Ecological site R025XY041ID
GRAVELLY 10-12

Last updated: 4/25/2024
Accessed: 05/11/2025

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

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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

The Gravelly 10-12 site generally occurs on colluvium side slopes and rolling hills. Slopes are rolling to steep and predominantly 8 to 30 percent. Elevation ranges from 3500 to 6000 feet. The soils are moderately deep, well drained, with moderate permeability above impermeable bedrock.

The dominant shrubs are Wyoming sagebrush and bitterbrush with bluebunch wheatgrass as the dominant grass.

This site was previously named: GRAVELLY 10-12 - Provisional

Associated sites

R025XY006ID	**SOUTH SLOPE STONY 10-13**

R025XY019ID	**LOAMY 10-13**
R025XY020ID	**LOAMY 7-10**
R025XY044ID	**VERY SHALLOW STONY LOAM 10-14**
R025XY048ID	**SHALLOW CLAYPAN 11-13**

Similar sites

R025XY019ID	**LOAMY 10-13**
R025XY020ID	**LOAMY 7-10**

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Artemisia tridentata subsp. wyomingensis* (2) *Purshia tridentata*
Herbaceous	(1) *Pseudoroegneria spicata*

Physiographic features

The Gravelly 10-12 site generally occurs on colluvium side slopes and rolling hills. Slopes are rolling to steep and predominantly 8 to 30 percent. Elevation ranges from 3500 to 6000 feet (1067-1829 meters).

Table 2. Representative physiographic features

Landforms	(1) Dip slope (2) Escarpment
Runoff class	Medium to very high
Flooding frequency	None
Ponding frequency	None
Elevation	3,500–6,000 ft
Slope	8–30%
Water table depth	60 in
Aspect	W, NW, N, NE, E, SE, S, SW

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)	103 days

Freeze-free period (average)	140 days
Precipitation total (average)	16 in

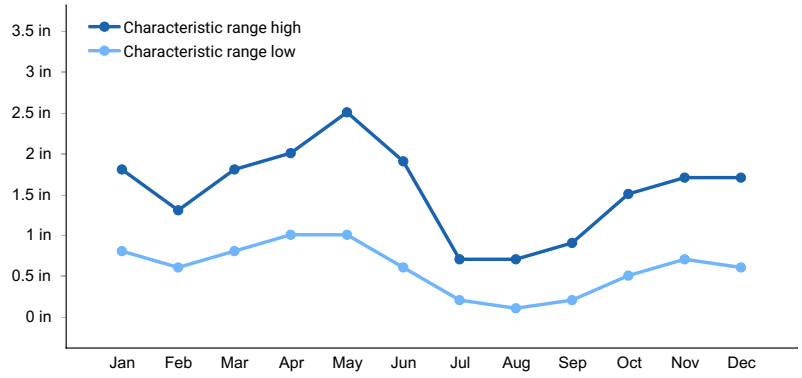


Figure 1. Monthly precipitation range

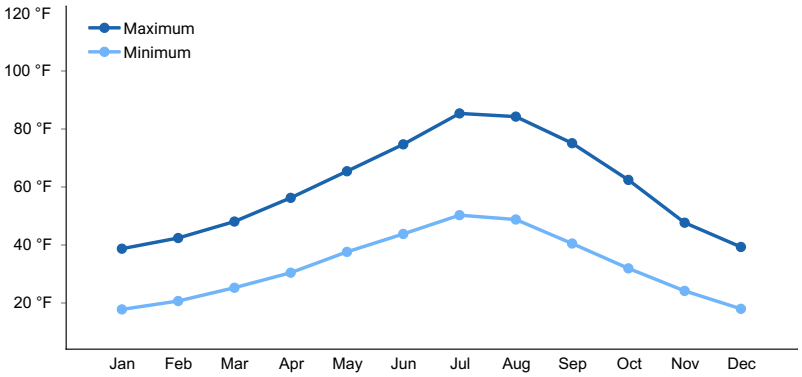


Figure 2. Monthly average minimum and maximum temperature

Influencing water features

This site is not influenced by adjacent wetlands, streams or run on.

