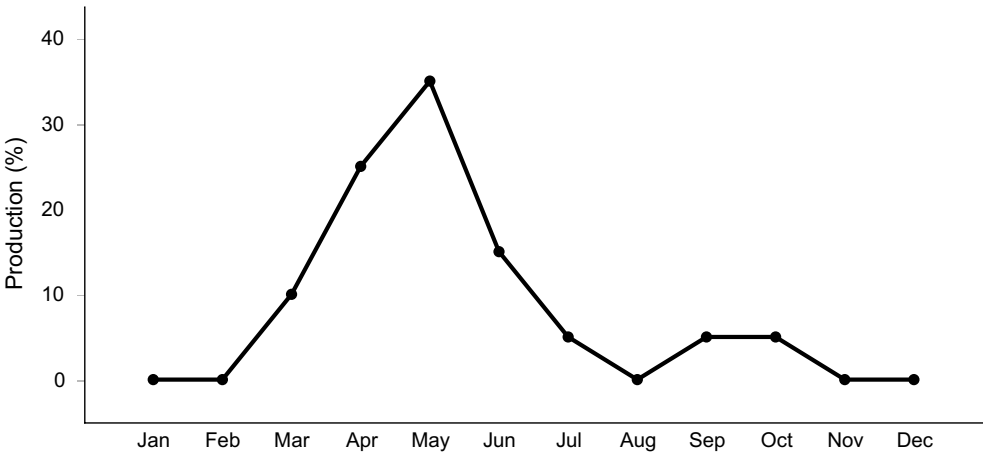


Figure 6. Plant community growth curve (percent production by month). ID0910, ARNO4/ACTH7/PSSPS.

Community 1.2  
Perennial bunchgrasses

This plant community has developed after a fairly recent fire. The fire intolerant shrubs, black sagebrush and shadscale have been removed. Spiny hopsage has re-sprouted. Thurber’s needlegrass lost vigor from the fire but has recovered. Bluebunch wheatgrass and bottlebrush squirreltail were stimulated by the fire.

## **Community 1.3**

### **Black sagebrush/Sandberg's bluegrass**

Due to improper grazing management the dominant perennial grasses, bluebunch wheatgrass, Thurber's needlegrass and most of the bottlebrush squirreltail are in low vigor and are being replaced by Sandberg bluegrass. Black sagebrush has increased. Palatable shrubs such as spiny hopsage and shadscale have low vigor and are usually heavily hedged.

## **Pathway 1.1a**

### **Community 1.1 to 1.2**

Develops with fire (approximately every 80-100 years). Fire only occurs in above normal precipitation (favorable) years.

## **Pathway 1.1b**

### **Community 1.1 to 1.3**

Develops under improper grazing management.

## **Pathway 1.2a**

### **Community 1.2 to 1.1**

Develops from prescribed grazing and no fire.

## **Pathway 1.3**

### **Community 1.3 to 1.1**

Develops under a good prescribed grazing management program and no fire.

## **State 2**

### **Annual State**

State is dominated by annual non-native species along with Sandberg bluegrass.

## **Community 2.1**

### **Sandberg bluegrass/annual non-native species**

The site has degraded into a plant community dominated by Sandberg bluegrass, cheatgrass and other annual grasses and forbs. Fine fuels are adequate to carry a fire in favorable years. Frequent fires and/or improper grazing management have caused the degradation. Excessive soil loss has not occurred at this point but the site has crossed the threshold. The plant community cannot return to State 1 because needed significant inputs are uneconomical.

### **State 3**

#### **Unknown site**

Undocumented state that may occur with extensive degradation, such frequent fires.

### **State 4**

#### **Unknown new site**

### **Community 4.1**

#### **Unknown new site**

This plant community has gone over the threshold to a new site. Site potential has been lost due to significant soil loss. Infiltration has been reduced and run-off has become more rapid. This community has developed due to continued improper grazing management and frequent fire. The plant community cannot return to State 1 because needed significant inputs are uneconomical.

### **Transition T1A**

#### **State 1 to 2**

Develops from Phase 1.2 with frequent fire or from Phase 1.3 with improper grazing management. This site has crossed the threshold. The plant community cannot return to State 1 because needed significant inputs are uneconomical.

### **Transition T2A**

#### **State 2 to 3**

The site has deteriorated further and soil loss has occurred resulting in a loss of site potential. This has resulted from improper grazing management and frequent fires. This site has crossed the threshold. The plant community cannot return to State 1 because needed significant inputs are uneconomical.

## **Additional community tables**

### **Animal community**

Wildlife Interpretations.

Relatively low numbers of wildlife use this site. Pronghorn antelope is the dominant large herbivore that use the site. They use the site yearlong but prefer it in the spring, fall and early winter. Sage grouse use the site for strutting grounds. Winter and spring use by mule deer occasionally occurs.

Grazing Interpretations.

This site is best suited for livestock use in the spring. Estimated initial stocking rate will be determined with the landowner or decision-maker. It will be based on the inventory, past use history and type, condition of vegetation, production, season of use and seasonal preference. Calculations used to determine estimated initial stocking rate will be based on forage preference ratings.

## Hydrological functions

The soils on this site are in hydrologic group D. When vegetation cover is good, natural erosion hazard is slight.

## Recreational uses

This site has limited values for aesthetics, natural beauty and hunting. The site is suitable for ORV and four-wheel drive off-highway use. Very little value exists for camping or picnicking.

## Wood products

None.

## Other products

None.

## Inventory data references

Information presented here has been derived from NRCS clipping and other inventory data. 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, State Rangeland Management Specialist, NRCS, Idaho (retired)

Joe May, State Rangeland Management Specialist, NRCS, Idaho

Leah Juarros, Resource Soil Scientist, NRCS, Idaho

Lee Brooks, Assistant State Conservationist, NRCS, Idaho (retired)

## Type locality

Location 1: Owyhee County, ID	
Township/Range/Section	T2 S R3 W S30
Latitude	43° 12' 50"

Longitude	116° 44' 2"
General legal description	Northwest Hydrology Research Watershed, Reynolds Creek Area; about 1 mile northeast of Reynolds; 1,250 feet west and 250 feet north of the southeast corner of section 30, T. 2 S., R. 3 W.; USGS Reynolds 7.5 minute topographic quadrangle

## Other references

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USDA, NRCS. 1992. Major Land Resource Area 25, Owyhee High Plateau, Nevada Site Descriptions, Reno, Nevada.

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

## Contributors

Dave Franzen And Jacy Gibbs

## Approval

Kendra Moseley, 4/25/2024

## 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)	
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Date	08/07/2007
Approved by	Kendra Moseley
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

## Indicators

1. **Number and extent of rills:** Rills rarely occur on this site due to the extremely cobbly to very stony surface soils.  

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

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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.  

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4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Bare Ground ranges from 20-30 percent.  

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

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

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7. **Amount of litter movement (describe size and distance expected to travel):** Fine litter in the interspaces typically moves less than one foot due to relatively flat slopes and low rainfall.

Coarse litter generally does not move.

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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 4-6 but need to be tested.
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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** The surface horizon is typically 2 to 5 inches thick. Structure typically includes weak, moderate, or strong thin or medium platy, weak very fine and moderate fine granular and moderate fine subangular blocky. Soil organic matter (SOM) ranges from 1 to 2 percent.
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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Bunchgrasses, especially deep-rooted perennials, slow runoff and increase infiltration. Medium height shrubs accumulate some snow in the interspaces.
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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):** Compaction layer is not present.
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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: Cool season, deep-rooted perennial bunchgrasses>> medium shrubs.

Sub-dominant: Perennial forbs>shallow rooted bunchgrasses.

Other:

Additional:

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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 as a result of 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 350 pounds per acre (392 Kg/ha) in a year with normal precipitation and temperatures. Perennial grasses produce 40-50 percent of the total production, forbs 10-20 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, bulbous bluegrass and halogeton.
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17. **Perennial plant reproductive capability:** All functional groups have the potential to reproduce in normal and favorable years.
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