Soil features

The soils are moderately deep, well drained, with moderate permeability above impermeable bedrock. Runoff is medium to very high. The erosion hazard is moderate by water. The available water holding capacity (AWC) is very low. These soils are usually 20-40 inches deep to bedrock and formed in coarse textured colluvium on side slopes and rolling hills. The surface texture is generally loamy. The subsoil is usually moderately well developed with clay ranging from approximately 25-35 percent. These soils are characterized by an aridic soil moisture regime that borders on xeric. Soil temperature regime is mesic.

Soil series correlated with this site is: Mackey

Table 4. Representative soil features

Parent material	(1) Colluvium (2) Slope alluvium
Surface texture	(1) Very gravelly loam (2) Very stony sandy loam
Family particle size	(1) Loamy-skeletal
Drainage class	Well drained
Permeability class	Moderate
Depth to restrictive layer	20–40 in

Soil depth	20–40 in
Surface fragment cover <=3"	0–9%
Surface fragment cover >3"	24–34%
Available water capacity (0-40in)	1.6–2.5 in
Calcium carbonate equivalent (0-40in)	0%
Electrical conductivity (0-40in)	0–2 mmhos/cm
Sodium adsorption ratio (0-40in)	0–5
Soil reaction (1:1 water) (0-40in)	6.6–7.3
Subsurface fragment volume <=3" (Depth not specified)	0–14%
Subsurface fragment volume >3" (Depth not specified)	10–60%

Ecological dynamics

The dominant visual aspect of this site is Wyoming big sagebrush and antelope bitterbrush in the overstory and bluebunch wheatgrass in the understory. Composition by weight is approximately 55-65 percent grasses, 5-15 percent forbs and 20 to 30 percent shrubs.

During the last few thousand years, this site has evolved in an arid climate characterized by dry summers and cold, wet winters. Herbivory has historically occurred on this site at low levels of utilization. Herbivores include pronghorn antelope, mule deer and lagomorphs.

Fire has historically occurred on the site at intervals of 60-80 years.

The Historic Climax Plant Community (HCPC), 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 HCPC is Phase A. This plant community is dominated by Wyoming big sagebrush, antelope bitterbrush and bluebunch wheatgrass. Subdominant species include Thurber’s needlegrass, Sandberg bluegrass and Indian ricegrass, arrowleaf balsamroot and tapertip hawksbeard. The plant species composition of Phase A is listed later under “Reference Plant Community Phase Plant Species Composition”.

Total annual production is 450 pounds per acre (504 kilograms per hectare) in a normal year. Production in a favorable year is 900 pounds per acre (1008 kilograms per hectare). Production in an unfavorable year is 300 pounds per acre (336 kilograms per hectare). Structurally, cool season deep-rooted perennial bunchgrasses are dominant, followed by shrubs that are more dominant than perennial forbs followed by shallow rooted bunchgrasses.

FUNCTION:

This site is well suited for livestock in spring and fall. It is used by big game in spring, fall and moderate winters. If water is available, the site is easily grazed by livestock due to gentle slopes.

This site has limited value for recreation.

Due to the low rainfall, low available water holding capacity and relatively flat slopes, this site is easily degraded by improper grazing management or frequent fires.

Infiltration can be good with a mixed stand of shrubs and perennial grasses. Runoff is medium and erosion hazard

is slight to moderate. Snow is caught in the shrub interspaces and a mixed stand of shrubs and perennial grasses is necessary to reach the potential of the site.

Impacts on the Plant Community:

Influence of fire:

In the absence of normal fire frequency, shrubs can gradually increase. Grasses and forbs decrease as shrubs increase.

When fires become more frequent than historic levels (60-80 years), Wyoming big sagebrush and antelope bitterbrush are reduced significantly. With continued short fire frequency, Wyoming big sagebrush and antelope bitterbrush can be completely eliminated along with many of the desirable understory species such as bluebunch wheatgrass, Thurber's needlegrass and Indian ricegrass. These species may be replaced by cheatgrass along with a variety of annual and perennial forbs including invasive plants. Sandberg bluegrass usually is maintained in the community.

Influence of improper grazing management:

Season-long grazing and/or excessive utilization can be very detrimental to this site. This type of management leads to reduced vigor of the bunchgrasses and antelope bitterbrush. With reduced vigor, recruitment of these species declines. As these species decline, the plant community becomes susceptible to an increase in Wyoming big sagebrush and noxious and invasive plants.

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

Proper grazing management that addresses frequency, duration, and intensity of grazing can maintain the integrity of the plant community. This type of management will lead to a reduction in fire frequency and a gradual increase in Wyoming big sagebrush. A planned grazing system can also be developed to intentionally accumulate fine fuels in preparation for a prescribed burn. Any brush management should be carefully planned as a reduction in shrubs can increase cheatgrass which will lead to more frequent fire intervals.

Weather influences:

Above normal precipitation in late March, April and May can dramatically increase total annual production of the plant community. These weather patterns can also increase viable seed production of desirable species to provide for recruitment. Likewise, below normal precipitation during these spring months can significantly reduce total annual production and be detrimental to good viable seed production. Overall plant composition is normally not affected when perennials have good vigor.

Below normal temperatures in the spring can have an adverse impact on total production regardless of the precipitation. An early, hard freeze can occasionally kill some plants.

Prolonged drought adversely affects this plant community in several ways. Vigor, recruitment and production are usually reduced. Mortality can occur. Prolonged drought can lead to reduction in fire frequency.

Influence of Insects and disease.

Outbreaks can affect vegetation health, particularly bitterbrush from western tent caterpillars (Malacosoma fragilis). Two consecutive years of defoliation by the tent caterpillar can cause mortality in bitterbrush. An outbreak of a particular insect is usually influenced by weather. The sagebrush defoliator moth (Aroga websterii) causes mortality in relatively small patches. It seldom kills the entire stand. Mormon cricket and grasshopper outbreaks occur periodically. Outbreaks seldom cause plant mortality since defoliation of the plant occurs only once during the year of the outbreak.

Influence of noxious and invasive plants:

Many of these species add to the fine-fuel component and lead to increased fire frequency. Annual invasive species compete with desirable plants for moisture and nutrients. The result is reduced production and change in composition of the understory.

Influence of wildlife.

Big game animals use this site in the spring, fall and moderate winters. Their numbers are seldom high enough to adversely affect the plant community. If the site is in a wintering area for big game, high numbers can adversely affect the plant community in the early spring.

Watershed:

Decreased infiltration and increased runoff on slopes greater than 15 percent occur when Wyoming big sagebrush is removed with frequent fires, particularly the year following the fire event. The increased runoff also causes sheet and rill erosion. The long-term effect is a transition to a different state.

Plant Community and Sequence:

Transition pathways between common vegetation states and phases:

State 1.
Phase A to B. Develops in the absence of fire and improper grazing management.
Phase A to C. Develops with fire.
Phase B to A. Develops with prescribed grazing and no fire.
Phase C to A. Develops with prescribed grazing and no fire.

State 1 Phase C to State 2. Develops through frequent fire and without prescribed grazing management. This site has crossed the threshold. It is economically impractical to return this site to State 1.

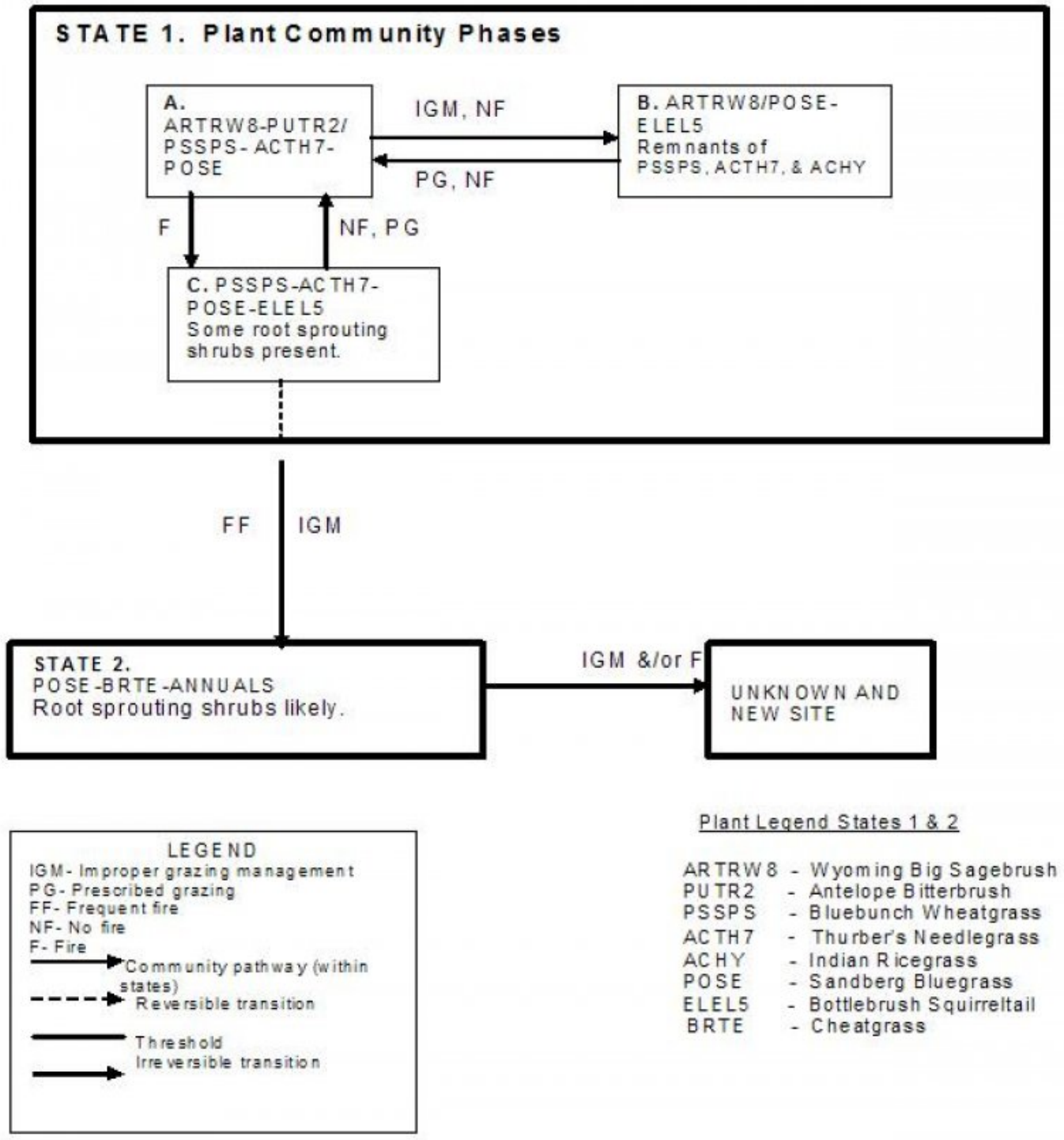
State 2 to unknown site. Excessive soil loss and changes in the hydrologic cycle caused by continued improper grazing management and/or frequent fire cause this state to retrogress to a new site withreduced potential. This site has crossed the threshold. It is economically impractical to return this site to State 1.

Practice Limitations:

Moderate limitations exist for seeding on this site due to very gravelly textured soils. There is a moderate chance of seeding failure during unfavorable moisture years. There are no physical limitations that exist for brush management on this site. Planning should carefully analyze the stand of perennial grasses and forbs, because removal of Wyoming big sagebrush can result in a significant increase in cheatgrass and medusahead. If the plant community becomes dominated with cheatgrass and medusahead, increased fire frequency could irreversibly degrade the community.

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 Commuity 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
Reference State

The Reference State (State 1), moves through many phases depending on the natural disturbances that impact the community over time. State 1, described later, indicates some of these phases. Community 1.1 is dominated by Wyoming big sagebrush, antelope bitterbrush and bluebunch wheatgrass. Subdominant species include Thurber's needlegrass, Sandberg bluegrass and Indian ricegrass, arrowleaf balsamroot and tapertip hawksbeard.

Community 1.1

Wyoming big sagebrush-antelope bitterbrush/bluebunch wheatgrass

This plant community has Wyoming big sagebrush and antelope bitterbrush in the overstory with bluebunch wheatgrass dominating the understory. Thurber's needlegrass and Sandberg bluegrass are sub-dominant species. Other significant species in the plant community are bottlebrush squirreltail, Indian ricegrass, needle and thread grass, tapertip hawksbeard and arrowleaf balsamroot. Other shrubs may include dwarf green rabbitbrush and tall green rabbitbrush. Natural fire frequency is 60-80 years.

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	190	270	585
Shrub/Vine	75	125	225
Forb	35	55	90
Total	**300**	**450**	**900**

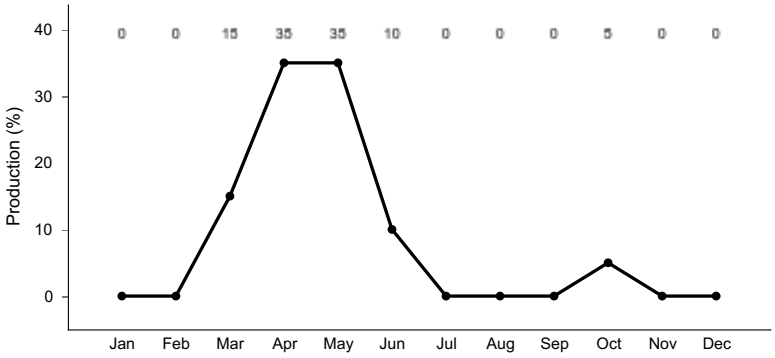


Figure 4. Plant community growth curve (percent production by month). ID0907, ARTRW8/PSSPS LOW PRECIP..

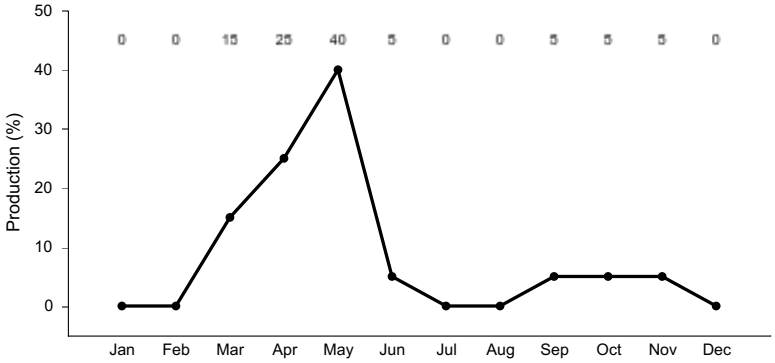


Figure 5. Plant community growth curve (percent production by month). ID0911, D25 POSE/BRTE/ANNUALS.

Community 1.2
Wyoming big sagebrush/Sandberg bluegrass

This plant community is dominated by Wyoming big sagebrush with Sandberg bluegrass and bottlebrush squirreltail in the understory. This state has developed due to improper grazing management and lack of fire. There is a reduced amount of bluebunch wheatgrass, Indian ricegrass, Thurber's needlegrass, and needle and thread. These deep-rooted perennial bunchgrasses are typically in low vigor.

Community 1.3
Perennial bunch grasses

This plant community is dominated by bluebunch wheatgrass and Thurber's needlegrass, although some needlegrass can be lost due to fire. Sandberg bluegrass is sub-dominant. Some Indian ricegrass may be present. Bottlebrush squirreltail has increased. Forbs remain about in the same proportion as Phase A. Very little Wyoming

sagebrush and antelope bitterbrush are present due to wildfire, but some rabbitbrush and horsebrush are present due to sprouting. This plant community is the result of wildfire.

Pathway 1.1a
Community 1.1 to 1.2

Develops in the absence of fire and improper grazing management.

Pathway 1.1b
Community 1.1 to 1.3

Develops with fire.

Pathway 1.2a
Community 1.2 to 1.1

Develops with prescribed grazing and no fire.

Pathway 1.3a
Community 1.3 to 1.1

Develops with prescribed grazing and no fire.

State 2
Eroded State

The Eroded State occurs when there has been soil loss and altered hydrologic cycle.

Community 2.1
Sandberg bluegrass

This plant community is dominated by Sandberg bluegrass, cheatgrass and other annuals. Root sprouting shrubs such as rabbitbrush and horsebrush can be present, dependent upon, how frequent, fire has occurred. This site has crossed the threshold to a new state. This site has crossed the threshold. It is economically impractical to return this site to State 1. This state has developed due to frequent fires and improper grazing management.

State 3
Unknown new site

Community 3.1
Unknown new site

This plant community has gone over the threshold to a new site. Site potential has been reduced. Significant soil loss has occurred. Infiltration has been reduced and run-off has become more rapid. This state has developed due to continued improper grazing management and/or frequent fires. This site has crossed the threshold. It is economically impractical to return this site to State 1.

Transition T1A
State 1 to 2

Develops through frequent fire and without prescribed grazing management. This site has crossed the threshold. It is economically impractical to return this site to State 1.

Transition T2A
State 2 to 3

Excessive soil loss and changes in the hydrologic cycle caused by continued improper grazing management and/or

frequent fire cause this state to retrogress to a new site with reduced potential. This site has crossed the threshold. It is economically impractical to return this site to State 1.

Additional community tables

Animal community

This site is used by big game in the spring, fall and moderate winters. This site provides fair to good habitat for upland birds, small mammals, mule deer and various song birds. Pronghorn antelope use the site only occasionally due to the height of the shrubs.

Grazing Interpretations.

This site is suited to spring and fall grazing by domestic livestock. The site is easily grazed due to the gentle slopes, but livestock water may be in short supply. Estimated initial stocking rate will be determined with the landowner or decision-maker. They will be based on the inventory which includes species, composition, similarity index, production, past use history, 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 in this site are in hydrologic group C. When hydrologic condition of the vegetative cover is good, natural erosion hazard is slight to moderate.

Recreational uses

There are limited opportunities for upland game bird, small animal and big game hunting. The site can be used for hiking and horseback riding. Some aesthetic value exists during bitterbrush blooming periods in the spring.

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: Cassia County, ID	
Township/Range/Section	T12 S R19 E S5
Latitude	42° 24′ 27″
Longitude	114° 15′ 53″

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	06/12/2007
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. If rills are present, they are likely to occur on slopes over 15 percent and immediately following wildfire.

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2. **Presence of water flow patterns:** This rarely occurs on this site except on slopes greater than 15 percent. They occur as short and disrupted flows. They are disrupted by cool season grasses, tall shrubs and gravels and are not extensive.

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3. **Number and height of erosional pedestals or terracettes:** These are rare on this site. Where flow patterns and/or rills are present, a few pedestals may be expected but are limited due to gravelly surface textures.

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4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Data is not available. On sites in mid-seral status, bare ground may range from 40-60 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:** Usually not present. Immediately following wildfire, some soil movement may occur on lighter textured soils.

7. **Amount of litter movement (describe size and distance expected to travel):** Fine litter in the interspaces may move up to 2 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 4-6 but needs to be tested.

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** The A or A1 horizon is typically 3 inches thick. Structure is typically weak, fine platy. Soil organic matter (SOM) is 1 to 2 percent.

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 run-off and increase infiltration. Tall shrubs can catch 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):** Not present.

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

    Sub-dominant: Tall shrubs> perennial forbs >shallow rooted grasses

    Other:

    Additional:

13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** Wyoming big sagebrush will become decadent in the absence of normal fire frequency. Grass and forb mortality will occur as tall shrubs increase.

14. **Average percent litter cover (%) and depth (in):** Additional litter cover data is needed, but is expected to be 5-20 percent to a depth of 0.1 inches. Under mature shrubs litter is <0.5 inches deep and is 90-100 percent ground cover

15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** 450 pounds per acre (504 kilograms per hectare) in a year with normal temperatures and precipitation. Perennial grasses produce 55-65 percent of the total production, forbs 5-10 percent and shrubs 20-30 percent.

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:** Plants include cheatgrass, Vulpia sp., medusahead, bulbous bluegrass, annual mustards, Russian thistle and annual Kochia.

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17. **Perennial plant reproductive capability:** All functional groups have the potential to reproduce in normal years.
